Annex 2

Feasibility Study

to the GCF Funding Proposal

"Building the resilience of Togo's national health system and vulnerable communities to climate-sensitive health outcomes"

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Abbreviations and Acronyms

ACMAD	African Centre of Meteorological Applications for Development
ACT	Artemisinin-based Combination Therapy
ACUIS	*Appui à la Coordination et à l'Utilisation des Informations de Surveillance* (Support for Coordination and Use of Surveillance Information)
AE	Accredited Entity
AEGT	*Architecture d'Entreprise Gouvernementale du Togo* (Government Enterprise Architecture of Togo)
AF	Adaptation Fund
AFC	Africa Finance Corporation
AfDB	African Development Bank
AGRHYMET	*Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle* (Regional Training and Application Centre for Agrometeorology, Hydrology and Meteorology)
AI	Artificial Intelligence
AIDS	Acquired Immunodeficiency Syndrome
AMA	Accreditation Master Agreement
AMF	Against Malaria Foundation
AMR	Antimicrobial Resistance
ANAMET	*Agence Nationale de Météorologie* (National Meteorological Agency)
ANCy	*Agence Nationale de Cybersécurité* (National Cybersecurity Agency)
ANGE	*Agence Nationale pour la Gestion de l'Environnement* (National Agency for Environmental Management)
ANID	*Agence Nationale d'Identification* (National Identification Agency)
ANPC	*Agence Nationale de la Protection Civile* (National Civil Protection Agency)
ANSAT	*Agence Nationale de la Sécurité Alimentaire du Togo* (National Food Security Agency)
APDP	*Autorité de Protection des Données Personnelles* (Personal Data Protection Authority)
API	Application Programming Interface
ARA	Adaptation Results Area
ARC	Africa Resource Centre
ARCEP	*Autorité de régulation des communications électroniques et postales* (Electronic Communications and Postal Regulatory Authority)
ARPEGE	*Action de Recherche Petite Échelle, Grande Échelle* (Small-Scale Large-Scale Research Action)
ASECNA	*Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar* (Agency for Aerial Navigation Safety in Africa and Madagascar)
ATACH	Alliance for Transformative Action on Climate and Health
ATD	*Agence Togo Digital* (Digital Agency of Togo)
AU	African Union
AU-DOHP	African Union Digital One Health Platform
AWS	Automated Weather Stations
BACKUP	Building Awareness for Country-level Knowledge on International Development Cooperation
BAU	Business-as-Usual
BMWM	Biomedical Waste Management
BMZ	*Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung* (German Federal Ministry for Economic Cooperation and Development)
BOAD	*Banque Ouest Africaine de Développement* (West African Development Bank)
BT	*Brevet de Technicien* (Technician Certificate)
C19RM	Covid-19 Response Mechanism
CAMEG	*Centrale d'Achat des Médicaments Essentiels Génériques et des Consommables médicaux* (Central Procurement Agency for Essential Generic Medicines and Medical Supplies)
CAP	Common Alerting Protocol
CAPEX	Capital Expenditure
CBO	Community-based Organisations
CCA	Canonical Correlation Analysis

CCP	Centre for Communication Programs
CCRA	Climate Change and Risk Assessment
CCU	Climate Change Unit
CDA	Cyber Defence Africa
CDT	Climate Data Tool
CEB	*Communauté Électrique du Bénin* (Electric Community of Benin)
CEGA	Centre for Effective Global Action
CFAF	*Communauté Financière Africaine Franc* (African Financial Community Franc)
CFI	Canal France International
CFRSP	*Centre de formation et de recherche en santé publique du Togo* (Togolese Public Health Training and Research Centre)
CHAP	Climate Health Analytics Platform
CHIRPS	Climate Hazard Group InfraRed Precipitation with Station
CHR	*Centre Hospitalier Régional* (Regional Hospital Centre)
CHU	*Centre Hospitalier Universitaire* (University Hospital Centre)
CHW	Community Health Worker
CI	Confidence Interval
CIEWS	Climate Information and Early Warning Systems
CLIDATA	Climate Database
CLTS	Community-Led Total Sanitation
CMIP	Coupled Model Intercomparison Project
CMIP6	Coupled Model Intercomparison Project Phase 6
CMMS	Computerised Maintenance Management Systems
CMRS	*Centre Météorologique Régional Spécialisé* (Specialised Meteorological Regional Centre)
CN	Concept Note
CNSD	*Centre National de Santé Digitale* (National Digital Health Centre)
CNSS	*Caisse Nationale de Sécurité Sociale* (National Social Security Office)
COAWEB	*Centre d'Observation et de l'Analyse du Web* (Centre for Web Analysis and Observation)
COGES	*Comités de gestion* (Management Committees)
COP	Conference of the Parties
CORDEX	Coordinated Regional Climate Downscaling Experiment
COUSP	*Centre d'Opération d'Urgences de Santé Publique* (Health Emergencies Operation Centre)
CPT	Climate Predictability Tool
CREWS	Climate Risks and Early Warning Systems
CRSCM	Centre for Research in Science and Medicine
CR	Climate Rationale
CSHO	Climate-sensitive Health Outcomes
CSO	Civil Society Organisation
CSP	*Corps des Sapeurs-Pompiers* (Fire Brigade)
CTC	Cholera Treatment Centre
CTU	Cholera Treatment Unit
C19RM	Covid-19 Response Mechanism
DALYs	Disability-Adjusted Life Years
DCN	*Direction de la Cartographie Nationale* (National Mapping Directorate)
DDS	*Direction des Districts Sanitaires* (Prefectural health directorates)
DER	*Division des Études et de la Recherche* (Division for Studies and Research)
DEWATS	Decentralised Wastewater Treatment Systems
DFS	Digital Financial Services
DGMN	*Direction Générale de la Météorologie Nationale* (General Directorate of National Meteorology)
DHAB	*Direction de l'Hygiène et de l'Assainissement de Base* (Basic Hygiene and Sanitation Department)
DHIS2	District Health Information System, version 2
DHS	Demographic and Health surveys
DISEM	*Direction des infrastructure Sanitaire, de l'Équipement et de la Maintenance* (Direction of Health Infrastructure, Equipment, and Maintenance)
DivLab	*Division des Laboratoires* (Laboratories Division)
DivMT	*Division des Maladies Transmissibles* (Communicable Diseases Division)

DivPOU	*Division de la Planification, des Opérations et des Urgences* (Division of Planning, Operations, and Emergencies)
DivPS	*Division de la Promotion de la Santé* (Division for Health Promotion)
DivSIUSR	*Division de la Surveillance Intégrée des Urgences Sanitaires et de la Riposte* (Division of Integrated Surveillance for Health Emergencies and Response)
DLM-PSP	*Direction de la lutte contre la maladie et des Programmes de Santé Publique* (Department of Disease Control and Public Health Programmes)
DPIA	Data Protection Impact Assessments
DPML	*Direction de la Pharmacie, du Médicaments et des Laboratoires* (Directorate of Pharmacy, Medicines, and Laboratories)
DRE	*Direction des Ressources en Eau* (Directorate of Water Resources)
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRS	*Direction Régionale de la Santé (*Regional Health Directorate*)*
DSA	Debt Sustainability Analysis
DSID	*Direction des Statistiques Agricoles, de l'Information et de la Documentation* (Directorate for Agricultural Statistics, Information and Documentation)
DSNISI	*Direction du Système National d'Information Sanitaire et de l'Informatique* (Division of the National Health Information and IT System)
DTC	Digital Transformation Centre Togo
EBS	Event-Based Surveillance
E. Coli	Escherichia Coli
ECOWAS	Economic Community of West African States
ECMWF	European Centre for Medium-Range Weather Forecasts
eDQR	Electronic Data Quality Review
EE	Executing Entity
EIR	Entomological Inoculation Rate
E-LMIS	Electronic Logistics Management Information System
EMONC	Emergency Obstetric and Neonatal Care
EMR	Electronic Medical Records
ENT	*Environment Numérique de Travail* (Digital Work Environment)
EPI	Expanded Program on Immunisation
EPL	*École Polytechnique de Lomé* (Lomé Polytechnic School)
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Safeguards
EPS	Ensemble Prediction System
EU	European Union
EUR	Euro
EV	Electric vehicle
EVI	Economic and Environmental Vulnerability Index
EVM	Effective Vaccine Management Initiative
EWARS	Early Warning, Alert and Response System
EWS	Early Warning System
EWS-TRC	Togolese Red Cross Community Early Warning System
EW4All	Early Warning for All Initiative
FAA	Funded Activity Agreement
FANFAR	Flood Forecasting and Alerts in West Africa
FEWS	Flood Early Warning System
FFS	Formal financial sector
FHIR	First Healthcare Interoperability Resources
FP	Funding Proposal
FS	Feasibility Study
FSRP	Food Systems Resilience Program
FUNES	Functional Estimation System
GAM	Generalised Additive Model
GAP	Gender Action Plan
GAVI	Global Alliance for Vaccines and Immunisation
GBD	Global Burden of Disease
GCF	Green Climate Fund
GCM	Global Climate Models

GDDP	Global Daily Downscaled Projections
GDHCN	Global Digital Health Certification Network
GDI	Gender Development Index
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEM	Gender, Environmental and Social Safeguards, Monitoring & Evaluation
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GFCS	Global Framework for Climate Services
GFDRR	Global Facility for Disaster Reduction and Recovery
GHG	Greenhouse gas
GHI	Global Hunger Index
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*
GLASS	Global AMR Surveillance System
GNI	Gross National Income
GPEI	Global Polio Eradication Initiative
GPI	Gender Parity Index
GPRS	General Packet Radio Service
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
GSF	Global Sanitation Fund
GTFCC	Global Task Force on Cholera Control
GTP	*Groupe de travail Pluridisciplinaire* (Multidisciplinary Working Group)
GTS	Global Telecommunication System
GWP	Global Warming Potential
HAAC	*Haute Autorité de l'Audiovisuel et de la Communication* (High Authority for Audiovisual and Communication)
HAI	Human Assets Index
HCI	Human Capital Index
HD	*Hôpital de Districtt* (District Hospital)
HDI	Human Development Index
H-EWS	Health Early Warning Systems
HF	Health Facility
HFC	Hydrofluorocarbon
HIV	Human Immunodeficiency Virus
HL7	Health Level Seven
HRP	Histidine-Rich Protein
H2R	Hardest-to-Reach
IBC	Community-Based Interventions
IBS	Indicator-Based Surveillance
ICAT	*Institut de Conseil et d'Appui Technique (Institute for Technical Advice and Support)*
ICRF	Infrastructure Climate Resilient Fund
ICT	Information and Communication Technology
IDB	Inter-American Development Bank
IDSR	Integrated Disease Surveillance and Response
IEC	Information, Education, and Communication
IFAD	International Fund for Agriculture Development
IFC	International Finance Corporation
IFCN	International Fact-Checking Network
IHE	Integrating the Healthcare Enterprise
IHME	Institute of Health Metrics and Evaluation
IHR	International Health Regulations
INAM	*Institut National d'Assurance Maladie* (National Health Insurance Institute)
INH	Institut National de l'Hygiène (National Institute of Hygiene)
INSEED	*Institut National de la Statistique et des Études Économiques et Démographiques* (National Institute of Statistics and Economic and Demographic Studies)
IPA	Innovations for Poverty Action
IPC	Infection Prevention and Control
IPCC	Intergovernmental Panel on Climate Change
IPCC-AR6	Intergovernmental Panel on Climate Change Sixth Assessment Report
IPT	Intermittent Preventive Treatment

IPTp	Intermittent Preventive Treatment in Pregnancy
IRMF	Integrated Results Management Framework
IRS	Indoor residual spraying
IsDB	Islamic Development Bank
ISIMIP	Inter-Sectoral Impact Model Intercomparison Project
ISO/IEC	International Organisation for Standardisation/International Electrotechnical Commission
ITRA	*Institut Togolais de Recherche Agronomique* (Togolese Institute for Agronomic Research)
ITN	Insecticide-treated Net
ITU	International Telecommunication Union
IUCN	International Union for Conservation of Nature
KAP	Knowledge, Attitudes, and Practices
KfW	*Kreditanstalt für Wiederaufbau*
LAMP	Loop-Mediated Isothermal Amplification
LC	Local Communities
LCP	Local Communities' Plan
LDC	Least Developed Country
LED	Light Emitting Diode
LMIS	Logistics Management Information System
LLIN	Long-Lasting Insecticidal Nets
LMIC	Low- and Middle-Income Country
LSHTM	London School of Hygiene and Tropical Medicine
LTS	Length of Transmission Season
MAEDR	*Ministère de l'Agriculture, de l'Élevage et du Développement Rural* (Ministry of Agriculture, Livestock and Rural Development)
MASPFA	*Ministère de l'Action Sociale, de la Promotion de la Femme et de l'Alphabétisation* (Ministry of Social Action, Women's Promotion, and Literacy)
MATDCC	*Ministère de l'Administration Territoriale, de la Gouvernance Locale et des Affaires Coutumières* (Ministry of Territorial Administration, Decentralisation, and Customary Chieftaincy)
MCA	Multi-Criteria Analysis
MCT	Monthly Climatological Table
MCDA	Multi-Criteria Decision Analysis
M&E	Monitoring and Evaluation
MEHV	*Ministère de l'Eau et de l'Hydraulique Villageoise* (Ministry of Water and Village Hydraulics)
MEN	*Ministère de l'Éducation Nationale* (Ministry of Education)
MENTD	*Ministère de l'Économie Numérique et de la Transformation* Digitale (Ministry of Digital Economy and Transformation)
MERFPCCC	*Ministère de l'Environnement, des Ressources Forestières, de la Protection Côtière et du Changement Climatique* (Ministry of Environment, Forest Resources, Coastal Protection, and Climate Change)
METAR	Meteorological Aerodrome Report
METFPA	*Ministère de l'enseignement technique, de la formation professionnelle et de l'artisanat* (Ministry of Technical Education, Vocational Training and Apprenticeship)
MFI	Microfinance Institution
MHEWS	Multi-Hazard Early Warning System
MICS	Multiple Indicator Cluster Survey
MIS	Malaria Indicator Survey
ML/TF	Money Laundering/Terrorist Financing
MPDC	*Ministère de la Planification, du Développement et de la Coopération* (Ministry of Planning and Cooperation)
MRV	Monitoring, Reporting and Verification
MSHPCSUA	*Ministère de la Santé, de l'Hygiène Publique, de la Couverture Sanitaire Universelle et des Assurances* (Ministry of Health, Public Hygiene, Universal Health Coverage, and Insurance)
MSE	Micro and Small Enterprises
MSPC	*Ministère de la Sécurité et de la Protection Civile* (Ministry of Security and Civil Protection)

MSWEP	Multi-Source Weighted-Ensemble Precipitation
MSWX	Multi-Source Weather
MTRAF	*Ministère des Transports Routiers, Aériens et Ferroviaires* (Ministry of Road, Air and Rail Transport)
NAP	National Adaptation Plan
NASA	National Aeronautics and Space Administration
NASA NEX-GDDP	NASA Earth Exchange Global Daily Downscaled Projections
NbS	Nature-based Solutions
NDA	National Designated Authority
NDC	National Determined Contribution
ND-GAIN	Notre Dame Global Adaptation Initiative
NDVI	Normalised Difference Vegetation Index
NEX	NASA Earth Exchange
NFCS	National Framework for Climate Service
NGO	Non-governmental Organisation
NIU	*Numéro d'Identification Unique* (Unique Identification Number)
NWP	Numerical Weather Prediction
OGS	Off-grid Solar
OpenHIE	Open Health Information Exchange
ORS	Oral Rehydration Solutions
ORSEC	*Organisation des Réponses pour la Sécurité Civile* (Civil Security Response Organisation)
OSCAR	Observing Systems Capability Analysis and Review Tool
OTM	*Observatoire Togolais des Médias* (Togolese Media Observatory)
O&M	Operation and Maintenance
PDC	*Plan de Développement Communal* (Municipal Development Plan)
PGICT	*Projet Gestion Intégrée des Catastrophes et des Terres* (Integrated Disaster and Land Management Project)
PIT	Plan International Togo
PM	Particulate Matter
PMC	Project Management Committee
PMI	President's Malaria Initiative
PMU	Project Management Unit
PNAS	*Plan National d'Adaptation pour le secteur de la Santé aux effets des changements climatiques* (Health National Adaptation Plan)
PNCM	*Plan National de Contingence Multirisques* (Multirisk National Contingency Plan)
PND	*Plan National de Développement* (National Development Plan)
PNDS	*Plan National de Développement Sanitaire* (National Health Development Plan)
PNIASAN	*Programme National d'Investissement Agricole et de Sécurité Alimentaire* (National Plan for Agricultural Investment and Food Security)
PNLP	*Programme National de Lutte contre le Paludisme* (National Malaria Control Programme)
PNPC	*Politique Nationale de la Protection Civile* (National Civil Protection Policy)
PNRRC	*Plateforme Nationale pour la Réduction des Risques Climatiques* (National Platform for Disaster Risk Reduction)
PNSM	*Plan national stratégique de la météorologie du Togo* (National Strategic Plan for Meteorology in Togo)
PPMP	Public-Private Maintenance Partnership
PQAT	*Projet Qualité de l'Air au Togo* (Air Quality Project in Togo)
PRM	Persons with Reduced Mobility
PSC	Project Steering Committee
PSNRS	*Plan Stratégique National de la Recherche en Santé* (National Strategic Plan for Health Research)
PTB	Preterm Birth
PU	Polyurethane
PUMA	Preparation for the Use of Meteosat Second Generation in Africa
PURS	*Programme d'Urgence de Renforcement de la Résilience dans la Région des Savanes* (Emergency Plan for Strengthening Resilience in the Savanes Regions)
PV	Photovoltaic
P4H	Providing for Health Network
RCP	Representative Concentration Pathway

RDT	Rapid Diagnostic Test
REDISSE	Regional Disease Surveillance Systems Enhancement
RH	Relative Humidity
RMC	Regional Maintenance Centre
RMF	Regional Maintenance Fund
RPPP	*Programme Régional d'Appui à la Prévention des Pandémies* (Regional Programme Support to Pandemic Prevention)
RSF	*Reporters Sans Frontières* (Reporters Without Borders)
RSPM	*Registre Social des Personnes et Ménages* (Social Registry of Individuals and Households)
SANDAL	*Sans Défécation à l'Aire Libre* (Open Defecation Free)
SBC	Social and Behaviour Change
SBCC	Social and Behaviour Change Communication
SDD	Solar Direct Drive
SDGs	Sustainable Development Goals
SDSN	*Schéma Directeur de la Santé Numérique* (Digital Health Master Plan)
SEAH	Sexual Exploitation, Abuse, Harassment
SEP	Stakeholder Engagement Plan
SimCLIM	Simulation Climate Data
SI	*Santé Intégrée*
SIN	*Société d'Infrastructures Numériques* (Digital Infrastructure Company)
SLA	Service-Level Agreement
SMC	Seasonal Malaria Chemoprevention
SNAP	National Pharmaceutical Supply Chain
SnCF	Subnational Climate Fund
SNIS	*Système National d'Information Sanitaire* (National Health Information System)
SNRRCN	*Stratégie nationale de réductions des risques de catastrophes naturelles* (National Strategy for Disaster Risk Reduction)
SOP	Standard Operating Procedures
SRHR	Sexual and Reproductive Health and Rights
SRMO	Safety and Risk Mitigation Officer
SSEQCU	*Services de Santé Essentiels pour une Couverture Sanitaire Universelle* (Quality Essential Health Services project for Universal Health Coverage)
SSP	Shared Socioeconomic Pathway
STAR	Strategic Tool for Analysis of Risks
SWA	Sanitation and Water for All
SWEDD	Sahel Women's Empowerment and Demographics Project
SYNOP	Surface Synoptic Observations
TA	Technical Assistance
TdE	*Société Togolaise des Eaux* (Togolese Water Company)
TDL	Togo Data Lab
TFP	Technical and Financial Partners
T_{max}/T_{min}	Maximum/Minimum Temperature
ToC	Theory of Change
ToRs	Terms of Reference
ToT	Training-of-Trainers
TRC	Togolese Red Cross
TWG	Technical Working Group
UHC	Universal Health Coverage
UJIT	*Union des Journalistes Indépendants du Togo* (Independent Journalist Union of Togo)
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
UoL	University of Lomé
URATEL	*Union des Radios et Télévisions Libres du Togo* (Union of Free Radio and Television Stations of Togo)
USAID	United States Agency for International Development

USD	United States Dollars
USP	*Unité de Soins Périphériques* (Peripheral Care Unit)
USP-2	GCF's Updated Strategic Plan 2024-2027
VECTRI	Vector-borne Disease Integrated Model
VIP	Ventilated Improved Pit
WACA	West Africa Coastal Areas Management Programme
WACS	West Africa Cable System
WAEMU	West African Economic and Monetary Union
WAHO	West African Health Organisation
WARDIP	West Africa Regional Digital Integration Program
WASCAL	West African Science Service Centre on Climate Change and Adapted Land Use
WASH	Water, Sanitation, and Hygiene
WB	World Bank
WHO	World Health Organisation
WHOS	World Hydrological Observing System
WIS	World Meteorological Organisation Information System
WMO	World Meteorological Organisation

Executive Summary

The Feasibility Study (FS) for the project *"Building the resilience of Togo's national health system and vulnerable communities to climate-sensitive health outcomes"* confirms that Togo faces escalating climate risks, particularly in the northern regions of Centrale, Kara, and Savanes. Rising temperatures, rainfall variability, floods, and droughts are driving higher incidence of malaria, diarrhoeal diseases, and heat-related health outcomes, while compounding maternal, neonatal, and child health risks. The FS demonstrates that the health system is constrained by fragmented information systems, limited early warning capacity, governance gaps, infrastructural weaknesses, and low community awareness, leaving populations exposed to recurring climate-sensitive health outcomes (CSHOs).

The FS establishes that a systemic, integrated response is technically and institutionally feasible. The project's four mutually reinforcing components — strengthening climate and health surveillance and Early Warning Systems (EWS); institutionalising climate-health governance; enhancing climate-resilient infrastructure and supply chains; and empowering communities — are designed to operate synergistically, ensuring long-term, sustainable impact.

A central intervention is the Health Early Warning System (H-EWS), which integrates meteorological and health data to enable predictive, evidence-based decision-making. Interoperability between the National Meteorological Agency (*Agence Nationale de Météorologie* – ANAMET) and District Health Information System, version 2 (DHIS2)[1], combined with predictive models for malaria and diarrhoeal diseases, will enable pre-emptive action and timely response, reducing disease burden and improving health outcomes for the most vulnerable populations.

Governance and capacity-building measures, validated by the FS, include a permanent Climate Change Unit (CCU) within the Ministry of Health, Public Hygiene, Universal Health Coverage, and Insurance *(Ministère de la Santé, de l'Hygiène Publique, de la Couverture Sanitaire Universelle et des Assurances* – MSHPCSUA), five regional units, clear interministerial coordination, and budgetary pathways to institutionalise climate-health planning. Targeted capacity-building and academic initiatives will strengthen technical, managerial, and gender-responsive skills, ensuring long-term national ownership and leadership.

Infrastructure interventions will upgrade or construct climate-resilient Peripheral Care Unit (*Unité de Soins Périphériques* - USP), particularly maternity and neonatal services, with passive cooling, flood mitigation, and resilient Water, Sanitation, and Hygiene (WASH) systems. Solar-powered cold chains and laboratory diagnostics will maintain continuity of essential services during climate shocks, supported by decentralised maintenance units. Community-level interventions will improve access to safe WASH, promote vector control, and train community health workers (CHW) as multipliers, enabling households to adopt protective behaviours and respond effectively to early warnings.

The project is expected to deliver a transformative shift from reactive to anticipatory, climate-resilient health management. Over 7.7 million people will benefit directly or indirectly, with strengthened essential health services, reduced CSHO incidence, and enhanced resilience among women, children, and marginalised groups.

These interventions are fully aligned with the Green Climate Fund's (GCF) Updated Strategic Plan 2024–2027 (USP-2), contributing to targeted results in climate information and EWS, resilient infrastructure, and adaptation (GCF, 2023). By embedding climate resilience across governance, infrastructure, workforce, and community systems, the project ensures systemic transformation, lasting benefits, and sustainable adaptation outcomes.

In conclusion, the FS confirms that the project is technically viable, financially sound, and institutionally feasible, providing a robust evidence base and operational roadmap for a climate-resilient health system capable of protecting vulnerable populations and sustaining long-term adaptation in Togo.

[1] *DHIS2 is an open-source software platform developed and implemented by the HISP network, a global collaboration between the HISP Centre at the University of Oslo and local HISP groups in Africa, Asia, the Middle East, and the Americas.*

1. Country Profile

1.1 Overall Country Profile

Togo, officially the Togolese Republic, is a West African nation situated between 6° and 11° North latitude and 0° and 1°40' East longitude. This corridor-shaped country has a surface area of 56,600 km², stretching 600 kilometres from north to south, with a narrow width ranging from 150 km inland to 55 km along its coastline on the Gulf of Guinea. Togo is bordered by Ghana to the west, Benin to the east, and Burkina Faso to the north.

Characterised by diverse terrain, Togo's geography ranges from coastal plains to rolling hills and plateaus in the central regions, culminating in the Atakora Mountains that traverse the country from southwest to northeast. Its hydrographic network encompasses the Oti River and its tributaries (Koumongou, Kara, and Mô) in the north, the larger Mono River in the centre-east, the coastal rivers Zio and Haho, and an important lagoon ecosystem in the south.

The country is divided into five administrative regions: Maritime, Plateaux, Centrale, Kara, and Savanes, which are further subdivided into 39 prefectures, 117 communes, and 390 townships. The Maritime Region, located in southern Togo, is the most populous with 3.5 million residents, 2.2 million of whom live in the Lomé metropolitan area. Lomé, the nation's capital, serves as the country's chief port and its administrative, commercial, and industrial centre. Togo's second most populous region, after the Maritime Region, is the Plateaux Region with 1.6 million residents. In contrast, the Centrale Region is largely agricultural, with 795,000 residents and a low population density. Further north, the Kara Region is the least populous of the five regions, with 769,000 residents. Lastly, the northernmost Savanes Region has a population of 1.1 million and hosts a significant hub for commerce and trade in the city of Dapaong.

1.2 Socio-Economic Profile

According to the National Institute of Statistics and Economic and Demographic Studies (INSEED), Togo's population reached 8.1 million in 2022, sustaining a demographic growth rate of 2.4% (INSEED, 2023). French is the official language, but Ewe/Mina (south) and Kabyè (north) are widely spoken, alongside ~40 other indigenous languages. The populace remains predominantly rural at 57%, with 42% residing in urban areas (INSEED, 2022).

The country's Gross Domestic Product (GDP) per capita is estimated at US$1,043 in 2024, with an average economic growth rate of 5.3% (WBG, 2024b). The primary sector, which relies mainly on agriculture, contributed 20% of the GDP in 2024, while the secondary sector, based on the manufacturing of food products, construction and the production and distribution of water, electricity, and gas, accounted for 23% of GDP (Direction Générale du Trésor, 2024). The tertiary sector, centred around trade and financial activities, contributed 57% to the GDP. The principal export commodities of Togo include clinker and cement, phosphate, and plastic items, with biological soy emerging as a significant sector, making Togo its primary West African exporter (Direction Générale du Trésor, 2024). Meanwhile, the informal sector remains predominant, accounting for more than 48.9% of the value added from the various branches of the economy (INSEED, 2022).

According to the African Development Bank (AfDB) Group budget deficit in Togo narrowed from 8.3% of GDP in 2022 to 6.9% in 2023. Domestic revenue has increased (from 12.1% of GDP in 2013 to 14.7% in 2023) due to institutional reforms and digitalisation. However, the tax base remains narrow. Future improvements rely on rationalising tax expenditures and expanding property and environmental taxes (WBG, 2025). In general, fiscal space is constrained by the need for high public investment in infrastructure and human capital, as well as rising security spending to address regional instability in the Sahel. The government is reducing capital expenditures to meet deficit targets while trying to preserve essential social spending (WBG, 2025).

The IMF Debt Sustainability Analysis (DSA) assesses Togo to be at moderate risk of external debt distress and high overall risk of public debt distress — unchanged from the last DSA (International Monetary Fund, 2025). The External Debt moderate rating is due to high debt service requirements and vulnerabilities to export shocks, though indicators generally remain below thresholds, while the Overall Public Debt rating of high is primarily due to a high level of domestic debt and heavy reliance on the regional West African Economic and Monetary Union (WAEMU) market for financing.

Togo's sovereign credit rating has been updated to B+ by S&P Global in April 2025, based on an improved external debt position (as the majority of external financing is via grants), and the ongoing fiscal consolidation and a progress on revenue mobilisation. The rating is also supported by the expected decline of the debt to GDP ratio under 60% and a cost of debt, at 2.6% of GDP, that is among the lowest of all 'B' category sovereigns (S&P Global Ratings, 2025).

In terms of inflation, Togo reached a peak in 2022 at around 7.6% before significant decreasing trend in 2023 (5.1% to 5.5%) which continued in the 2024 forecast period (2.7% to 2.9%). The downward trend is attributed to lower food prices and subsidies on fuel and electricity prices (AfDB, n.d.).

Togo has been classified among the world's Least Developed Countries (LDCs) since 1982, with graduation from this status requiring it to meet thresholds across three areas: Gross National Income (GNI) per capita, Human Assets Index (HAI) and Economic and Environmental Vulnerability Index (EVI). Currently, Togo remains below the GNI graduation threshold with US$942 (2024) compared to the required US$1,306. Similarly, its HAI score of 61.1, which assesses health and education[2], falls short of the required value of 60 or below for LDC graduation, underscoring ongoing human capital development challenges. While Togo meets EVI graduation level[3], which considers factors like agricultural share in GDP and vulnerability to disasters, the country must satisfy all three criteria for LDC graduation. Consequently, Togo remains classified as an LDC (UN UNDESA, n.d.).

According to the World Bank (WB), the poverty level is twice as high in rural areas (58.8%) as in urban areas (26.5%) (2024). Women remain more vulnerable as they have less access to economic opportunities, education, health, and other basic socioeconomic opportunities (WBG, 2024b). Adult literacy faces a substantial gender gap, with men's literacy rate exceeding women's by 19.2% (WBG, n.d.-a). The Gender Parity Index (GPI) for gross secondary school enrolment as of 2021 was 0.81 (WBG, 2022)[4]. Moreover, the UNDP's Gender Development Index (GDI), measuring health, education and living standards across men and women, is 0.848, placing Togo in category 5 (out of 10) (UNDP, 2021).

Furthermore, Togo's Human Capital Index (HCI) remains at 0.43, which means that a child born today in Togo will reach only 43% of his or her potential in health, education, and nutrition as an adult (WBG, 2024b). Togo's Human Development Index (HDI) for 2022 was 0.547, demonstrating "low" human development as it ranked 163rd out of 191 countries (UNDP, 2021). However, between 1990-2022, Togo's HDI value increased by 37.1% and life expectancy at birth improved from 54.4 to 61.6 years (UNDP, 2021).

Overall, the 2023 Notre Dame Global Adaptation Initiative (ND-GAIN) index, which measures vulnerability to climate change, ranks Togo 127th out of 187 countries. This is determined by Togo's high climate change vulnerability (0.503) and low readiness (0.326) to leverage investments and convert them to adaptation actions (Notre Dame Global Adaptation Initiative, 2023). Togo's climate change vulnerability is compounded by low scores related to aspects such as its agricultural capacity, and an insufficient number of medical staff per 1000 people (including physicians, nurses and midwives). Consequently, Togo ranks as the 49rd most vulnerable and the 119th most ready country (Notre Dame Global Adaptation Initiative, 2023).

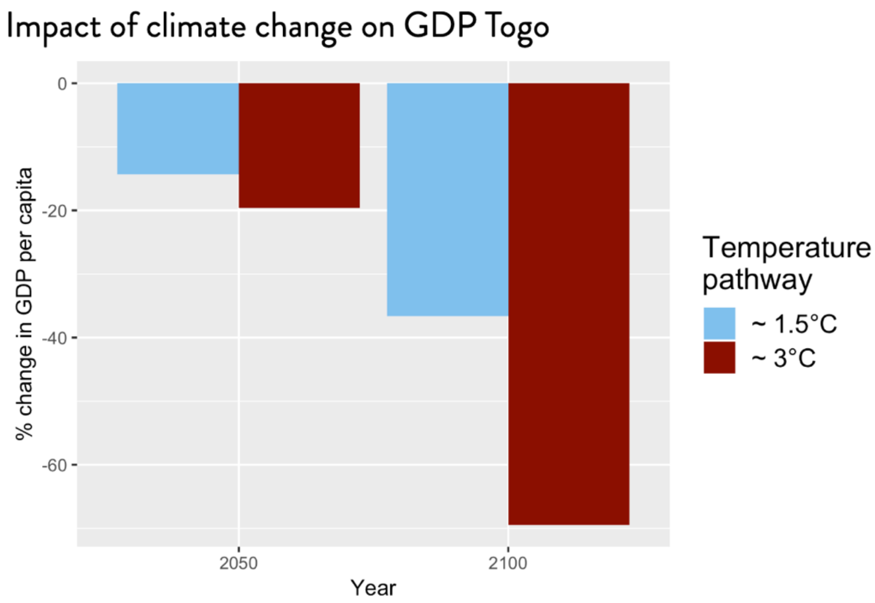
With a current warming trajectory of 3°C, the costs occurring from the impacts of climate change could be 20% of Togo's GDP by 2050 (Burke et al., n.d.), according to an analysis quantifying the economic damages associated with UN national-level commitments, as can be seen in ***Error! Reference source not found.*** (Climate Analytics, n.d.).

[2] HAI assesses factors such as under-five and maternal mortality rates, stunting prevalence, lower secondary education completion, adult literacy, and gender parity in education.

[3] EVI considers factors such as the share of agriculture, forestry and fishing in the GDP, remoteness and landlockedness, export concentration, instability of exports, population in low-elevation coastal zones and drylands, agricultural production instability, and disaster victims.

[4] GPI below 0.97 indicates a disparity in favour of men.

Figure 1: Cost of inaction



(Climate Analytics, n.d.)

1.3 Financial Sector Overview

Togo's financial landscape has seen significant progress in financial inclusion in the last decade, driven largely by mobile money. Yet, it faces persistent structural gaps regarding access to formal credit and equity, particularly in rural areas and among women.

Togo has achieved a 45% financial inclusion rate, notably exceeding the Sub-Saharan African average, primarily through the rapid adoption of Digital Financial Services (DFS) (Microsave Consulting, 2023). This surge is directly linked to government efforts to disburse cash transfers to social program beneficiaries via DFS, with 30% of recipients opening their first account specifically for this purpose. Currently, 57% of adults own an account, and 37% possess a mobile money account (Klapper et al., 2025). However, significant disparities remain, notably the gender gap, as only 45% of women own an account compared to 70% men (Klapper et al., 2025).

The formal financial sector (FFS), dominated by banks, often avoids engaging with Micro and Small Enterprises (MSEs) and informal traders due to insufficient collateral and a lack of official documentation. Even for businesses with sufficient collateral interest rates can go up to 12.5% annually for medium- and long-term loans (Orabank Togo, 2020). Consequently, the majority of the population relies on informal credit and savings. The most common forms are the "tontine" (rotating savings and credit associations) and loans from family and friends. Interest rates in the informal sector can start from 15% annually (URCLEC Togo, n.d.)Table 13: Number and distribution of healthcare facilities by region in 2022. While 78% of the population reports having borrowed money, only 13% did so from a formal bank or using a mobile money account, underscoring a strong dependence on unregulated sources despite often-high interest rates (Klapper et al., 2025). To bridge this gap, some microfinance institutions (MFIs) actively collaborate with or integrate aspects of the informal sector. Notably, "linked tontines" associated with FFS providers are popular among female traders, who gain access to formal credit based on their daily savings discipline, bypassing the need for strict traditional collateral.

Togo's financial industry has embraced digitisation, integrating services such as bank-to-wallet, mobile banking, and WhatsApp banking. This enhances efficiency and convenience but has not fully exploited its potential for all financial services. This landscape demonstrates that, despite an increasingly digitised environment, the major challenge for Togo remains converting the trust and discipline of informal savings into secure and generalised access to formal credit products.

1.4 Political and Institutional Context

Togo is undergoing a significant political and institutional transition following the adoption of the 2024 Constitution, which established the Fifth Republic and established a parliamentary system of governance. This shift is unfolding alongside the country's decentralisation reforms, aimed at strengthening local governance and improving service delivery across sectors, including health (see *Section 0*).

Recent government restructuring has included leadership changes within key ministries, notably the MSHPCSUA, where the most recent ministerial appointment was made in October 2025. These changes form part of broader administrative reforms and reflect the government's continued prioritisation of universal health coverage (UHC) and improved access to essential services.

More broadly, Togo's governance environment remains conducive to advancing national resilience priorities. Ongoing institutional modernisation and decentralisation efforts strengthen the enabling conditions for improved service delivery across sectors – including health, climate information, Disaster Risk Management (DRM), and the development of Multi-Hazard Early Warning Systems (MHEWS).

2. Climate Problem

2.1 Climate Context

2.1.1 Methodological Approach

This section compiles historical, observed and projected climate data, using high-resolution datasets and climate-health modelling methods as applied in the London School of Hygiene and Tropical Medicine (LSHTM) 2025 Climate Rationale (see *Annex 2a* for more information). The climate change analysis was conducted using a mixed-methods approach, integrating two high-resolution climate datasets, aligned with the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) risk framework (Calvin et al., 2023). Both datasets are bias-corrected products, and analyses focus on relative changes rather than absolute values to ensure consistency across time periods and data sources.

- Historical climate data are based on the Multi-Source Weather (MSWX) dataset (1980-2024), a global product at 0.1° (~11km) resolution (see *Section 2.1.2.1*)(GloH20, n.d.).
- Climate projections utilised the daily, downscaled (0.25°) from the NASA Earth Exchange (NEX) Global Daily Downscaled Projections (GDDP) dataset, or NEX-GDDP-CMIP6 derived from a five-model ensemble of the Coupled Model Intercomparison Project Phase 6 (CMIP6) (see *Section 2.1.2.2*) (NASA, n.d.).

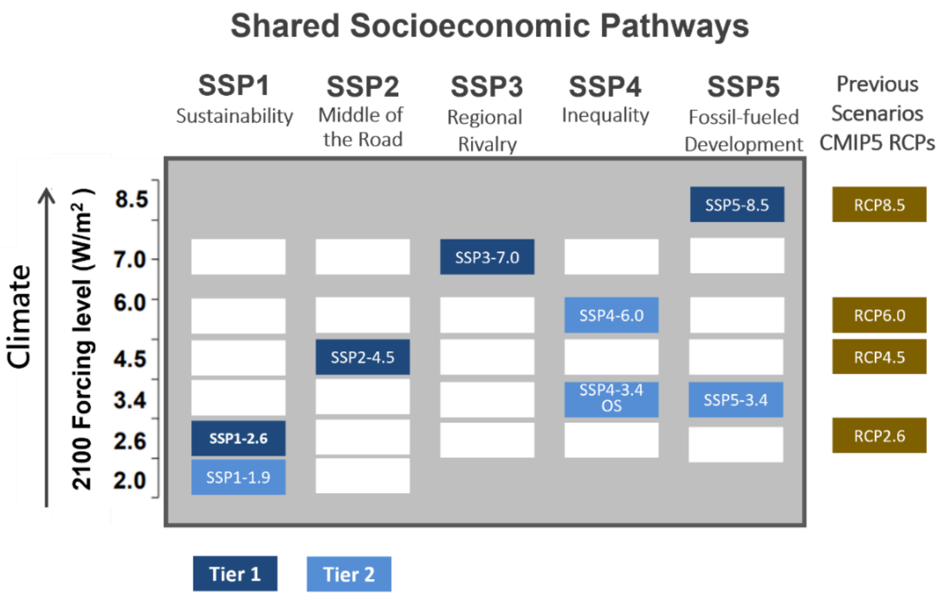
For projecting future climate change risks, climate hazard Information was derived from CMIP6 daily time series data, with both general (national) and health outcome specific hazards highlighted. To summarise future trends, projections were summarised into relevant time slices before being compared to a reference baseline period:

- 1981 – 2000: Reference baseline
- 2001 – 2020: Recent
- 2021 – 2040: Near-term
- 2041 – 2060: Mid-century

AR6's Shared Socioeconomic Pathways (SSPs) framework was then used to contrast potential socio-economic and climate trajectories and assess their influence on projected health impacts. In the CMIP6 framework, these SSPs are scientifically coupled with the radiative forcing trajectories previously defined by the Representative Concentration Pathways (RCPs). The RCPs provide a quantitative description of concentrations of GHG in the atmosphere over time. This coupling creates plausible combinations known as SSP-RCP scenarios. The climate analysis consequently focused on the two contrasting Tier 1 SSP-RCP scenarios to assess future climate projects (see *Figure 2*):

- SSP2-4.5: Representing a "middle of the road" medium-emission development pathway, this scenario is coupled with the medium emissions forcing RCP 4.5 scenario. It is explored as a future with some mitigation and medium emissions forcing.
- SSP5-8.5: Representing a high-emission, fossil-fuel intensive development pathway, this scenario is coupled with the high emissions RCP 8.5 scenario. It serves as a contrasting scenario representing low mitigation and high emissions forcing.

Figure 2: SSP and RCP (emissions forcing combined in IPCC - AR6)



(Calvin et al., 2023)

Additionally, an extensive review of academic literature (national strategies, plans and reports) was conducted to contextualise the data used for the pre-screening and development of the proposed health project.

2.1.2 Climate Data Sources and Processing

2.1.2.1 Historical observed climate data

The full time series available for all meteorological variables was extracted from the MSWX dataset, spanning January 1981 to August 2025. MSWX provides near–real-time daily meteorological fields (1980 – a few months before present) at 0.1° (~11 km at equator) spatial resolution (Copernicus Climate Change Service, 2019). This dataset is part of the Multi-Source Weighted-Ensemble Precipitation dataset - MSWEP/MSWX family of 'blended' climate products, integrating in-situ weather station observations (sourced from global weather station databases and various national networks), satellite remote sensing, and reanalysis data to ensure high accuracy (GloH20, n.d.).

Several historical datasets were initially evaluated for suitability, including:

- MSWEP, a bias-corrected 0.1° dataset considered one of the best performing precipitation datasets for West Africa (Beck et al., 2019).
- The European Centre for Medium-Range Weather Forecasts (ECMWF) Reanalysis v5 – Land dataset (ERA5-Land) (0.1°), a reanalysis climate product consistent with ERA5 (~0.25°), providing higher spatial detail over land; and
- The Climate Hazard Group InfraRed Precipitation with Station dataset (CHIRPS), a hybrid rainfall data set for trend analysis and drought monitoring at 0.05°C (Climate Hazard Group, 2018).

These datasets were used for comparative correlation analyses across Togo. Although variables like mean temperature and precipitation showed high correlation between products (coefficient ~0.9), they were not entirely congruent as time series. Consequently, the MSWX dataset was selected for all subsequent analyses and model training to maintain internal consistency through a single, bias-corrected and harmonised source.

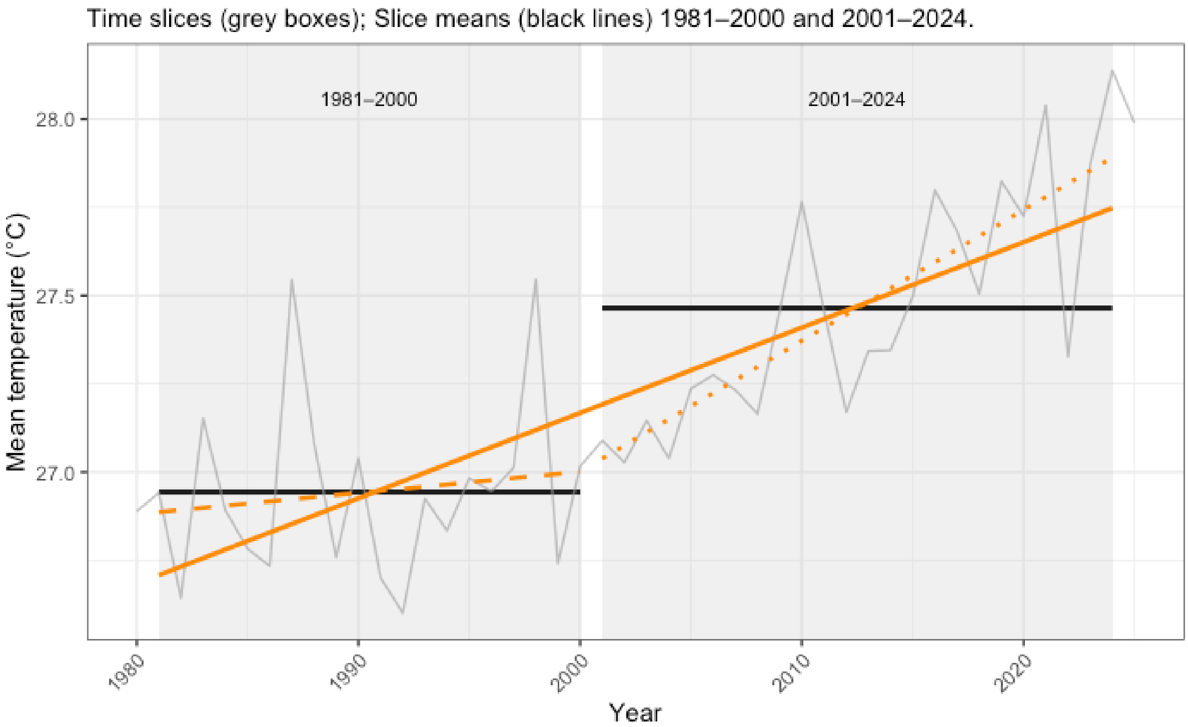
2.1.2.1.1 <u>*Methodological approach for trend assessment*</u>

Historical observed data were summarised for the 1980-2024 period for all core variables of interest. To maintain statistical integrity, 2025 was omitted from the final statistics as it represents an incomplete year.

- Baseline and reference periods: Trends illustrated using linear trendlines over the full period, with specific focus on a reference baseline (1981-2000) compared against the subsequent 2001-2024 period. This baseline is used consistently for both historical observations and future projections.
- Statistical testing: Trend significance and magnitude were assessed using Mann-Kendall (MK) tests and Sen slope estimates (Techniques and Methods, 2020).
- Calculation of change: Average values were used for citing differences between time slices. Rates of change are derived from trendline slopes and, where appropriate, multiplied by reporting periods (e.g., x10) to present changes per decade.

  An example is provided in *Figure 3*, where grey line represents the annual time series for the climate variable. The solid orange line indicates the linear trend across the entire study period (1980-2024), while the dashed and dotted lines illustrate trends for the reference baseline (1981-2000) and the recent period (2001-2024), respectively. Black horizontal lines signify the mean values calculated for each distinct time slice

Figure 3: Illustrative time series of historical observed climate data for trend and statistical derivation.



2.1.2.2 *Future climate projections*

Future climate projections are derived from the NASA NEX-GDDP-CMIP6 suite of models. This dataset provides daily, 0.25° (~28km at equator) downscaled and bias-corrected data specifically suited for regional climate analysis (NASA, n.d.). From the available pool of over 30 Global Climate Models (GCMs), five were selected to represent a diverse range of sensitivities to anthropogenic emissions and corresponding climate change predictions: GFDL-ESM4, IPSL-CM6A-LR, MPI-ESM1-2-HR, MRI-ESM2-0, UKESM1-0-LL.

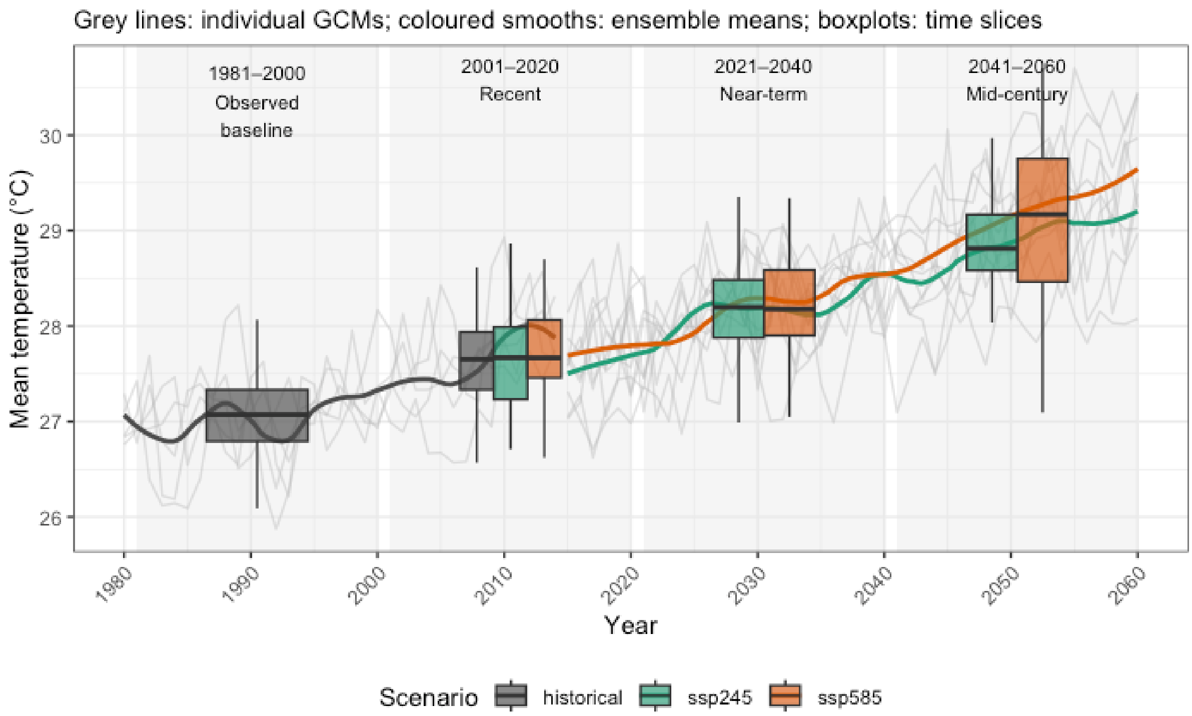
The NASA NEX dataset is structured around two distinct temporal blocks:

- Historical experiments (1950-2014): Models are forced with observed or estimated greenhouse gas (GHG) emissions, aerosols, and land-use contributions, allowing for validation against historical observations.
- Scenario experiments (2015-2100): Future projections are forced by estimated emissions trajectories according to the SSPs framework. GCMs exhibit differing sensitivities to these forcings, resulting in a range of predicted future climate responses (Kyu et al., 2025).

2.1.2.2.1 *Emission scenarios and analytical framework*

Analysis of future projections utilises two of the four "Tier 1" GHG emission scenarios: the SSP2-4.5 and SSP5-8.5. Extracted variables match those utilised in the MSWX historical dataset. For summary purposes, averages are calculated for 20-year time slices covering the focal period of 1981-2060. Trend tests are applied to the projection block for the period of 2015-2060 to assess anticipated changes. As shown in *Figure 4*, the grey boxes illustrate the time slices used for summary statistics, displayed as boxplots. The faint grey lines represent individual GCM outputs, while solid lines denote the ensemble means for each scenario.

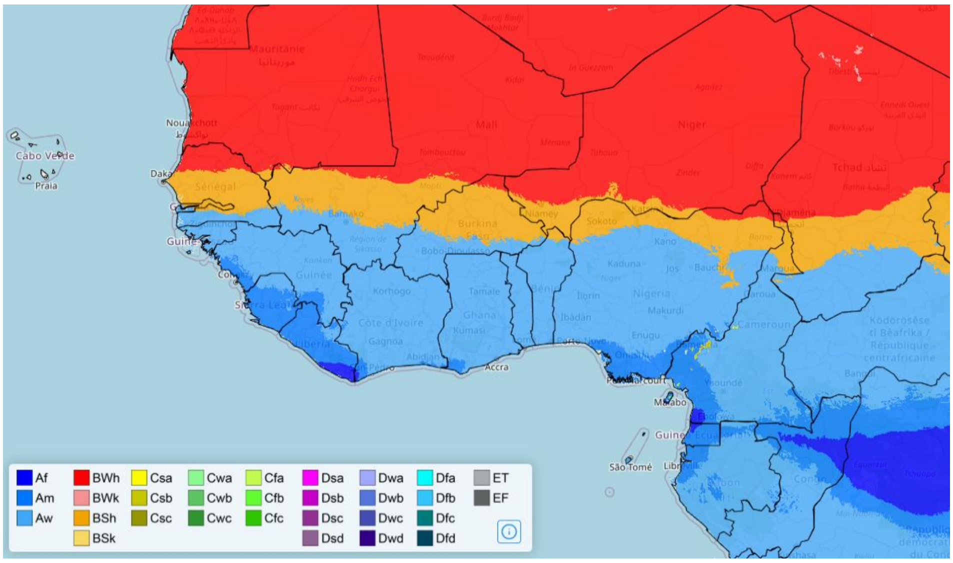
Figure 4: Illustrative time series of climate and model projections



2.1.3 Observed Climate Change Trends

Situated in the Tropical Savannah (Aw) climate zone (Köppen-Geiger classification), Togo experiences a marked north-south climatic gradient shaped by latitude, elevation, and proximity to the Atlantic Ocean (see ***Error! Reference source not found.***). The southern part of the country (Maritime and parts of Plateaux) displays a tropical Guinean climate with bimodal rainfall, while the Centrale region represents a transition zone with high-inter-annual variability. The northern regions (Kara and Savanes) exhibit a Sudan-Sahelian climate with a unimodal rainy season and a prolonged dry season influenced by Harmattan winds from December to February (MERF, 2022). Temperatures are highest in those regions, with frequent hot days and heatwaves late in the dry season.

Figure 5: Köppen-Geiger climate zone classification. Togo falls within the Tropical Savannah zone



(Beck et al., 2023)

Compared to the 1981-2000 historical baseline, recent (2001-2024) average temperatures have increased while changes in rainfall patterns have been more variable. Highland central and southern regions have experienced overall declines in rainfall and relative humidity (RH) while the northernmost areas have seen a slight increase.

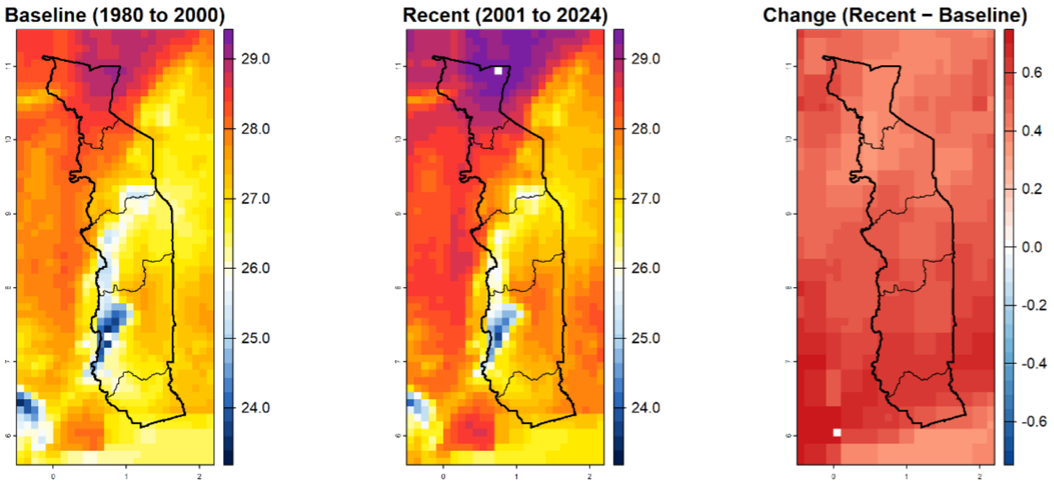
Taken together, the results of the observed extreme climate events suggest that in parallel with long term climate shifts, Togo is experiencing seasonal shifts in rainfall distribution, dry periods, and magnitudes of extremes in the hottest and wettest parts of the year. Such changes have implications for health, with many climate health exposures exhibiting strong season patterns due to changes in human behaviours (e.g., farming practices, time spent outdoors) and pathogen and vector ecologies (e.g., mosquito breeding, pathogen proliferation). Such seasonal changes will require targeted adaptation and climate resilience measures, even where long term declines in risk may be observed.

2.1.3.1 Temperature

Togo is characterised by generally hot conditions throughout the year, with a mean annual temperature of 27.4°C mean annual minimum temperature of ~ 22°C, and mean annual maximum temperature of ~ 32.8°C. Since 2000, the country experiences a consistent warming trend, with the nationally averaged warming rate estimated at +0.44°C, +0.37°C and +0.38°C per decade (2000-2024).

A comparison of the temperature (T) between the baseline (1980-2000) and recent (2001-2024) periods demonstrate a strong and consistent warming trend across the country, observed across all months of the year and in all administrative regions (Savanes, Kara, Centrale, Plateaux and Maritime) (see Figure 6). The northern regions of Kara and Savanes are the warmest areas, with the highest absolute temperatures. The analysis confirms this double burden, as the magnitude of national warming is most pronounced in those same northern and central-northern regions, with the increase approaching +0.8°C. While the magnitude of change in the South is slightly lower than in the North, it is still substantial (in the range of +0.4°C to +0.6°C), though the intensity of the change is highest where the *absolute* heat is highest.

Figure 6: Annual mean temperature (°C) comparison: Baseline (1981-2000), recent (2001-2024), and observed change (ΔT)

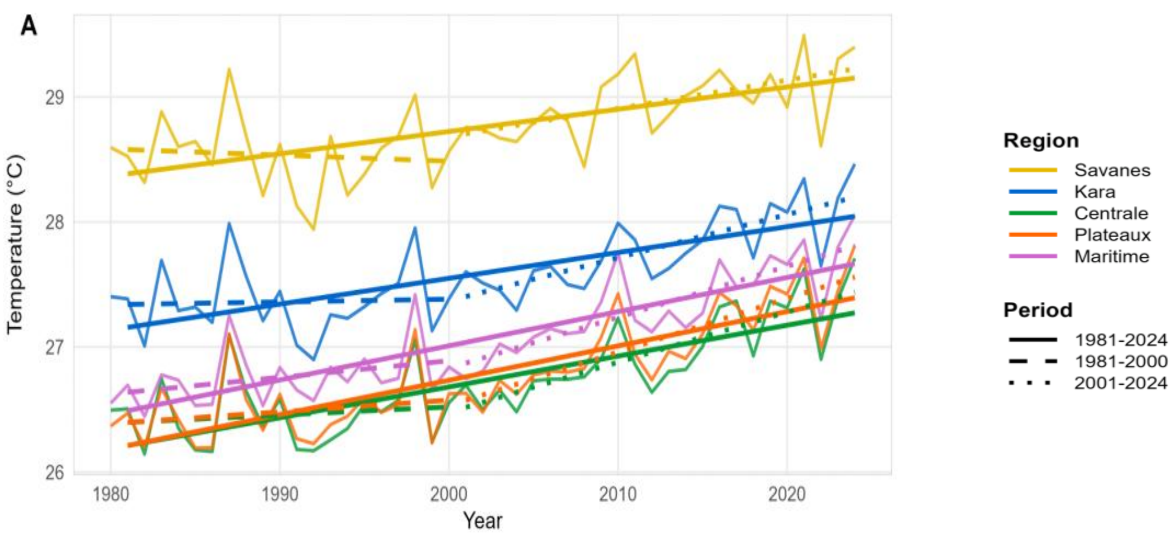


(GloH20, n.d.)

The regional time series plot confirms that the warming trend observed nationally is present across all administrative regions, with every region displaying a positive trend in mean annual temperature over the full 1981-2024 period. This analysis also highlights the persistent and dominant thermal stress in the North, as the Savanes region consistently maintains the highest mean annual temperature (above 28°C) throughout the entire record.

For temperature variables (maximum, minimum and mean temperature), trends during the 1981-2000 period were generally non-significant across regions. By sharp contrast, the period 2001-2024 saw a significant increase in all temperature variables. This accelerated warming is driven notably by minimum temperatures (T_{min}) rising more rapidly (mean increases across regions (+0.46°C) than maximum temperatures (T_{max}) (+0.40°C), particularly in the northern regions (see *Figure* 7*)*.

Figure 7: Annual mean temperature (°C) trendlines by administrative region: Baseline (1981-2000), recent (2001-2024), and overall trend (1981-2024)



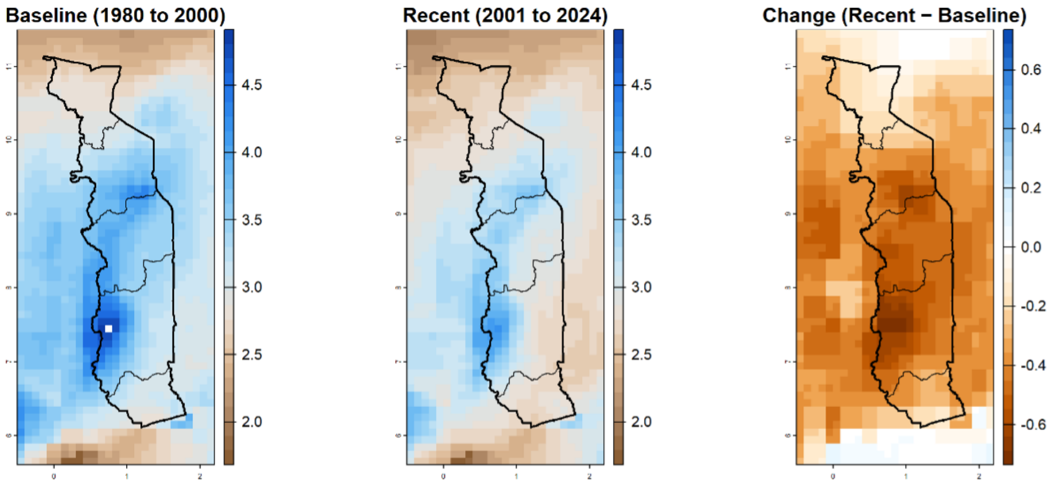
(Own elaboration; data extracted from GloH20, n.d.)

2.1.3.2 Precipitation

Precipitation in Togo is highly variable, both annually and between years. A study using data from weather stations across Togo reported that between 1961 and 2001 the annual precipitation in Togo has decreased at 80% of the weather stations, with this reduction being more pronounced in the southern regions (Djaman, 2017).

Togo is experiencing a significant and widespread shift in its hydrological regime, exhibiting a pronounced and uniform drying trend across the country. A comparison of mean annual precipitation between the baseline (1981-2000) and recent (2001-2024) periods confirms a nationwide decrease in rainfall. Overall, Togo has experienced an approximate 10.8% decline in rainfall between historical comparison periods.

Figure 8: Annual mean precipitation (mm/day) comparison: Baseline (1981-2000), recent (2001-2024), and observed change (ΔP)

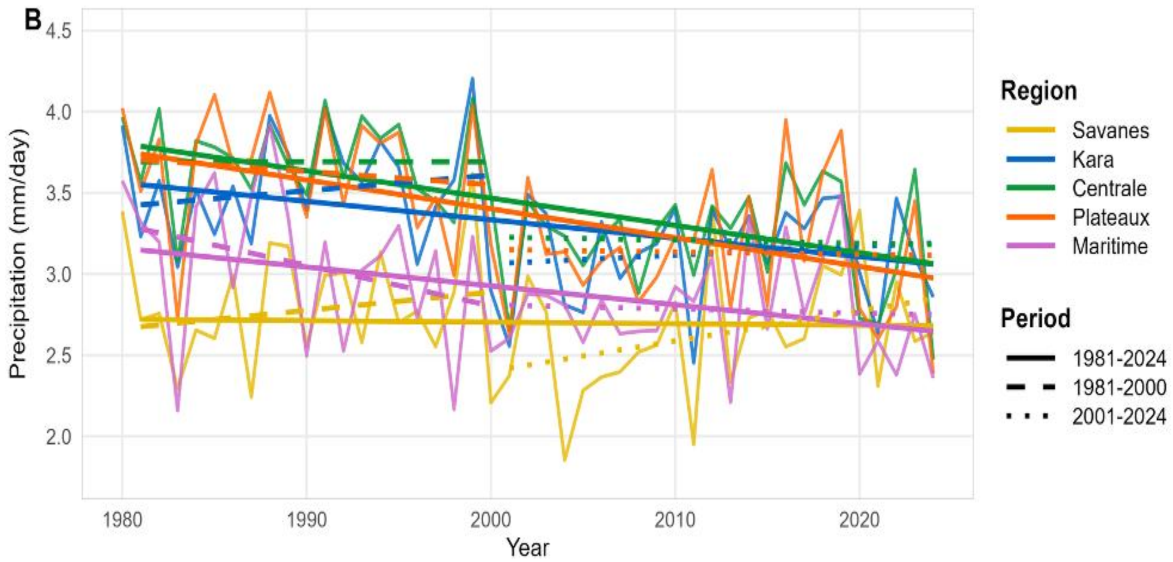


(GloH20, n.d.)

Geographically, the decline in rainfall is most pronounced in the central and southern regions, though this trend has seen stabilisation or partial reversal in recent decades in parts of the Savanes and Maritime regions. Highland central and southern regions also show overall declines in rainfall and relative humidity, while the northernmost areas show slight increases (MERF, 2022).

This decrease is accompanied by a marked change in rainfall patterns. Recent patterns (2001-2024) show greater variability compared to the 1981-2000 historical baseline, with the onset of rainfall becoming increasingly delayed. There is a noticeable reduced accumulation during the early rainy season and a concentration of rainfall closer to peak months (September).

Figure 9: Annual mean precipitation (mm/day) trendlines by administrative region: Baseline (1981-2000), recent (2001-2024), and overall trend (1981-2024)

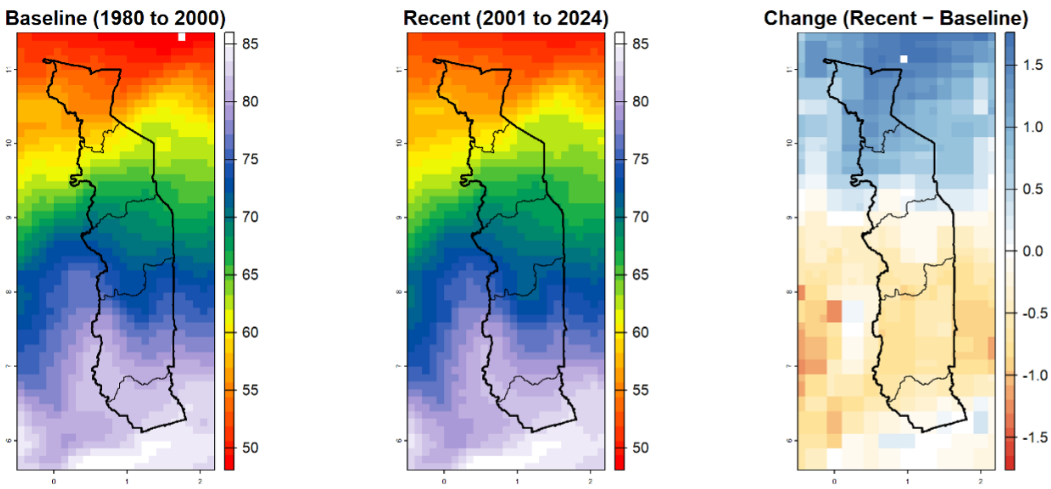


(Own elaboration; data extracted from GloH20, n.d.)

2.1.3.3 Relative humidity

Togo's baseline climate is further defined by its RH, which historically showed the highest levels (above 75%) along the southern coastal and Maritime regions, while the northern Savanes region exhibited the lowest RH (below 60%).

Figure 10: Annual mean relative humidity (%) comparison: Baseline (1981-2000), recent (2001-2024), and observed change (ΔRH)

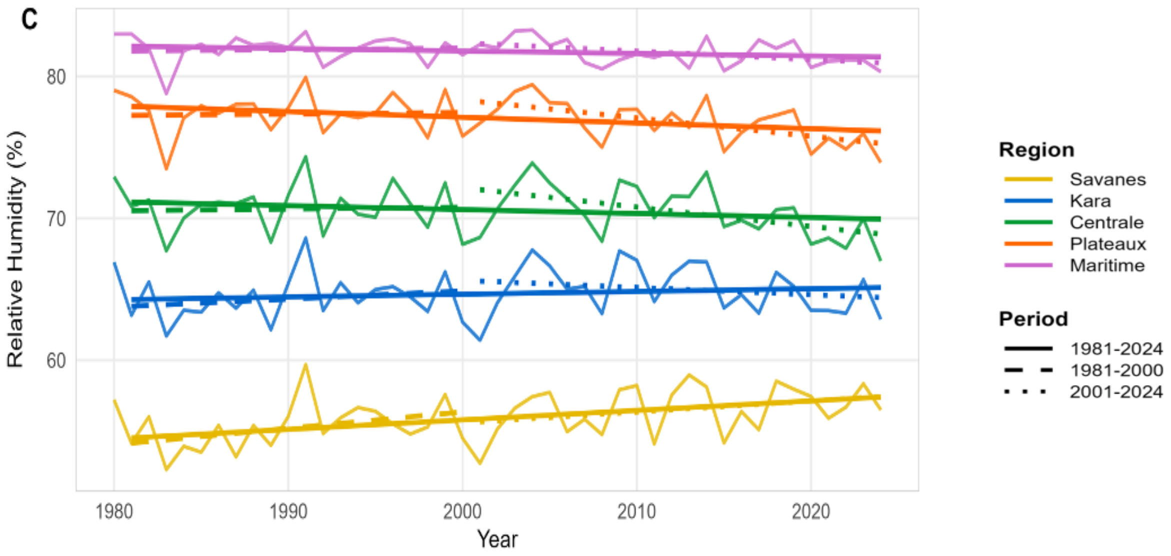


(GloH20, n.d.)

A comparison with the recent period (2001-2024) reveals a strong and consistent trend: RH has decreased since 2000 in all regions except Savanes. The analysis confirms a predominant drying trend across the entire southern and central half of the country, with locally intense areas showing a decline of -1.0 to -1.5 on the relative scale.

In contrast, the northernmost Savanes region exhibits a unique and divergent pattern, showing a slight to moderate increase in relative RH which aligns with a steady increase observed over the full historical

Figure 11: Annual mean relative humidity (%) trendlines by administrative region: Baseline (1981-2000), recent (2001-2024), and overall trend (1981-2024)



(Own elaboration; data extracted from GloH20, n.d.)

2.1.3.4 Extreme climate events

The climate narrative for extreme climate events describes the following hazard metrics:

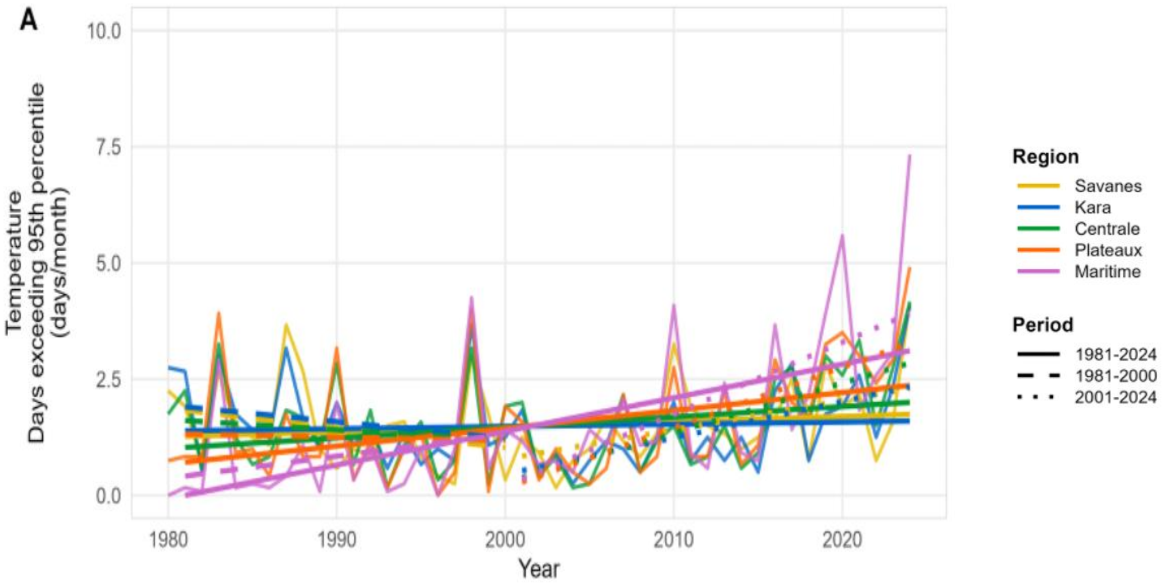
- **"Extreme precipitation days"** is defined as the frequency of days when 1-day rainfall exceeds the 90th percentile of the historical baseline (R1D > P90).
- **"Compound hot and dry days"** captures days when the T_{max} exceeds the 90th percentile of the historical baseline *and* the trailing 10-day precipitation sum is less than 5 mm.
- **“Extreme temperature days”** is defined as the T_{max} exceeding the 95th percentile of the 1981-2000 baseline.

Overall, the results of the observed extreme weather analysis indicate an increase in hot and, in parts of the country, drier climate, particularly in northern regions, characterised by rising temperatures, more frequent heat extremes and declining rainfall.

2.1.3.4.1 Extreme temperature

Extreme heat days showed no change in the baseline period (1981-2000) but increased significantly across all regions in the recent period (2001-2024), particularly in the southern regions.

Figure 12: Annual mean extreme temperature (days/month) trendlines by region: Overall trend (1981-2024)

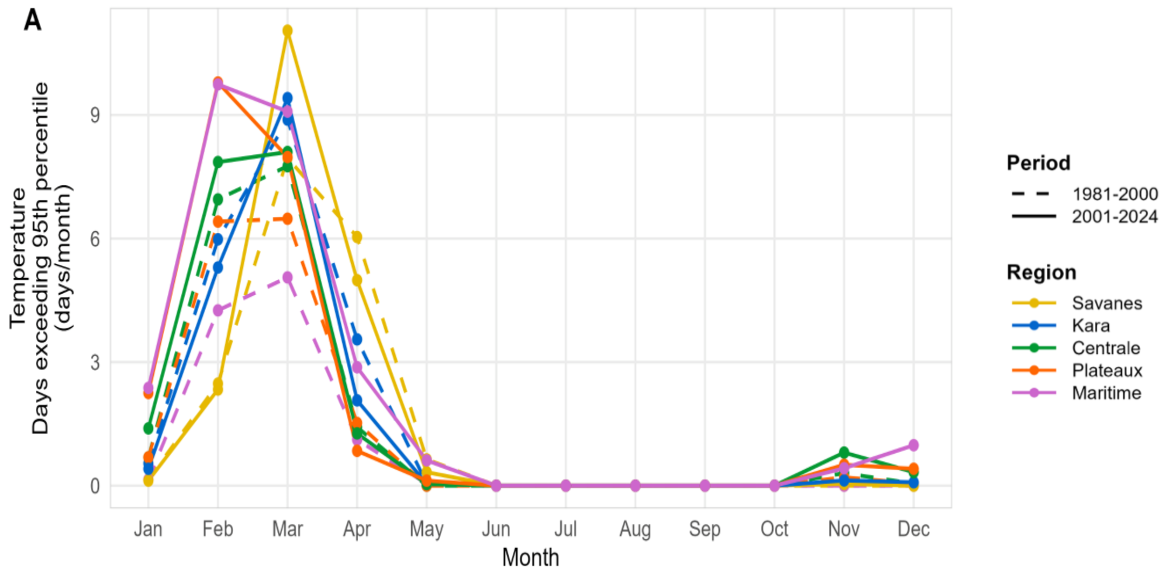


(Own elaboration; data extracted from GloH20, n.d.)

The analysis of the average monthly trends reveals the increasing temperature is evenly present throughout the year but heightened during the hottest parts of the year (March-April).

Increases in extreme heat events are concentrated in the hottest months of the year (Feb-March), with the biggest increases observed in the Maritime and Savanes regions.

Figure 13: Seasonal trends in annual mean extreme temperature (days/per month) by region: Baseline (1981-2000) and recent (2001-2024)

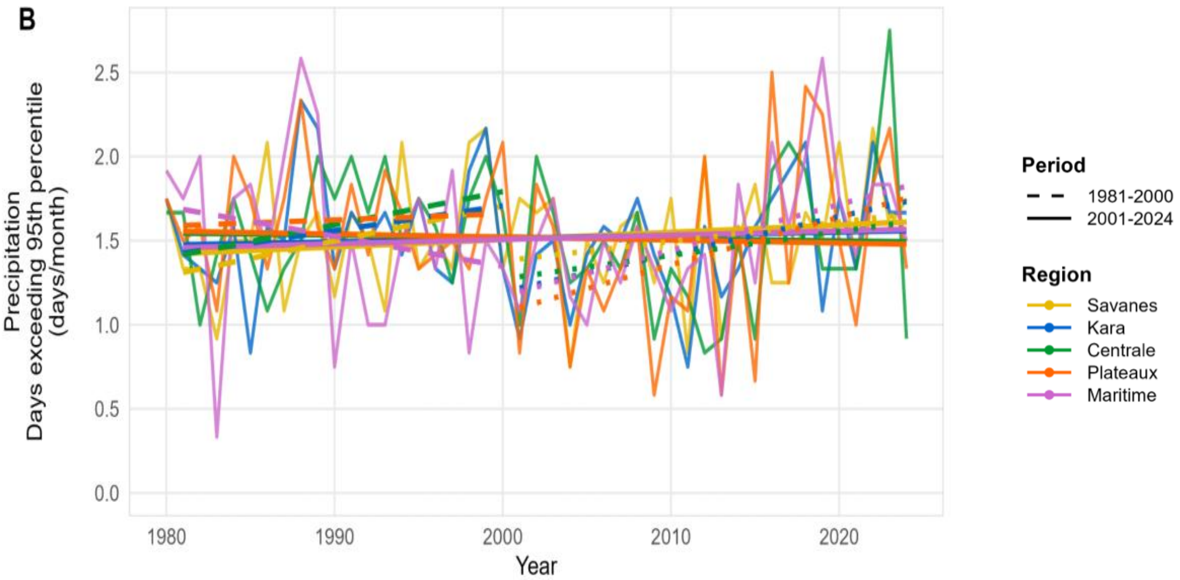


(Own elaboration; data extracted from GloH20, n.d.)

2.1.3.4.2 *Extreme precipitation*

The number of extreme precipitation days has remained relatively stable at national level but shows marked increases in the second half of the time series (2001-2024) across most regions, particularly during the wettest months in the Maritime and Savanes regions.

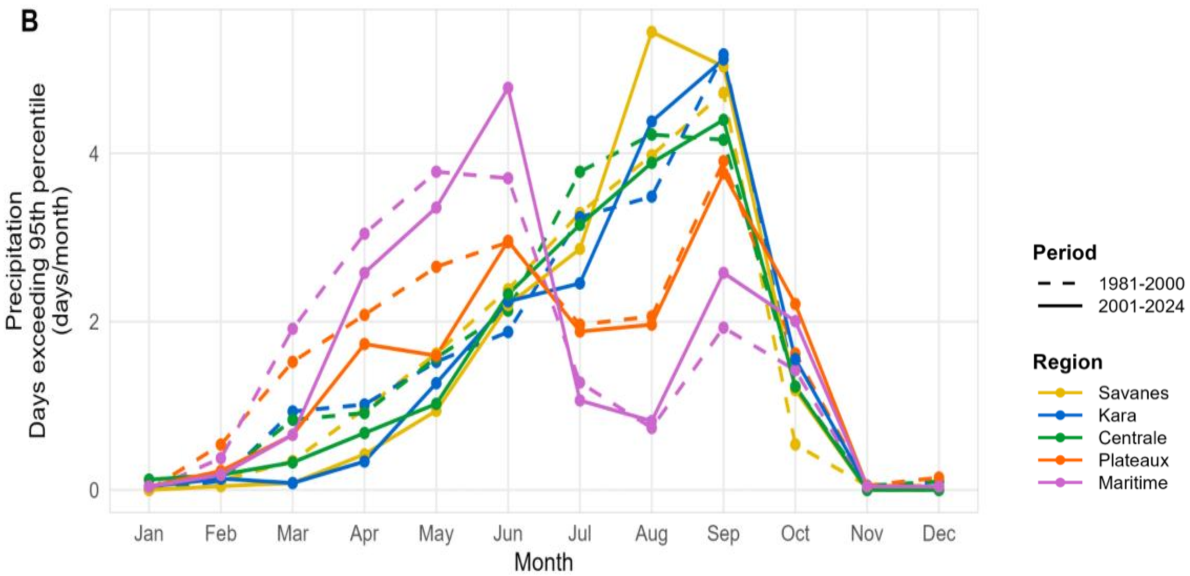
Figure 14: Annual mean extreme precipitation (days/month) by region: Overall trend (1981-2024)



(Own elaboration; data extracted from GloH20, n.d.)

Although no overall change in the number of extreme precipitation events was observed in the annual time series, the decreases in extreme rainfall events are observed in the early wet season and increases are observed in the peak of the wet season particularly for Savanes and Kara (August) and Maritime (September).

Figure 15: Seasonal trends in annual mean extreme precipitation (days/month) by region: Baseline (1981-2000) and recent (2001-2024)



(Own elaboration; data extracted from GloH20, n.d.)

2.1.4 Projected Climate Change

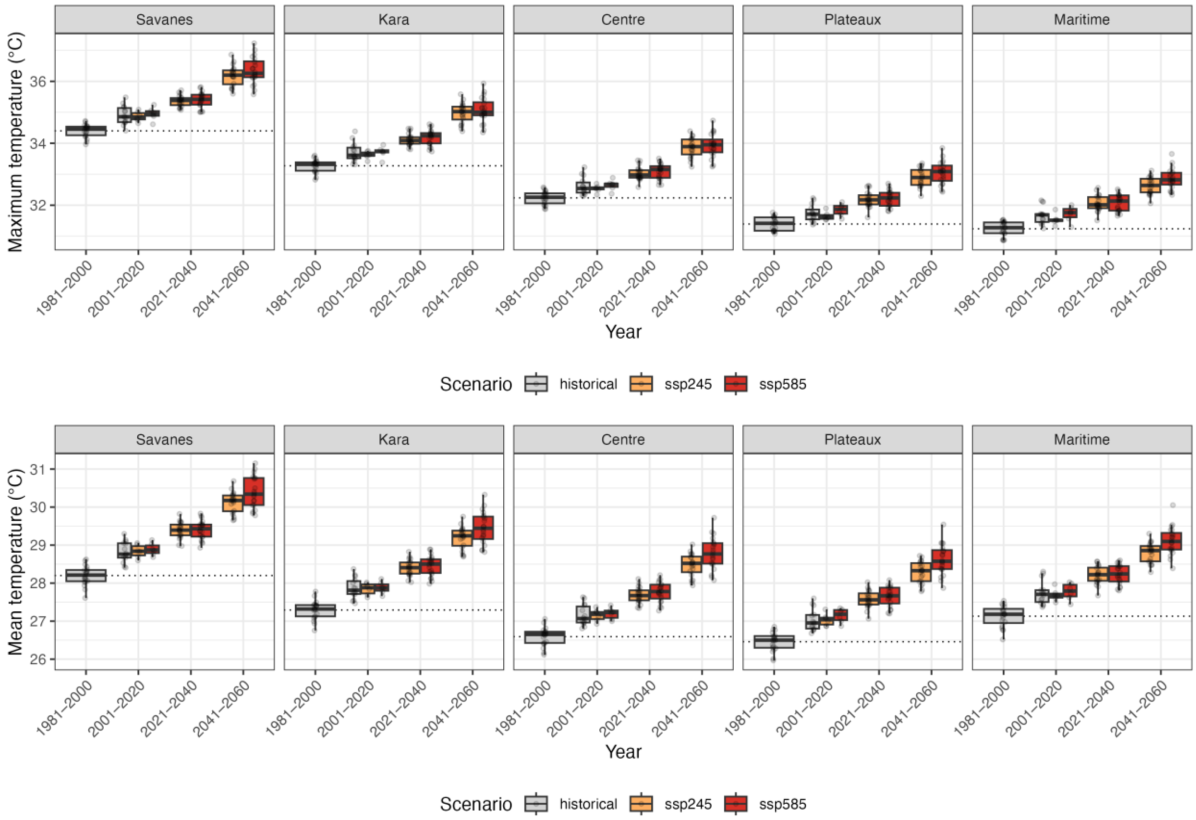
Future climate projections for Togo are derived from the NASA NEX-GDDP-CMIP6 dataset. Across all regions and both SSPs, the projections show a very robust warming signal in all regions consistent with a continuation of the observed climate trends. The analysis indicates that maximum, mean and especially minimum temperatures increase significantly everywhere ($p < 0.001$), with typical rates of about +0.35–0.45°C per decade under SSP2-4.5 and up to +0.5-0.57°C per decade for minimum temperature under SSP5-8.5 in Centrale, Kara and Savanes regions (*Figure 16*).

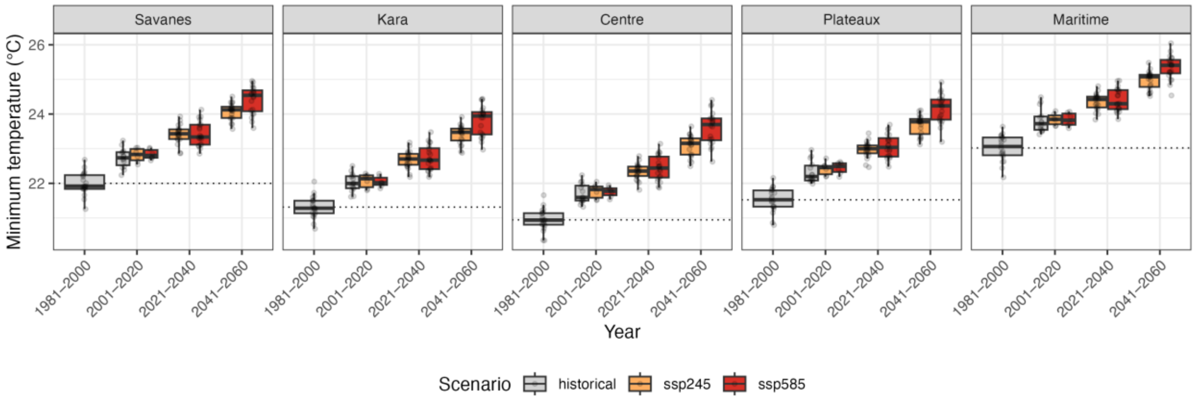
2.1.4.1 Temperature

Regardless of the emission scenario, Togo is expected to experience significant warming in the coming decades. By mid-century (2041-2060), mean temperatures are projected to rise by approximately +2°C across all regions compared to the historical baseline 1981-2000.

Notably, projections indicate that the minimum temperature will rise at the highest rate, consistently showing the greatest absolute projected increase across most regions compared to mean and maximum temperatures. This differential warming reduced the diurnal temperature range and limits nocturnal cooling, exacerbating heat stress impacts on health. The warming is projected to be most severe under the high-emission SSP5-8.5, and the Savanes and Kara regions are projected to remain the hottest, consistently recording the highest absolute temperatures across both future scenarios.

Figure 16: Projected changes in temperature variables (maximum (top), mean (middle) and minimum (bottom) by region and time periods (2021-2040 and 2041-2060 compared to baseline (1981-2000) and recent (2001-2024)) and SSPs 2-4.5 and 5-8.5



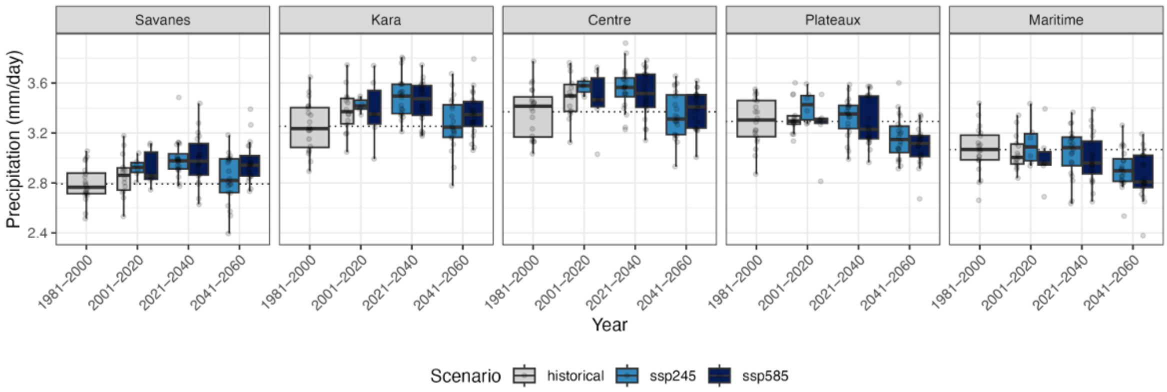


(Own elaboration; data extracted from NASA, n.d.)

2.1.4.2 Precipitation

*Figure 17*Figure 17 illustrates the projected precipitation changes and highlights the complexity and regional divergence of Togo's future hydrological outlook. Mean precipitation generally declines under SSP2-4.5 in all regions except Savanes, with significant drops of around -0.05–0.08 mm/day per decade, and similar but slightly more mixed declines under SSP5-8.5 (strongest in Centrale, Plateaux and Maritime).

Figure 17: Projected changes in precipitation (mm/day) by region and time periods (2021-2040 and 2041-2060 compared to baseline (1981-2000) and recent (2001-2024)) and SSPs 2-4.5 and 5-8.5

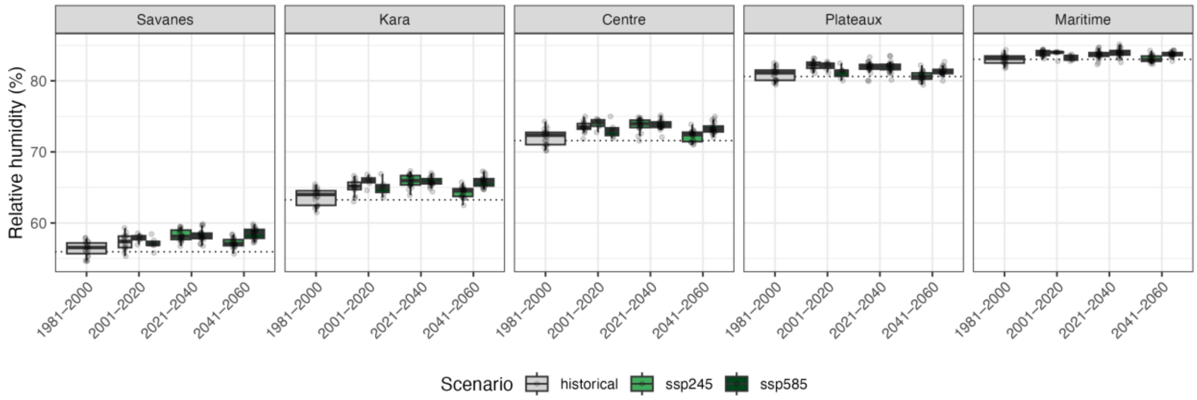


(Own elaboration; data extracted from NASA, n.d.)

2.1.4.3 Relative humidity

Relative humidity tends to increase slightly in the near-term, but overall decreases are observed across most regions under by mid-century under both SSPs (*Figure 18*).

Figure 18: Projected changes in relative humidity (%) by region and time periods (2021-2040 and 2041-2060 compared to baseline (1981-2000) and recent (2001-2024)) and SSPs 2-4.5 and 5-8.5



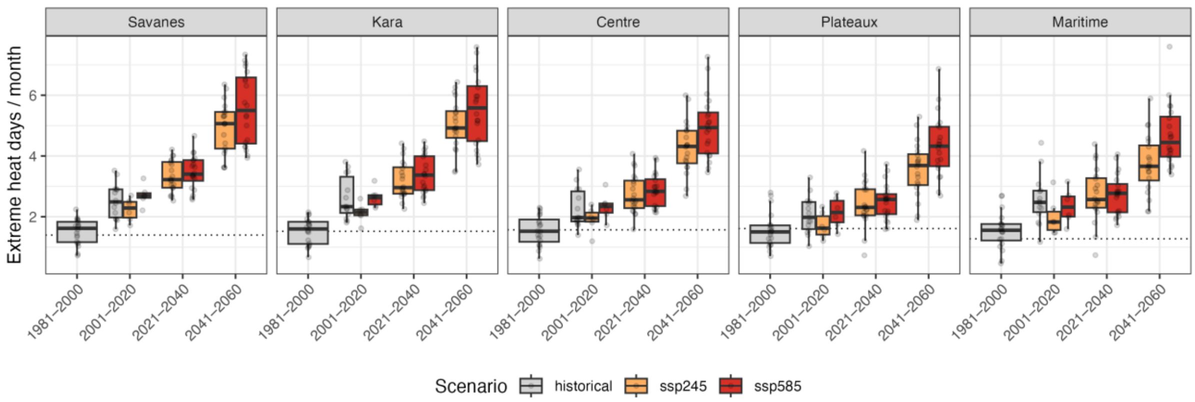
(Own elaboration; data extracted from NASA, n.d.)

2.1.4.4 Extreme climate events

2.1.4.4.1 <u>Extreme temperature</u>

Heat-related extremes are projected to intensify consistently across Togo. The frequency of hot days (> 95th percentile) is projected to increase significantly in all regions and under both scenarios, typically by +0.3–0.6 extremely hot days per month per decade. The impact is most severe in the northern regions: the Kara and Savanes regions are projected to experience the largest absolute increases in extreme heat days under the high-emission SSP5-8.5 scenario, rising from a historical median of approximately two days per month to around five to six days per month by mid-century (2041-2060). The Centrale region follows a similar pattern, with its median extreme heat days increasing from two days per month to approximately four to five days per month by 2041-2060 under SSP5-8.5.

Figure 19: Projected changes in extreme temperatures (days/month) by region and time periods (2021-2040 and 2041-2060 compared to baseline (1981-2000) and recent (2001-2024)) and SSPs 2-4.5 and 5-8.5



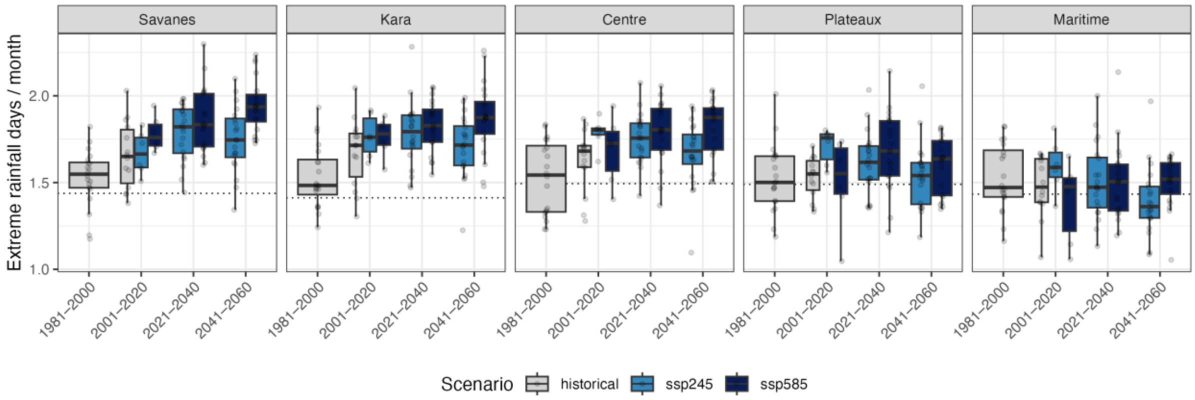
(Own elaboration; data extracted from NASA, n.d.)

2.1.4.4.2 <u>Extreme precipitation</u>

Projected changes in extreme rainfall days (above the 95th percentile) are highly variable across the country. The analysis shows a measurable increase in the frequency of extreme rainfall days primarily under the high-emission scenario, specifically in the Savanes and Kara regions, where the increase is approximated at ≈ +0.04–0.05 extra days per month per decade.

In the Savanes region, the projected median number of extreme rainfall days increases from approximately 1.5 per month in the historical period to around 1.9 days per month by 2041-2060 under SSP5-8.5. The Kara region exhibits a similar positive shift. By contrast, the Centrale region and the southern regions show highly mixed or weak trends, with large inter-model uncertainty and median projections that remain close to or slightly below the historical baseline, particularly under the SSP2-4.5 scenario. The spatial contrast suggests that the northern regions face a specific and measurable increase in the frequency of intense rainfall events under the high-emissions path.

Figure 20: Projected changes in extreme precipitation (days/month) by region and time periods (2021-2040 and 2041-2060 compared to baseline (1981-2000) and recent (2001-2024)) and SSPs 2-4.5 and 5-8.5



(Own elaboration; data extracted from NASA, n.d.)

These findings are further corroborated by Togo's fourth National communication to United Nations Framework Convention on Climate Change (UNFCCC) and the National Adaptation Plan to Climate Change (*Plan National d'Adaptation aux Changements Climatiques* - PNACC), which state that heavy rainfall is expected to increase by 43% in frequency and 12% in intensity. Consequently, the increase in flooding events has been identified as an impact of climate change in the country (MERF, 2018b, 2022). However, due to the uncertainty in precipitation projections, there is no national quantitative data in terms of the future distribution of flooding events (GIZ, 2021b).

2.2 Selection and Prioritisation of Climate-Sensitive Health Outcomes

2.2.1 Methodological Context

The project's selection and prioritisation of CSHOs and target areas is underpinned by a preliminary Climate Rationale (CR) developed in 2023, that was included as Annex 1.a in the September 2023 GCF Concept Note (CN) of this project. The primary objective of this preliminary analysis was to establish the expected increase in the burden of climate-sensitive health outcomes.

The analysis of the preliminary Climate Rationale (CR) informed the current Climate Rationale (Annex 2.a) in terms of the CSHO that were analysed further with more robust methodological approaches. The funding proposal climate rationale corroborated and expanded on the previous assessment, conducting a validation of the targeted area selection and a more up-to-date literature review. Moreover, it assesses the expected impact of climate change to the CSHO utilising epidemiological modelling.

2.2.2 Climate Rationale Findings

2.2.2.1 Literature review methodology

A systematic literature review, conducted following the gold standard Cochrane guidelines[5], was undertaken to identify previous research on CSHOs that are, or will become, particularly relevant to Togo. The review's core purpose was to establish a robust, evidence-based link between specific climate hazard and health outcomes by including research from countries that share a similar location and climate to Togo. This method allowed for the prioritisation of CSHOs strongly linked to climate hazards in the region.

2.2.2.1.1 Search strategy and criteria

The search strategy aimed to quantify the number of studies per health outcome and identify the corresponding climate hazards linked to the selected CSHOs.

- Search strategy and databases: The search strategy used keywords around diseases, health, climate change and climate hazards (e.g., temperature, rainfall, flooding, drought, etc.). The search was run in August 2025, with no restrictions on publication date, across the following databases: Medline, Embase, Global-health, Africa-wide Information, GreenFILE, Web of Science, and Scopus.
- Geographic scope: Studies had to be conducted in Togo or other countries that were both in the West Africa Region (as defined by the UN) and were predominantly in the same tropical savannah (Aw) climate zone. This zone is defined in the Köppen Geiger classification based on constrained CMIP6 projections as shown in *Figure 5* (Beck et al., 2023). Eligible countries included Togo, Benin, Nigeria, Ghana, Ivory coast, Guinea, Guinea-Bissau and Burkina Faso.
- Inclusion/Exclusion criteria: Studies were included only if they quantified the relationship between one or more climate hazards and one or more health outcomes. Both a specific climate hazard and a health or disease outcome were necessary for inclusion. Covidence software was used to coordinate review stages. Studies were excluded if they were qualitative, animal studies, or focused on air-pollution, as this was not considered as a climate hazard due to the complex relationship between climate, emissions, pollution and air-pollution.

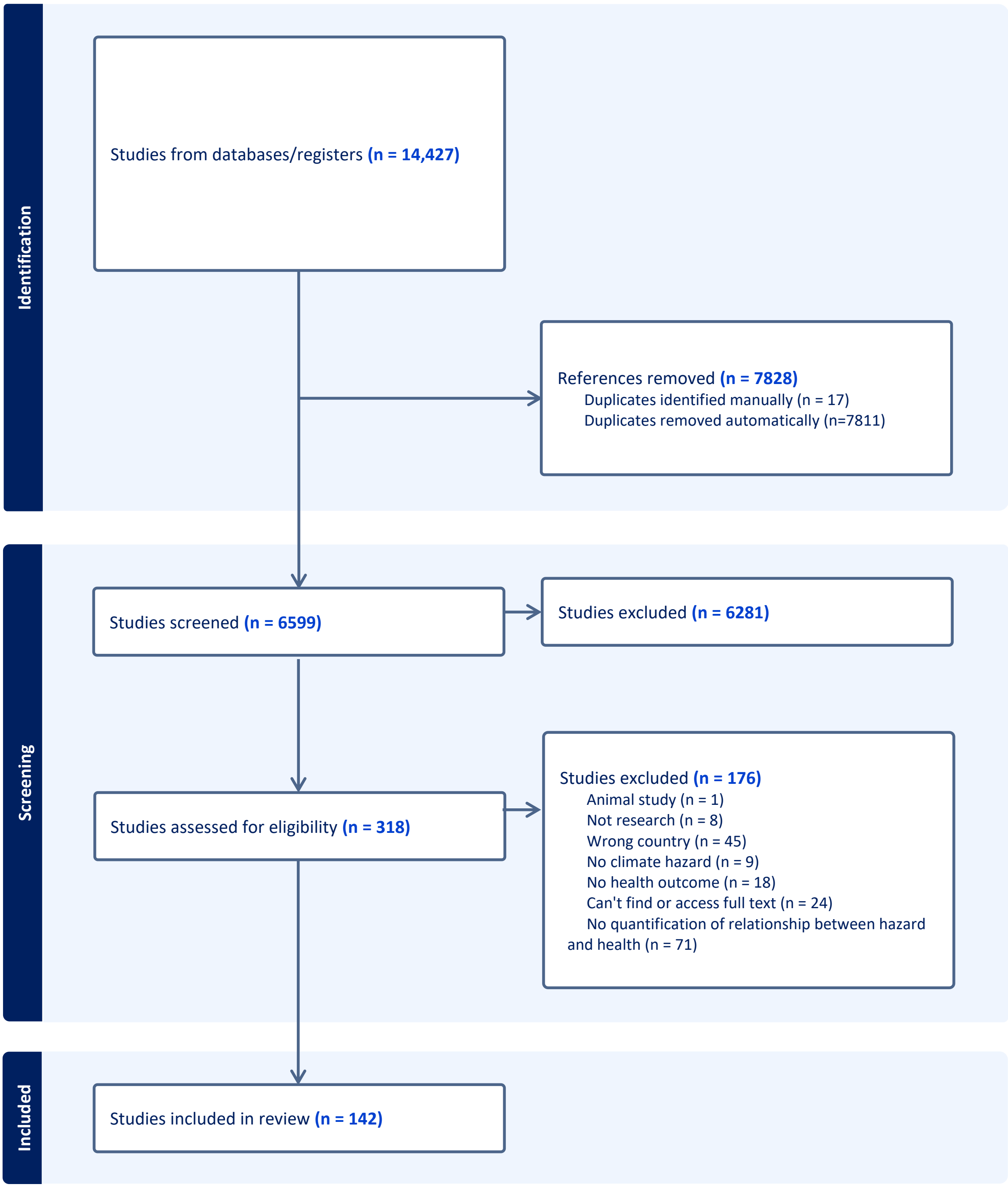
2.2.2.1.2 Screening process

After initial deduplicating this yielded 6,599 papers to screen by title and abstract. Two independent reviewers screened each title and abstract to evaluate if studies should proceed to full text screening. Disagreements were resolved by discussion between the two independent reviewers, with a third reviewer contributing if a decision could not be reached by the initial reviewers. Full-text review was then carried out again by two independent reviewers.

[5] *With the exception of being unable to lodge a review protocol in the Cochrane Library for peer review before starting the review, due to time constraints in delivering our results.*

The PRISMA diagram (*Figure 21*) below shows how many texts were screened and included/excluded at each section of the literature review.

Figure 21: PRISMA flow diagram for literature review

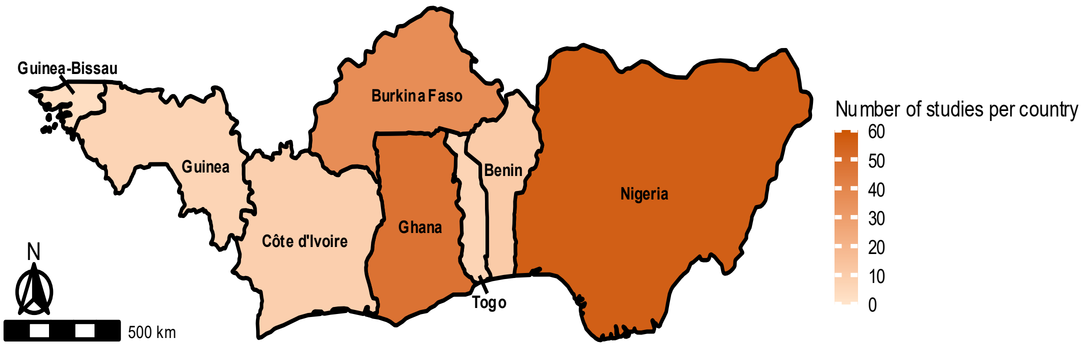


(Source: Own elaboration, 2025)

2.2.2.2 Geographic imbalance

The geographical distribution of studies reviewed highlights a significant dearth of literature on climate change and health focusing on Togo itself, as well as countries within the region. Most of the evidence came from Nigeria (58 studies), Ghana, and Burkina Faso, respectively. In contrast, only nine studies included disaggregated data from Togo. This points to a lack of local evidence-based insight into the potential impact of climate change on health in the country.

Figure 22: Number of studies per country included in the literature review



(Source: Own elaboration, 2025)

2.2.2.2.1 Identified climate-sensitive health outcomes

The review successfully identified the CSHOs that are the most important to the area and have a strong link to climate hazards. The conditions with the highest number of studies identified were malaria, diarrhoeal disease, malnutrition, meningitis, and adverse perinatal and neonatal outcomes. COVID-19 was separated from other respiratory diseases due to its complex multi-system disease, extending beyond respiratory outcomes (Baskett et al., 2023).

Table 1: Number of studies identified in literature review[6]

Disease	Climate Hazard(s)	Number of studies
Malaria	Temperature, precipitation, humidity, seasons	50
Diarrhoeal disease (any)	Precipitation, seasons, temperature, humidity, flooding	21
Malnutrition (including stunting)	Precipitation, temperature,	13
Meningitis	Humidity, temperature, season,	13
Adverse perinatal and neonatal outcomes: Neonatal mortality/stillbirth/preterm birth/low birth weight	Temperature, humidity	12
Mortality	Precipitation, temperature, flooding, drought, season, humidity	10
Other respiratory disease	Temperatures, humidity, windspeed	8
COVID-19	Temperature, humidity	7
Measles	Precipitation, temperature, humidity	4
Schistosomiasis	Precipitation, temperature	4
Dengue fever	Temperature, precipitation, humidity	3
Mental health	Drought	3
Other cardiovascular disease	Temperature, season	2
Other (diseases with only one paper)	Precipitation, temperature, season	18

(Source: Own elaboration, 2025)

[6] The total numbers in the "number of studies" column sum to more than 142 (the total number of studies included in the review), as several of the studies included multiple health outcomes

2.2.3 Prioritisation of Climate-Sensitive Health Outcomes: Multi-Criteria Decision Analysis

Following compilation of the results from the literature review, a bivariate decision analysis (a simple Multi-Criteria Decision Analysis - MCDA) was used to determine priority CSHOs for the FP-level CR, adapting the methodology used for the preliminary CR stage.

The MCDA was conducted to identify CSHOs most relevant to Togo — i.e., those with high health impact, strong local relevance, and substantial available evidence on climate-health linkages. These were represented by: 1) evidence volume, measured as the number of publications linking climate change to the outcome in West Africa from the climate-health literature review; and 2) the disease burden in Togo, using Global Burden of Disease (GDB)'s estimates of Disability-Adjusted Life Years (DALYs) (Level 3) (IHME, 2023)

Each criterion was standardised by 1) min–max normalisation, and 2) computing a (weighted) composite score, which was then ranked to obtain the final ordering. Robustness of the ranking was assessed with sensitivity analyses that varied the weights, and by substituting DALYs for deaths from data extracted from the Institute of Health Metrics and Evaluation (IHME)'s GBD data. **Error! Reference source not found.** summarises the results, with the columns showing standardised ranks based on the min-max method (original ranking of 1 = highest). The total is the sum.

Table 2: MCDA for selection of priority CSHOs for Togo

Cause (GBD Level 3 category)	Studies	DALYs	Studies scaled	DALYs scaled	Priority score	Ranking
Malaria	50	3694.74	1.000	0.730	0.865	1
Neonatal disorders	12	5050.84	0.208	1.000	0.604	2
Diarrhoeal diseases	21	3761.07	0.396	0.743	0.569	3
Meningitis	13	709.17	0.229	0.135	0.182	4
Malnutrition	13	332.38	0.229	0.060	0.145	5
Mental health conditions	3	727.85	0.021	0.139	0.080	6
COVID-19	7	275.26	0.104	0.049	0.076	7
Other respiratory diseases	8	61.32	0.125	0.006	0.065	8
Measles	4	181.65	0.042	0.030	0.036	9
Schistosomiasis	4	89.38	0.042	0.011	0.027	10
Other cardiovascular and circulatory diseases	2	244.04	0.000	0.042	0.021	11
Dengue	3	31.74	0.021	0.000	0.010	12

(Source: Own elaboration, 2025)

2.2.3.1 Prioritisation results

Following this prioritisation process, the three health outcomes selected as the primary priorities for in-depth modelling and project intervention were the conditions exhibiting the highest priority scores.

1. Malaria: Ranked first with a priority score of 0.865. Malaria had the heist number of supporting studies (50) and a significant disease burden (3,694.74 DALYs), solidifying its prioritisation inclusion.

2. Neonatal disorders: Ranked second with a priority score of 0.604. Although only 12 studies supported its climate link, it carried the highest DALY burden (5,050.84 DALYs) among all CSHOs analysed, underscoring its critical public health importance. This outcome specifically addresses adverse perinatal and neonatal outcomes, including preterm birth (PTB). Compelling

evidence indicates that heat stress threatens the entire maternal, infant, and child health continuum; in this analysis, PTB serves as the primary indicator for these cumulative risks (see *Section 0*).

3. Diarrhoeal diseases: Ranked third with a priority score of 0.569é This disease exhibited the third-highest DALY burden (3,761.07 DALYs) and a substantial number of supporting studies (21), confirming its necessity for inclusion.

This rigorous prioritisation ensured that the project's focus aligns directly with the CSHOs that represent the highest combined scientific evidence and disease burden for the population of Togo.

2.3 Climate Change Impacts on the Selected Climate-Sensitive Health Outcomes

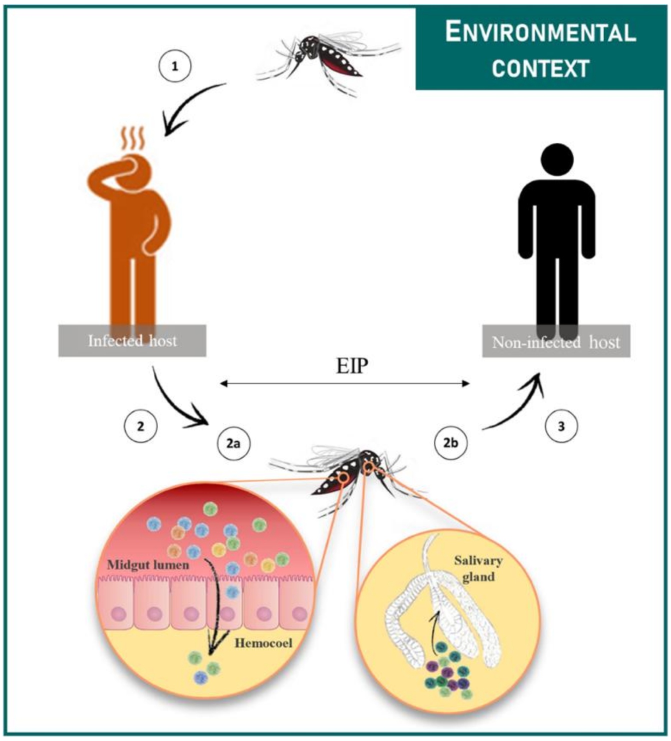
2.3.1 Expected Climate Impacts on Malaria

Vector-borne diseases include mosquito-borne, rat borne and tick-borne diseases. Increased temperatures have favoured the proliferation and reproduction rates of such vectors, as well as longer transmission seasons. As a result, the IPCC AR6 states with very high confidence that globally, the geographic area suitable for transmission will become larger (i.e., more areas will be susceptible to vector-borne diseases).

Malaria in humans is caused by five species of protozoa, with *P. falciparum* responsible for 97% of global cases. It is transmitted by the female *Anopheles* mosquitoes, mainly found in subtropical and tropical climates (Colón-González et al., 2021; IPCC, 2023a). Furthermore, DALY rates have decreased worldwide for many vector-borne diseases due to non-climatic factors. This is because vulnerability to these factors is heavily influenced by socioeconomic contexts (IPCC, 2023b).

Malaria transmission is strongly influenced by environmental conditions, which affect mosquito vector (*Anopheles* spp.) ecology, parasite development and human vulnerabilities over short (days to weeks), medium (seasonal) and long term (interannual and decadal) time horizons (Megersa & Luo, 2025; Van Der Deure et al., 2025). For example, temperature influences mosquito development rates, adult survival, and biting behaviours, as well as the malaria parasite's extrinsic incubation period. Temperature significantly influences the development, survival, reproduction, geographical distribution, and biting rates of *Anopheles* mosquitoes, as well as the development of the malaria parasite within the mosquitoes (shown in *Figure 23*). Specifically, a 2021 risk analysis published by *The Lancet Planetary Health* found that optimal climate conditions for year-round malaria transmission are between 20.9°C and 34.2°C, with annual precipitation ranging from 5,050.5 mm to 15,959.6 mm. Above 35°C, the length of malaria's transmission season decreases. The study found that globally, malaria is shifting towards higher altitudes, with tropical and subtropical regions increasingly more suitable for transmission (Colón-González et al., 2021).

Figure 23: Role of temperature in malaria transmission



(Bellone & Failloux, 2020)

Rainfall and surface water define the availability and seasonality of habitats in which mosquitoes lay eggs and larvae develop (Van Der Deure et al., 2025). Humidity further affects adult survival and biting behaviour (Komba et al., 2024). Climate change therefore has the potential to alter environmental suitability for malaria transmission, which may influence geographic distribution, length of the transmission season, intensity of transmission and long-term temporal trends in prevalence and burden (Van Der Deure et al., 2025). In addition, extreme events such as flooding can create temporary mosquito breeding sites and impact infrastructure, intervention campaigns and healthcare services, exacerbating malaria impacts (Megersa & Luo, 2025). In relation to flooding and higher precipitation, rainfall is crucial for creating breeding sites for *Anopheles* mosquitoes, and there is evidence in sub-Saharan Africa contexts that floods can create suitable breeding sites for disease vectors (Suhr & Steinert, 2022). Standing water resulting from rainfall provides the necessary habitat for mosquito eggs to be laid and for larvae and pupae to develop, while excessive rainfall can wash away breeding sites (Baril et al., 2023; Benedum et al., 2018). The humidity and moisture conditions that accompany floods also enable the development and survival of larvae and eggs (Suhr & Steinert, 2022).

Previous studies on malaria in Togo indicate the disease is endemic across the country, with year-round transmission, seasonal peaks tied to rainfall, and high heterogeneity across regions. In 2023, 2,367,706 confirmed cases and 1,281 deaths were recorded on a population of ~8 million people (WHO, 2024f). Children <5 accounted for 31.6% of cases. Prevalence ranged from 2.6% in the commune of Lomé up to 43% in the northern Savanes region (Kombate et al., 2024). A target has been set to eliminate malaria in Togo by 2030 under the National Malaria Control Program (*Programme National de Lutte contre le Paludisme* - PNLP), with four coordinated plans carried out to date to achieve this. Intervention effort has thus been high, including chemical larval control since 1975, and intermittent preventive treatment (IPT) and seasonal chemoprevention for pregnant women and children under 5 since 2005. Management of vector resistance to insecticides was introduced in 2006. Since 2008 vector control methods including long lasting insecticide treated bed nets (LLINs) have been used, and biolarvicide has been used at household level since 2010. Such interventions have had an impact on malaria prevalence and mortality patterns (Bakai et al., 2020).

In a study analysing monthly data compiled from medical records and CHW reports at multiple levels of the healthcare system (community, district, regional, and central), total malaria cases increased nearly fourfold over the period from 2008 to 2017, while the population increased by a factor of 1.3 (Bakai et al., 2020). This equates to an increase from 50 to 160 cases per 1,000 people, and a mean annual increase nationally of 13.1%. Increases were observed in all regions and subgroups, with smaller increases in the Commune of Lomé (8.1%) and a larger increase in the Centrale region (16.7%). Increases were greater in children <5 (13.1%) and people >5 (14.4%) than pregnant women (10.4%). The only decrease was in pregnant women in the Lomé Commune (-3.2%). By contrast, malaria deaths decreased nationally in all regions and subgroups. The Centrale and Plateaux regions saw the smallest decreases. Pregnant women showed larger decreases (-15.7%) than children <5 (-6.6%) or people >5 (-5.6%). Only pregnant women in the Kara region showed an increase in deaths (12.1%). Evidence from this dataset highlights a seasonal pattern in malaria prevalence with a peak in cases over July, August, September, corresponding to the rainy season (Thomas et al., 2024).

Thomas et al., (2024) recently used the same dataset for the period 2013-2017 to develop malaria prediction models by health district and target group using a range of meteorological (precipitation, humidity, temperature, wind speed) and environmental predictors (Normalised Difference Vegetation Index - NDVI) to forecast malaria cases nationally. Models were trained on data from 2013-2016 and then used to predict the number of cases in 2017 as a test of predictive performance. They used four different models of varying characteristics. The authors concluded that, although during the model training period the models had reasonable explanatory power (ranging from ~40-80% deviance explained), generally the models exhibited poor performance in predicting the number of cases in the subsequent year. The authors thereby warn against using such data / models for forecasting at present, particularly for informing control strategies and decision making. They, however, point to some avenues for potential improvement, including the use of finer spatial scale climatic predictors (<0.5°), finer temporal scale outcome data (weekly malaria case data), and inclusion of other covariates (e.g., proximity to water, land cover, housing characteristics, socioeconomic variables, intervention data).

The most recent Malaria Indicator Survey (MIS) was conducted in 2017-2018, with 171 cluster locations selected across the country (DHS Program, 2017). Analysis of these data indicated that malaria incidence is spatially clustered in Togo and associated with climatic and environmental factors including positive associations with mean temperature, precipitation, aridity and proximity to water bodies (Kombate et al., 2024). Trends in malaria incidence through time were also evaluated by linking routine surveillance data, provided by DHIS2 to the MIS cluster locations. Contrary to the trends reported above, this analysis showed a general decrease in incidence through time across 4 time points (2000, 2005, 2010 and 2015) in most regions, except in the northern Kara and Savanes regions. These regions showed incidence peaking in 2010 before decreasing in 2015. Finer temporal scale for malaria outcome data also exists in Togo, but spatial coverage is limited.

Since 2017, the PNLP, in collaboration with the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM), implemented a malaria sentinel surveillance program, consisting of real-time data collection and analysis to support decision-making. Data come from 16 health facilities ("sentinel sites"), four hospitals and 12 USPs across two health regions (Savanes, Plateaux). Weekly data on malaria morbidity and mortality are reported for children < 5, people ≥ 5, and pregnant women. Preliminary analysis of this dataset from 2017-2019 confirmed the pattern of increasing cases and deaths during the rainy season, and concentration of deaths among children <5 (Thomas et al., 2021).

Projection results of malaria incidence and prevalence in Togo are equivocal among consulted studies. Fall et al., (2023) used a mechanistic vector-transmission model (VECTRI) forced by CMIP6 climate model projections for two SSPs (SSP2-4.5 and SSP5-8.5) to estimate change in the entomological inoculation rate (EIR), a disease transmission indicator based on vector abundance and inferred biting rate, across West Africa (Fall et al., 2023). The key climatic parameters used in the model are temperature and precipitation. Results over Togo suggest relatively minor changes in risk over this period, with high-risk areas in the north of the country remaining high risk in the future with an average EIR in the 60-75 ib/p/m range[7] (inferred from maps, Togo specific results not presented). Areas in the far northeastern corner and southern coast region are projected to have slight declines in risk. The study suggests minor extensions (~0-2 months) of the malaria season, particularly in northern regions that are already highly seasonal (Fall et al., 2023).

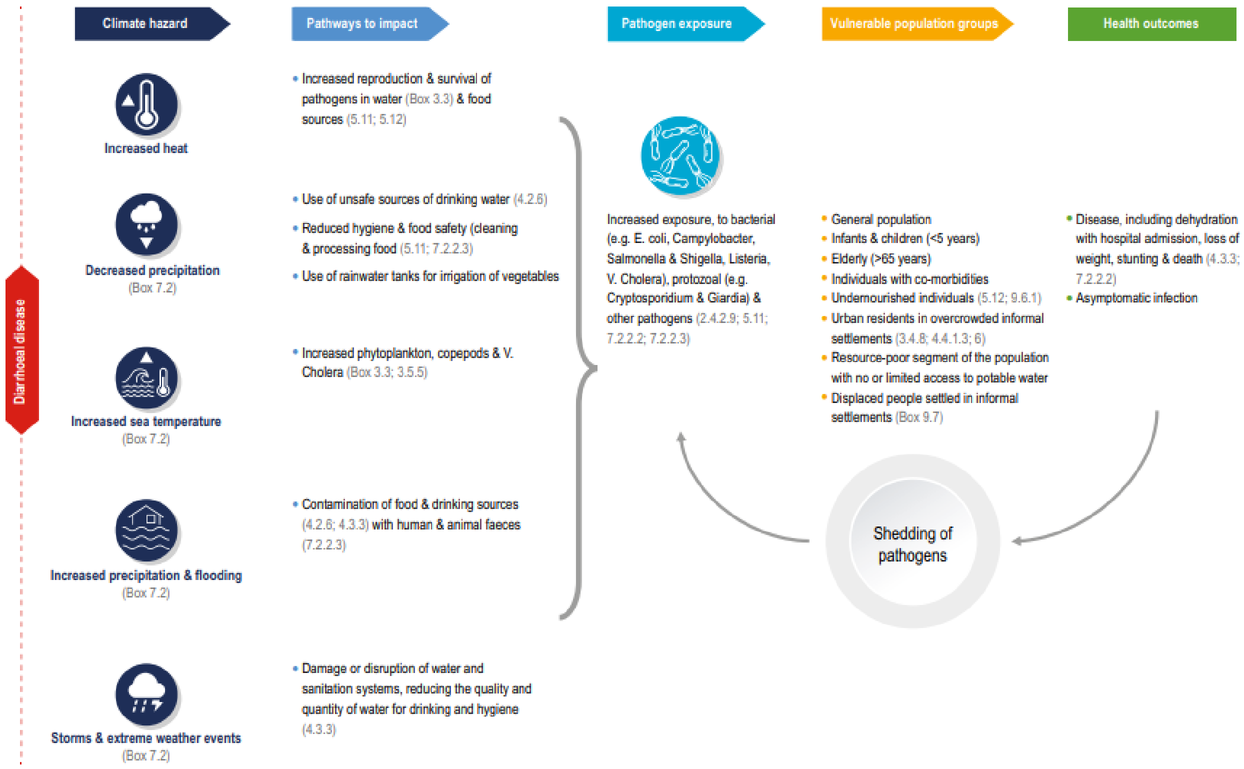
2.3.2 Expected Climate Impacts on Diarrhoeal Diseases

Diarrhoea is usually a symptom of a bacterial, viral, or parasitic infection in the intestinal tract. Infection is spread through contaminated food or drinking water, or from person to person because of poor hygiene (faecal–oral transmission). There are three types of diarrhoea: acute watery diarrhoea that lasts hours to days (includes cholera); acute bloody diarrhoea (also called dysentery); and persistent diarrhoea, which spans over a longer period. Interventions to prevent diarrhoea include access to safe drinking water, improved sanitation, and handwashing with soap (WHO, 2018a).

Climate hazards such as droughts, floods and extreme precipitation all increase the transmission of diarrhoeal disease bacteria and protozoa through the contamination of food and water. On a global scale, Africa has the highest death rates from these diseases (IPCC, 2023b). Alterations in wet and dry seasons, and impacts on sanitation infrastructure due to increased extreme climate events (e.g., wastewater overflow, flood damage to buildings) will have an impact on hygiene practices and knock-on effects on environmental pollution, compounding the risk of contracting these types of diseases (IPCC, 2023b). Under 1.5 °C- 2.1°C global warming, diarrhoeal diseases will cause an additional 20,000-30,000 deaths in the child population on the African continent, with West Africa being the most affected by 2050 (WHO, 2014). The causal pathways between climate and diarrhoea are complex, as can be seen in *Figure 24 (IPCC,* 2023a).

[7] The unit ib/p/m stands for infectious bites per person per month. This is a variation of the Entomological Inoculation Rate, which is the standard metric used to measure the intensity of malaria transmission in a specific area.

Figure 24: Transmission pathways of diarrhoeal disease in Africa



(IPCC, 2023a)

Many pathogens responsible for diarrhoeal diseases thrive in warmer temperatures, which can increase their reproduction rates, transmission and viability. Because diarrhoea can be the result of faecal-oral transmission, higher temperatures provide favourable environments for agents such as flies that will spread infection (Flückiger & Ludwig, 2022). High temperatures can accelerate the spoilage of food and the proliferation of foodborne pathogens, leading to an increased risk of diarrhoeal diseases transmitted through contaminated food. Bacteria like Salmonella and Escherichia coli (E. coli) can multiply rapidly in food left out at warm temperatures (Cissé, 2019). Higher temperatures also increase the reproduction rates of bacteria (Cissé, 2019). An analysis of demographic health surveys in 30 Sub-Saharan African countries spanning the 1991-2017 period, focusing on children under 5 years of age, found that a rise of 4.5°C raises the likelihood of diarrhoeal episodes by 1.6 percentage points (Flückiger & Ludwig, 2022).

Similarly to temperature, there is a positive correlation between flooding and diarrhoea worldwide (Abu & Codjoe, 2018; Levy et al., 2016). Flooding contaminates food and water with human and animal faeces, exposing people to infection, but also crucial sanitation infrastructure, reducing the frequency and appropriateness of hygiene practices. Moreover, excessive rainfall and flooding can overwhelm sanitation systems, leading to the contamination of drinking water with faecal matter, introducing or increasing the concentration of pathogens such as bacteria (e.g., E. coli, Vibrio cholerae, viruses (e.g., norovirus, rotavirus), and parasites (e.g., Giardia, Cryptosporidium) (Powers et al., 2023). This contamination occurs when sewage systems are overwhelmed or when surface runoff carries pathogens from animal waste and other sources into water bodies used for drinking, cooking, and bathing (Howard et al., 2016). Also, flooding and continuous rainfall can make it difficult to maintain hygiene practices due to damaged water supply infrastructure or limited access to clean water. This can result in increased hand-to-mouth transmission of pathogens (Abrams et al., 2021).

Diarrhoeal diseases are significantly linked to all major factors of climate variability, including temperature, relative humidity, rainfall, precipitation, and flooding (Gobena & Mengistu, 2025). Understanding this relationship is complex because causative pathogens (bacterial vs. viral) show varying, often non-linear responses to temperature changes (Levy et al., 2018; WHO, 2024). While bacterial infections are expected to increase with temperature, this might not hold for viral infections

(Carlton et al., 2016; Philipsborn et al., 2016). Furthermore, antecedent climate events- such as droughts followed by heavy rainfall- can drastically impact incidence rates (Levy et al., 2018).

Individual risk profiles for diarrhoeal diseases are shaped by a variety of interacting factors driven by societal roles, agricultural practices, access to safe drinking water, and underlying nutrition. This complexity highlights that vulnerability to these diseases depends not only on environmental exposure but also on the adaptive capacity of individuals, households, and communities (e.g., the ability to treat water or switch sources during extreme weather) (Dimitrova et al., 2023; Levy et al., 2018). Additionally, health interventions like vaccination campaigns may alter pathogen patterns, further complicating predictive models.
A recent large-scale systematic review and meta-analysis found a significant positive association that rising temperatures and increased rainfall lead to a higher risk of childhood diarrhoea, showing a 4% increase in risk for every 1°C of warming and a 14% increase in risk associated with increased rainfall. This effect was further exacerbated by poor WASH facilities (Geremew et al., 2024). A recent study using data from ten West African countries found increased odds of diarrhoea associated with higher temperature, and a non-linear relationship with precipitation (Dunn & Johnson, 2018).

In Togo diarrhoeal disease is widespread, representing the fifth highest cause of death as of 2021 (WHO, 2021). While little research exists focusing on diarrhoea in Togo specifically, the literature review identified several pieces of country specific research examining the relationship between climate hazards and diarrhoea in neighbouring countries. These papers showed a range of different and complex relationships between climate factors, including temperature, precipitation, drought and season and their incidence on diarrhoeal diseases. The most common climate hazards that were found to have a relationship with diarrhoeal disease were precipitation and temperature, although the nature of these relationships were not consistent across studies. For example, a recent study carried out in Ghana used meteorological data and information from the Ghana Health Services to model incidence of diarrhoea (Asare et al., 2022). This paper found a relationship between diarrhoea and temperature; however, the strength and direction of associations with temperature differed across the four different ecological zones in Ghana. They also found a weak biannual seasonality with major and minor peaks in June and October, respectively, coinciding with the rainy seasons (Asare et al., 2022).

Another paper modelling patterns of climate-related diseases in children found only a weak relationship between precipitation and diarrhoea (‘Spatial and Demographic Patterns of Climate Related Diseases among Hospitalised Children in Parts of Southwest Nigeria’, 2020)(‘Spatial and Demographic Patterns of Climate Related Diseases among Hospitalised Children in Parts of Southwest Nigeria’, 2020). A recent study examining the seasonality of cholera in sub-Saharan Africa found no seasonal relationship in Togo or Ghana but did find evidence of seasonal relationship in Benin and Burkina Faso (Perez-Saez et al., 2022). Another recent systematic review examined the potential future climate change-attributable diarrhoea burden globally (Miller et al., 2025). This study found that most identified research predicted an increase in diarrhoeal diseases in the near (2020–2040), mid (2040–2060) and long term (2060+) future due to climate change. They also found that high baseline burden of diarrhoeal disease, as it is in Togo, was associated with larger increases in burden (Miller et al., 2025).

Collectively, this evidence underscores that while the specific transmission pathways between climate hazards and diarrhoeal disease exhibit significant variability across diverse environmental settings and pathogens, the overarching findings confirm a relationship with potential implications for Togo. Consequently, this analysis seeks to rigorously quantify the extent to which climate variability and projected climate change are anticipated to influence the incidence of diarrhoeal disease among children under the age of five in Togo.

While numerous frameworks (such as WHO Climate Resilient Health Systems, IPCC scenarios, and the One Health approach as outlined in the table below) guide the strategic integration and cross-species modelling of climate impacts on health, few approaches currently exist to effectively utilise predictive modelling for targeting specific health interventions.

Table 3: Key frameworks guiding climate impact modelling in health

Framework/Guideline	Use in climate–disease modelling
WHO Climate Resilient Health Systems	Strategic integration and public health planning

IPCC SSPs/RCPs	Climate scenario inputs for disease projections
One Health	Cross-species, environmental transmission modelling
CDC BRACE	Practical guide to modelling and action on climate health risks
HIA Guidelines	Assessment of health risks in climate-sensitive contexts
Planetary Health / EcoHealth	Systems thinking and environmental integration
FAIR Principles	Data transparency and interoperability

(Source: Own elaboration, 2025)

2.3.3 Expected Climate Impacts on Preterm Birth

There is evidence to support that heat stress impacts the entire continuum of maternal, infant, and child health, with PTB serving as a critical indicator of these cumulative risks. These impacts are often compounded by poor infrastructure in sub-Saharan Africa, which disproportionately affects women in lower socioeconomic groups (Chersich et al., 2020; Nakstad et al., 2022a). Heat triggers several pathophysiological processes in foetuses, including increased foetal tachycardia, reduced foetal movements, and foetal distress (Nakstad et al., 2022a). In a meta-analysis of 70 studies, the authors found that high environmental temperatures are associated with preterm birth, low birth weight, and stillbirths. It found that the odds of a pre-term birth increased by 1.05-fold for each 1°C increase in temperature (Chersich et al., 2020). It also found that heat exposure in the final weeks of pregnancy appears to be most important for preterm births and stillbirths, although effects on birth weight seem to occur early in pregnancy (Chersich et al., 2020). Furthermore, it notes that pregnant women in low- and middle-income countries (LMICs) could be at particular risk from heat exposure, as they already have high rates of preterm birth and low birth weight. These risks are especially high among subgroups of pregnant women who have reduced physiological ability to respond to high temperatures (Chersich et al., 2020).

Similarly, heat also has an impact on health outcomes in infants. A systematic review of 26 studies worldwide evaluated the impact of short-term exposure to high and low ambient temperatures on infants under 1. High temperatures were associated with increased infant mortality and associated with increased hospital visits and admissions (Lakhoo et al., 2022). Increased temperatures also have an impact on breastfeeding and infant nutrition. A long-term exposure to 41°C leads to a decline in milk production. Malnutrition is a risk factor for other diseases, and those born too soon or with low birth weights are especially vulnerable (Nakstad et al., 2022a).

Furthermore, heat episodes are linked to diminished agricultural yields and household food insecurity, while simultaneously compromising water quality and availability, posing a significant risk to maternal and neonatal health. While research indicates that breast milk remains sufficient to hydrate exclusively breastfed infants under hot and arid conditions (Nakstad et al., 2022a), exposure to elevated temperatures during pregnancy induces various adverse physiological effects. These include reduced placental blood flow (Wang et al., 2020) and an inflammatory response that may trigger early labour (Chersich et al., 2020).

PTB, defined as delivery occurring before 37 completed weeks of gestation, is the primary cause of neonatal and under-5 child mortality globally (Lakhoo et al., 2025). In Togo, complications of PTB represent the sixth leading cause of mortality, accounting for 33.7 deaths per 100,000 population in 2021 (WHO, 2021). While Togo's PTB rate was estimated at 13.3% of all live births in 2010 (Blencowe et al., 2012), more recent 2020 data for the country is unavailable; however, stable trends from neighbouring West African countries, such as Benin and Nigeria, suggest these rates remain a persistent regional concern (Ohuma et al., 2023).

There is strong evidence that short-term exposure to high ambient temperatures increases the risk of PTB (Lakhoo et al., 2025). A recent systematic review of heat exposure impacts on maternal, foetal, and neonatal health identified 84 studies on PTB with high levels of agreement (very high confidence). The meta-analysis revealed a 4% increased odds of PTB per 1°C increase in temperature 0-4 weeks before delivery and a 26% increased odds during a heatwave versus a non-heatwave period (typically defined as 2 or more days above the 90th percentile of local temperatures) (Lakhoo et al., 2025). The majority of studies have been conducted in high-income countries, but there is some evidence to suggest that the heat-PTB impact is stronger in lower-middle-income countries.

Research on the link between climate and PTB remains limited in sub-Saharan Africa, primarily due to challenges in accessing high- quality environmental and medical data. One notable study involving 14 LMICs, including nearby Benin and Nigeria, observed a clear trend where the risk of premature birth rose as daily maximum temperatures exceeded 20°C (McElroy et al., 2022). Specifically, the data suggested that for every 1°C increase in heat, the odds of a preterm birth occurring within a week of exposure increased by approximately 5%.

While this temperature-related finding was not definitive due to limitations in how pregnancy length was self-reported by participants, the study found a much more certain connection regarding the diurnal temperature range – the difference between the day's highest and lowest temperatures. For example, when the gap between the hottest and coldest part of the day widened from 14°C to 16°C, the risk of preterm birth significantly increased (McElroy et al., 2022). This suggests that sharp temperature swings may be an even greater risk factor for expectant mothers in the region than high heat alone.

The current literature review identified nine studies examining the effects of heat on neonatal outcomes, with two specifically focusing on PTB (Ahmed et al., 2024; Reddam et al., 2025). In Kaduna State, Nigeria, an analysis of hospital records from Barau Dikko Specialist Teaching Hospital (2015–2023) revealed that unusually cold daytime temperatures were linked to an increase in preterm births, while warmer nighttime temperatures showed a slight decrease in risk (Ahmed et al., 2024). Conversely, a study in Ghana found that humid heat, measured by the average wet bulb temperature, had a significant impact during the second trimester of pregnancy. Specifically, every 1°C increase in humid heat during this middle stage of pregnancy was associated with an increase in the risk of preterm birth (Reddam et al., 2025).

While most research focuses on heat exposure in the final weeks before delivery, growing evidence indicates that high temperatures during early and mid-pregnancy are also critical factors. Recent findings suggest that the risk of premature labour may actually be higher when extreme heat events occur more than four weeks before birth. One meta-analysis reported that exposure during these longer-term periods resulted in a 1.37-fold higher risk of preterm birth compared to exposure occurring just before delivery (Lakhoo et al., 2025).

2.3.3.1 Additional climate-sensitive health outcomes

While the literature review and MCDA established malaria, diarrhoeal disease, and preterm birth as the three primary CSHOs for this report, the review further identified several other areas with an established evidence base linking climate change to health outcomes relevant to Togo. These outcomes were identified in regional countries sharing similar climatic characteristics, indicating their high relevance to the Togolese context.

Meningitis and malnutrition, supported by thirteen studies each, were ranked fourth and fifth in the MCDA, reflecting their significant burden of disease within the country. These findings underscore the potential regional importance of these conditions alongside other identified diseases. Additionally, eight studies specifically quantified the relationship between general mortality and climate hazards that will be exacerbated by climate change, including precipitation, temperature, flooding, drought, seasonality, and humidity. This evidence reinforces the underlying role of CSHOs as critical drivers of mortality across the West African region. Despite these broader findings, the remainder of this report focuses exclusively on the three prioritised outcomes to ensure a targeted and robust analysis.

2.3.4 Health Impacts by Region: Malaria, Diarrhoea and Heat

2.3.4.1 Status of malaria in Togo by region

Malaria is endemic in all regions of Togo, with its transmission season lasting throughout the year, experiencing seasonal recurrence during the rainy periods (mid-March to late July and early September to early November). A review of malaria case data per health district from 2008-2017 (Thomas et al., 2021) determined that maximum seasonal indices were observed during or shortly after a rainy season, and the minimum seasonal indices during the dry season, especially between January and April. There is also an indication that in the north of the country, malaria transmission is highly seasonal, particularly for children under 5. Seasonal variations of malaria are less evident in some areas of the Lomé commune region (Thomas et al., 2021). Despite this trend, it is important to note that malaria transmission is mediated by multiple factors, such as temperature and malaria control and prevention activities (Thomas et al., 2021).

In 2019, external consultations represented 54.4% of all consultations in Togo (MSHP, Direction Générale des Études de la Planification et de l'Information Sanitaire, 2019). This means that it is a fundamental priority for Togo on a health planning and policy level. Currently, Togo's 2023-2026 PNLP focuses on vector control, chemoprevention, diagnostic strengthening both in healthcare facilities and within communities, treatment, surveillance, monitoring and evaluation, and advocacy for behavioural change and awareness, as well as programming management (MSHP, 2023b). As of 2016, the various iterations of PLNP plans have aligned with the WHO's Global Technical Strategy Against Malaria (*Stratégie Technique Mondiale contre le Paludisme*) 2016-2030.

Another academic study reviewed monthly malaria-related data collected by CHWs in Togo in the context of a knowledge gap identified by Togo's *PNLP* (Bakai et al., 2020). These CHWs are supervised by the heads of USPs to ensure data quality, which is then reviewed and compiled at the regional level. The data for this study were collected from 6,000 CHWs' notes on all 944 Togolese USPs, then grouped in 43 health districts and 6 health regions. *Table 4* shows the number of cases in 2017 (Bakai et al., 2020).

Table 4: Number of cases per region and rate per 1000 inhabitants as of 2017

Region	Number of cases	Rate per 1,000 inhabitants
Centrale	171,996	228.81
Kara	192,973	206.02
Savanes	192,244	190.80
Plateaux	301,305	180.10
Maritime	277,061	129.21
National level total	**1,204,192**	**159.88**

(Bakai et al., 2020)

As such, the regions of **Centrale, Kara and Savanes** have the highest rate of malaria cases per 1,000 inhabitants based on the CHW data. These are also the prioritised regions for this project.

Moreover, the data collected shows **that the incidence of malaria has increased in all regions**, particularly Centrale, Savanes and Maritime. This higher incidence can be explained by malaria's expansion into higher altitudes, but also by higher detection rates (Bakai et al., 2020). This increase in annual average cases has increased in all groups: children under 5 (13% increase), pregnant women (10% increase) and persons over 5 years of age (14% increase) (Bakai et al., 2020).

Table 5: Mean annual percentage change in malaria cases per region (2008-2017) [8]

Region	Mean annual percentage increase in malaria cases (2008-2017)
Centrale	16.7
Kara	13.5
Savanes	15.8
Plateaux	11.3
Maritime (incl. Lomé Commune)[9]	15.4
National level	**13.7**

(Bakai et al., 2020)

In terms of malaria's mortality, as of 2017, the regions with the highest death rate per 100,000 inhabitants caused by malaria are **Plateaux, Centrale and Kara,** as seen below (Bakai et al., 2020)**.** Although the data is from 2017 (5 years old at the time of writing), it comes from a peer-reviewed journal that uses community health worker reports.

[8] *Data from Lomé Commune is sometimes grouped with Maritime region, as in this case.*

Table 6: Deaths attributed to malaria per region in 2017

Region	Number of deaths	Rate per 100,000 inhabitants
Centrale	211	28.07
Kara	110	11.74
Savanes	95	9.43
Plateaux	305	18.23
Maritime	135	6.30
National level	**973**	**12.92**

(Bakai et al., 2020)

2.3.4.2 Status of diarrhoea in Togo by region

In Togo, the prevalence of diarrhoea in children under five is 15% (Demissie et al., 2021), with particularly high rates in children aged 6-11 months (23%) and 12-23 months (22%), according to data collected in the 2014 government health survey (MPDAT, 2015). The introduction of rotavirus vaccination, with a current coverage of 79% (WHO, 2023b), has led to a substantial reduction in related hospitalisations (Tsolenyanu et al., 2014, 2018).

The Health and Public Hygiene Ministry's 2019 statistical review records varying diarrhoea data at the district level and indicates cumulative cases as an indicator of morbidity (MSHP, Direction Générale des Études de la Planification et de l'Information Sanitaire, 2019). The same statistical review found the following number of cases:

Table 7: Number of bloody diarrhoea and acute diarrhoea cases in Togo, per region, in 2019

Region	Bloody diarrhoea cases	Severe diarrhoea cases	Total cases (absolute number)	Total rate per 10,000 people
Savanes	1,532	0	1,532	15.2
Kara	1,757	123	1,880	19.9
Centrale	1,439	160	1,599	21.0
Plateaux	2,152	175	2,327	13.8
Maritime	561	219	780	3.6
National total	7,529	700	8,229	N/A

(MSHP, Direction Générale des Études de la Planification et de l'Information Sanitaire, 2019)

As can be seen from *Table 8*, two types of diarrhoeic disease were recorded. The region of Plateaux, followed by Kara, are the ones with the highest number of absolute cases in 2019. The highest rates of bloody diarrhoea and severe diarrhoea cases together, per 10,000 people, are the regions of Centrale, Kara and Savanes, the same regions as where malaria incidence is the highest. In terms of recorded deaths, only 3 deaths for bloody diarrhoea were recorded that year, two of them in the Savanes region (MSHP, Direction Générale des Études de la Planification et de l'Information Sanitaire, 2019).

As previously mentioned, children under 5 are a particularly vulnerable group to diarrhoea in Togo. An earlier cluster household survey conducted in 2017 found that the number of children under 5 who had experienced diarrhoea in the 2 weeks before the survey was the highest in the Plateaux region, followed by Savanes and Kara regions (INSEED, 2017).

As of 2022, the cases of non-precise gastroenteritis, Amebiasis, and bloody diarrhoea are summarised in the table below by region.

Table 8: Number of diarrhoeal diseases cases by type and by region in 2022

Region	Bloody diarrhoea-Shigella (suspected cases)	Bloody diarrhoea-Shigella (Confirmed cases)	Gastroenteritis cases with unprecise origin	Intestinal amebiasis cases	Total

Centrale	1,500	55	12,888	3,119	17,562
Kara	2,039	114	23,597	11,244	36,994
Savanes	2,188	112	25,436	5,918	33,654
Plateaux	2,024	45	19,887	5,963	27,919
Maritime	777	19	14,163	2,746	17,705
Lomé Commune	122	11	34,843	4,608	39,584
National total	8,650	357	130,814	33,598	173,419

(INSEED, 2017)

2.3.4.3 Status of maternal and child health in Togo by region

Togo faces persistent and severe challenges in maternal and child health, exacerbated by socio-economic and geographic disparities. The maternal mortality ratio is estimated at 349 deaths per 100,000 live births in 2023 (WHO, 2025). Childbirth remains risky, as the most common direct causes of maternal death include postpartum haemorrhage (47%), eclampsia or hypertensive disorders (24%), and sepsis/infections (13%), yet only 12% of maternal deaths are reviewed through formal audit processes (Douaguibe et al., 2023).

The challenges extend to newborn health as the neonatal mortality stands at 24 per 1,000, and stillbirths at 20 per 1,000 total births (UN IGME, 2025).

Table 9: Neonatal and infant mortality rates

Indicator	Number	Unit of measure	Lower bound	Upper bound
Neonatal mortality rate	24.9	Deaths per 1,000 live births	19.2	32.1
Neonatal deaths	0.4	% of under-five deaths	0.3	0.4
Stillbirths	5,878	Number of stillbirths	5,043	6,878
Stillbirth rate	20.7	Stillbirths per 1,000 total births	17.3	24.8
Neonatal deaths	6,930	Number of deaths	5,360	8,928
Infant deaths	11,074	Number of deaths	9,010	13,617

(UNICEF, 2019)

Table 10: Disparities in key maternal and newborn health interventions

		Coverage – care for mothers						Coverage – care for newborns								Other
		Demand for family planning satisfied by modern methods (%)	Antenatal care coverage at least 4 times (%)[a]	Skilled attendant at birth (%)	Institutional delivery (%)	Delivered by caesarean section (%)	Postnatal care of mothers within 2 days (%)	Postnatal care of newborns within 2 days (%)	Newborn weighed at birth (%)	Early initiation of breast-feeding (%)	Exclusive breast-feeding (<6 months) (%)	BCG vaccine for newborn (%)	DPT 1 vaccination received (%)**	Tetanus protection for newborns (%)	Birth registration (%)	Births by age 18 (%)[a,a]
	National estimate	17	57	59	73	7	71	35	60	61	57	95	93	77	78	13
Region	Grande Agglomération de Lomé	20	74	94	96	13	81	44	85	59	57	98	96	83	97	10
Region	Maritime (Sans Agglomération de Lomé)	15	56	75	80	8	83	38	62	80	53	95	89	79	86	16
Region	Plateaux	17	49	42	63	4	65	21	43	66	50	91	88	74	60	21
Region	Centrale	23	60	45	75	6	68	50	66	34	50	98	98	81	81	24
Region	Kara	20	51	41	56	4	62	27	46	46	77	96	95	72	65	21
Region	Savanes	10	46	36	52	2	60	37	50	62	61	98	97	70	78	15

Key for tables: 0-24% 25-49% 50-74% 75-100% Data not available

(UNICEF, 2018)

2.4 Projected Climate Change Impacts to Climate-Sensitive Health Outcomes

2.4.1 IPCC Concepts and Definitions

The definitions and concepts used in this document follow the AR6 of IPCC's Working Group II (IPCC, 2023b). Following the framework presented in the report, the risk of climate change-related impacts on human and natural systems is conceptualised as the interaction of climate hazards, exposure and vulnerability factors. These concepts are defined as follows:

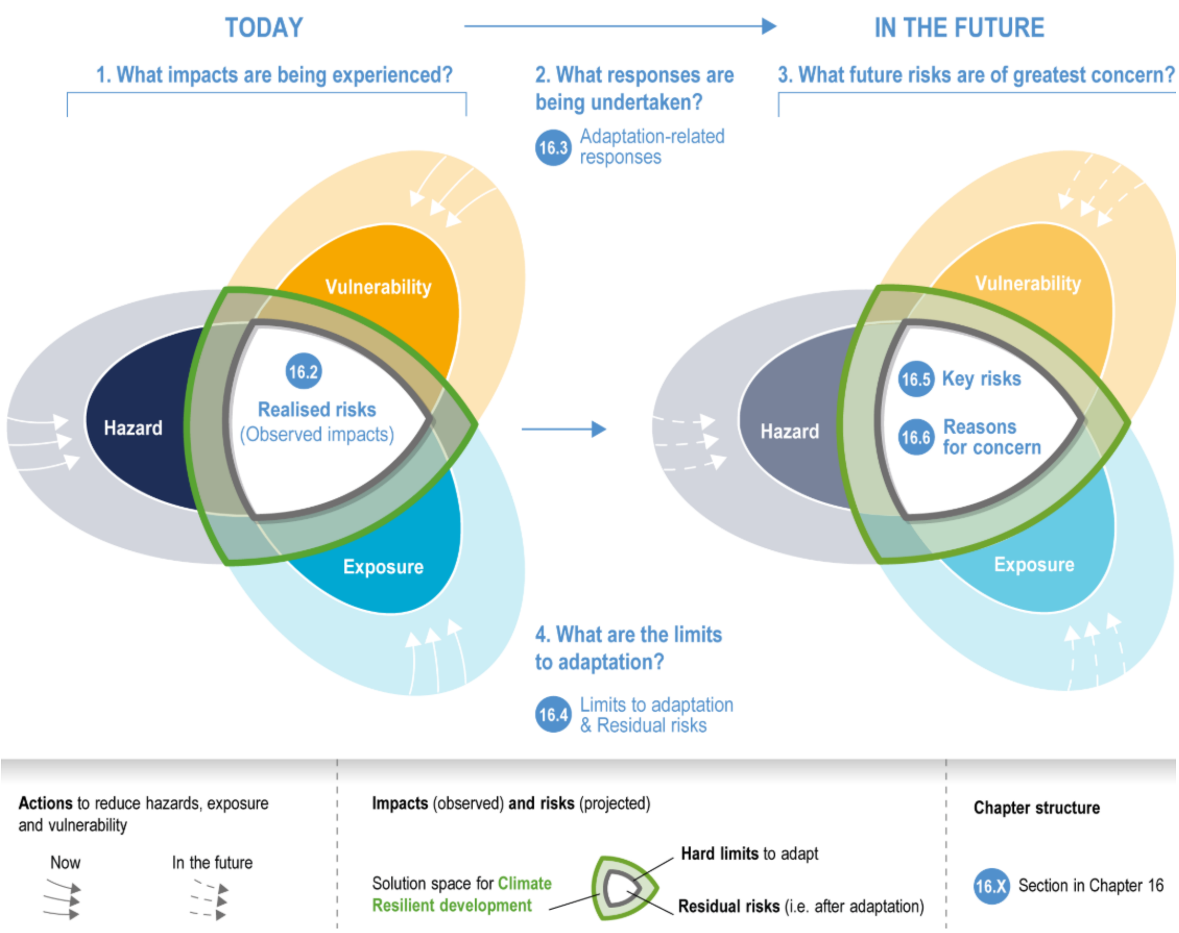
- Hazard: A natural or human-induced physical event or trend that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.

- Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social or cultural assets in places and settings that could be adversely affected.

- Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm, and lack of capacity to cope and adapt.

The interaction between these interrelated factors is summarised in Figure 25 (IPCC, 2023b). As illustrated in the graphic, risk is created through the interaction of hazard, exposure and vulnerability. Within this framework, each domain must be considered to understand how risks manifest across different populations.

Figure 25: Interaction between Hazard, Exposure and Vulnerability



(IPCC, 2023b)

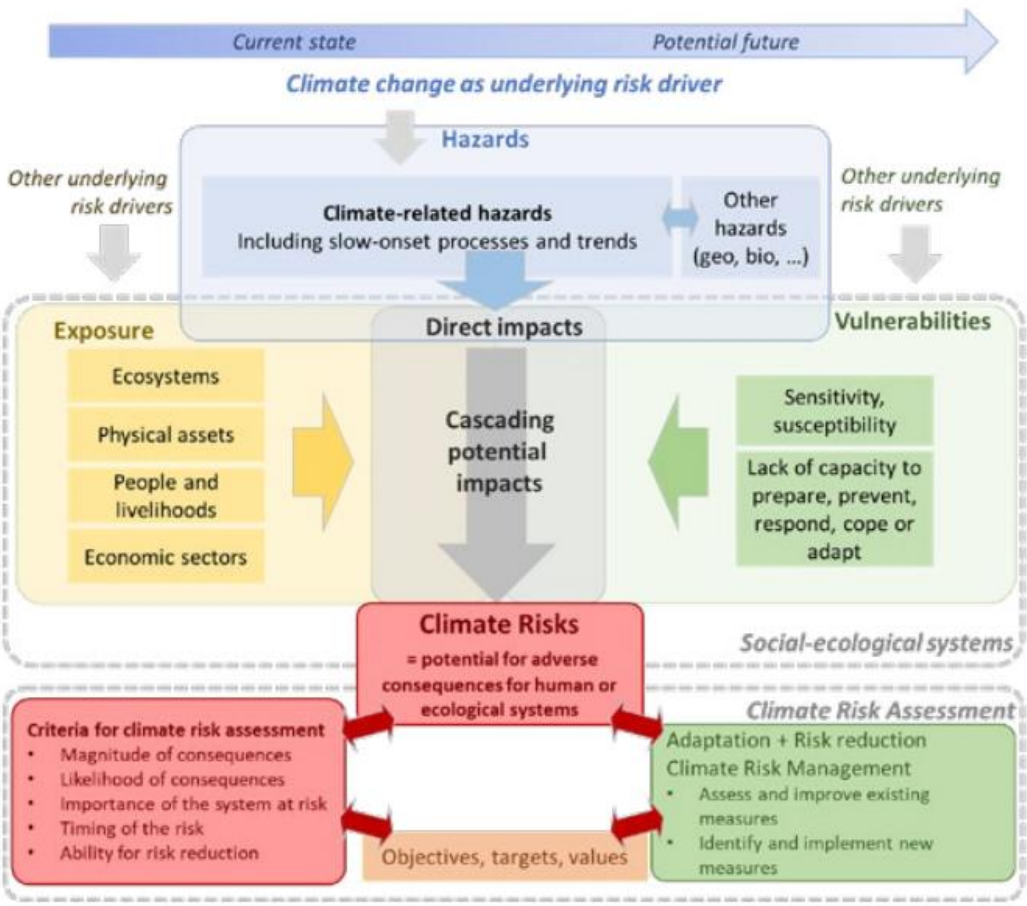
2.4.2 Risk Assessment Framework and Impact Chains

The 2023 GIZ Climate Risk Sourcebook provides a standardised framework for assessing the theoretical concept of risk, incorporating the latest findings from the IPCC Sixth Assessment Report (Zebish, M. et al., 2023). Within a climate-health assessment, this framework requires defining specific climate hazards, identifying exposed populations, and characterising key vulnerability factors for each health impact. Future risk is then determined by projecting how these underlying components evolve in response to a changing climate.

Impact chains are utilised throughout this report to map the causal pathways from climate hazards through exposure and vulnerability to final health impacts. While these conceptual models are frequently used to prioritise indicators for semi-quantitative assessments, they are adopted here to illustrate the specific factors incorporated into the preliminary risk assessment (Stage 1) and subsequent epidemiological models (Stage 2). While impact chains do not capture every driver of risk, they serve as context-specific tools designed to highlight the most critical factors for consideration.

*Figure 26*Figure 26, adapted from the GIZ Climate Risk Sourcebook, outlines the general structure for the development of these impact chains.

Figure 26: Impact chain structure



(Zebish, M. et al., 2023

2.4.3 Data Sources

2.4.3.1 Climate data

Climate data sources and processing methodologies are detailed in *Section 2.1.2.*

2.4.3.2 Socio-economic and public health datasets

National Institute of Statistics and Economic and Demographic Studies (*Institut National de la Statistique et des Études Économiques et Démographiques* – INSEED) Census 2022 :

Household geographic coordinates (longitude and latitude) were used to map records to corresponding prefectures or cantons, resolving discrepancies in nomenclature and coding between datasets. Using provided weighting factors, population estimates were generated at the administrative level for both the general population and key demographics subgroups, such as children under five and women of reproductive age. Additionally, specific vulnerability indicators, including access to air conditioning and improved drinking water sources, were calculated at the household level (INSEED, 2022).

DHIS2:

Health data were extracted from the DHIS2 platform at a monthly resolution from January 2018 to August 2025 across 39 prefectures. Following extraction, variables were aggregated by prefecture and categorised into Togo's five administrative regions to ensure spatial consistency. A minimum event count of 1 was utilised, and the classification of missing values as 0 was determined on an outcome-specific basis.

MIS:

Data from the 2017 MIS were processed by merging individual, household, and child recodes (DHS Program, 2017). The final analysis focused on children under five, incorporating malaria biomarkers alongside socio-economic and environmental covariates. This linked dataset was integrated with a Global Positioning System (GPS) cluster coordinate, with variables converted into standardised categorical formats. Derived covariates, including wealth indices and housing quality, were aggregated to the cluster level, representing 141 clusters across 39 prefectures

Published geospatial and modelled data sources:

- Healthcare accessibility: Access to facilities was estimated using the Malaria Atlas Project data, which calculated motorised travel time to the nearest health facility (HF) as a function of distance, land cover, and topography. This 1 km resolution data was averaged at the prefecture level (Weiss et al., 2020).

- Improved housing index: Estimates for improved housing material were derived from a Bayesian analysis of public health surveys (Demographic and Health surveys – DHS and Multiple Indicator Cluster surveys - MICS). A composite index was produced by averaging the coverage of improved walls, floors and roofs at the prefecture level (Colston et al., 2024).

2.4.4 Risk Models

2.4.4.1 Stage 1: Preliminary risk assessment and regional prioritisation

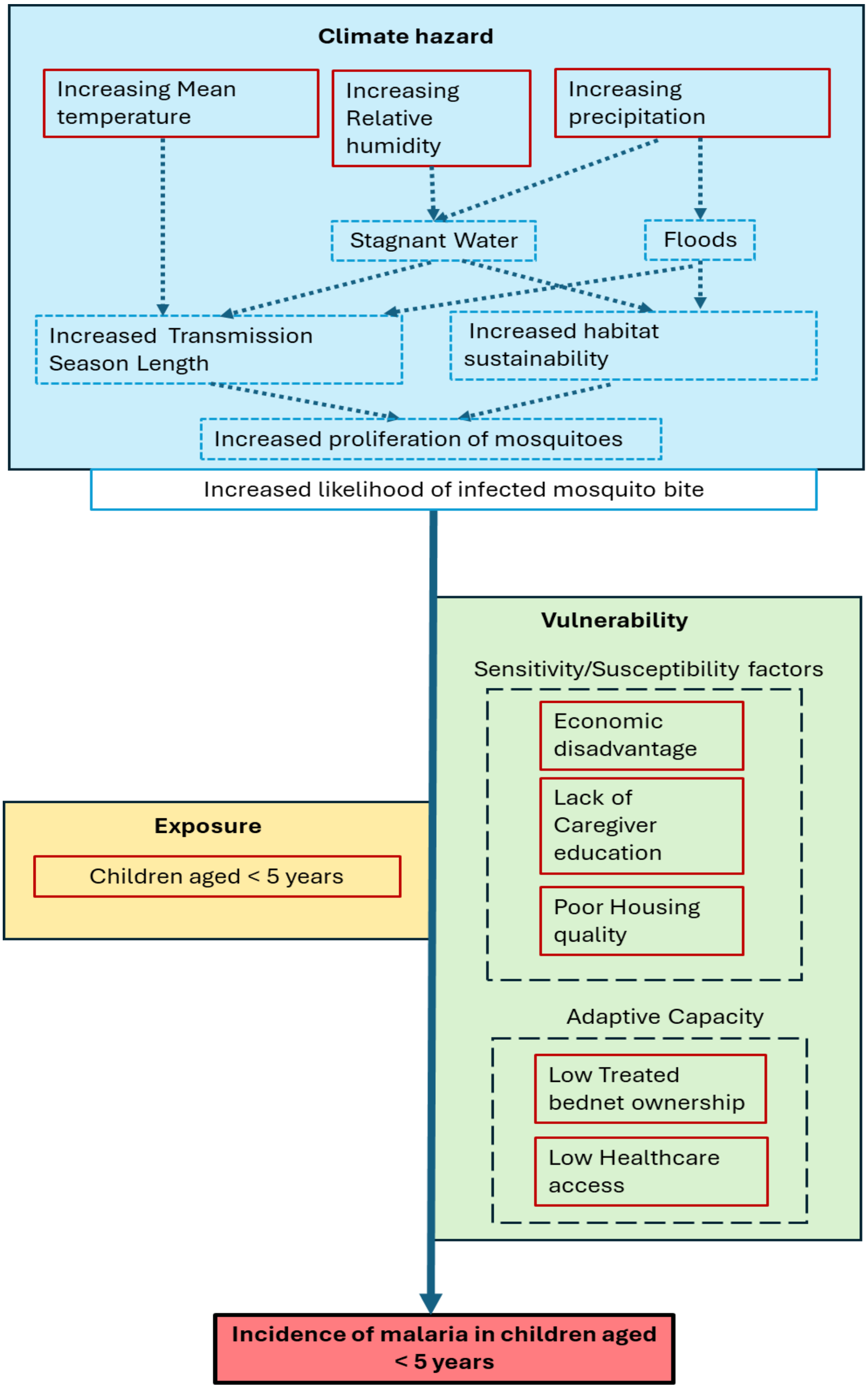
Preliminary climate risk mapping followed the IPCC risk assessment framework, where overall risk is conceptualised, as described in detail above, as:

Risk = Hazard × Exposure × Vulnerability

Figure 27 to *Figure 29* summarise the key hazards, exposures and vulnerabilities used in the Stage 1 risk assessment for each health outcome.

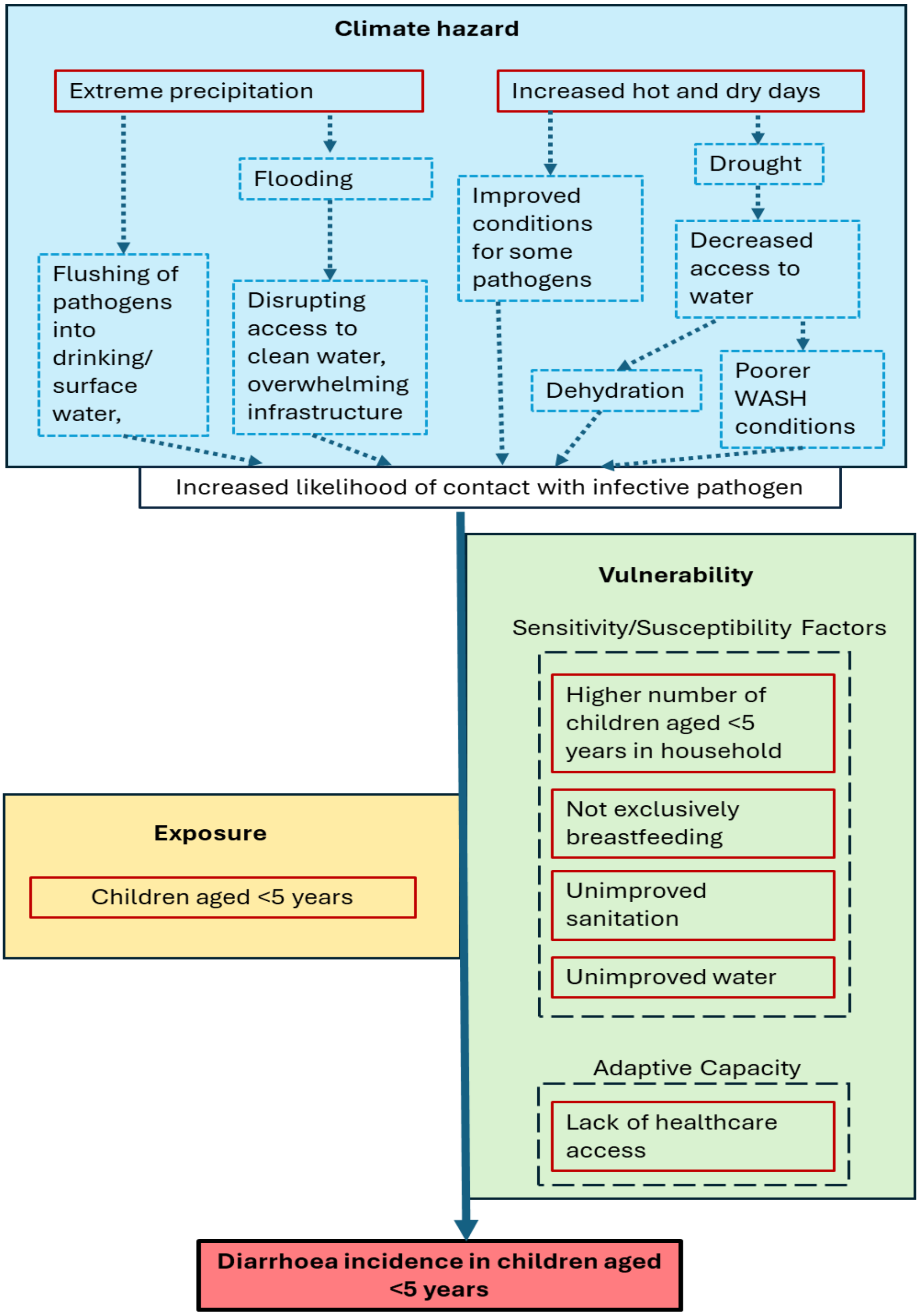
The impact chains presented below take the hazard, vulnerability and exposure factors, and visually represent how these factors can potentially increase the risk of incidence of the three CSHOs. These impact chains are representations of the risk maps and factors that were considered in the modelling and only contain the factors that have been accounted for in these sections. The impact chains also highlight the roles of adaptive capacity and sensitivity/susceptibility within the wider category of vulnerability.

Figure 27: Impact chain – risk of malaria



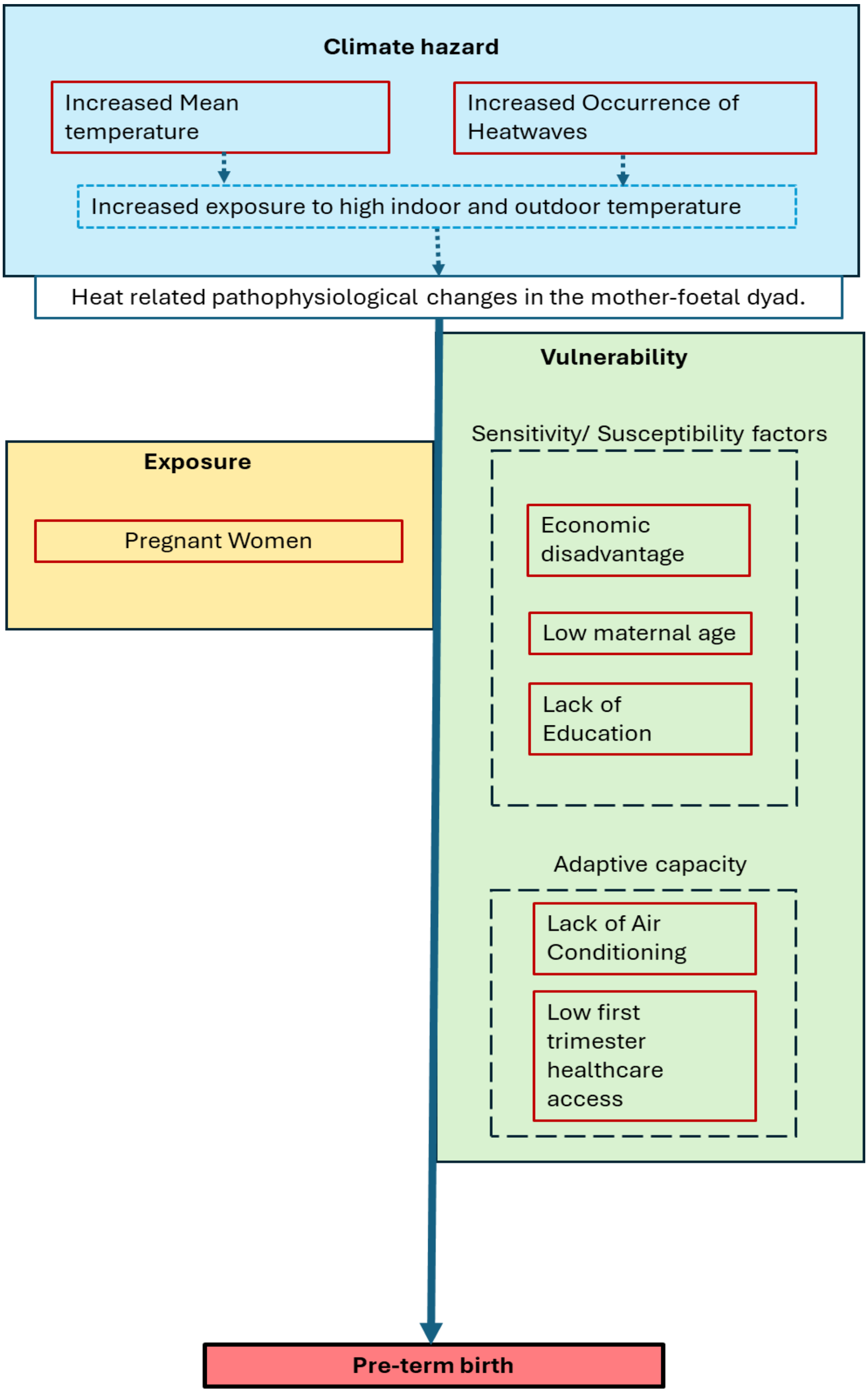
(Source: Own elaboration, 2025)

Figure 28: Impact chain – risk of diarrhoeal disease



(Source: Own elaboration, 2025)

Figure 29: Impact chain – risk of preterm birth



(Source: Own elaboration, 2025)

2.4.4.2 Stage 2: Epidemiological modelling

The following section presents an overview of the methodological approach for stage 2. For a complete overview, see *Annex 2.a, Section 4.5.5.*

2.4.4.2.1 <u>Malaria</u>

Data and model setup: Monthly prefecture-level confirmed malaria cases in children under 5 were obtained from the DHIS2 system (January 2018–August 2025) to ensure national coverage and temporal consistency. These were paired with high-resolution daily climate data (MSWX) aggregated to monthly metrics, including temperature, precipitation, and humidity, as well as static socio-economic covariates like wealth, education, and bed net usage.

Climate associations and projections: The modelling process tested various combinations of climate variables to identify the best predictors of malaria incidence. The final model was then used to project future incidence under historical and future climate scenarios (SSP2-4.5 and SSP5-8.5) using the NASA NEX-GDDP-CMIP6 dataset. Projections were generated for near-term (2021-2040) and mid-century (2041-2060) periods, providing estimates of percentage change in incidence relative to a baseline, along with functions for climate variables (current and lagged), long-term trends, and seasonality, while accounting for spatial heterogeneity through random intercepts.

Validation: Model performance was rigorously tested using residual diagnostics, checks for overdispersion, and sensitivity analyses on model specifications. Temporal validation involved training the model on data from 2018–2021 and testing its predictive skill on held-out data from 2021–2025. Additionally, the risk of extrapolation was assessed by clamping climate variables in future projections to the ranges observed in the training data, ensuring the model's predictions remained robust within observed climatic conditions.

2.4.4.2.2 <u>Diarrhoeal disease</u>

Data and model setup: Like the malaria approach, monthly prefecture-level diarrhoea cases were sourced from DHIS2 for the same period. The modelling framework used a negative-binomial Generalised Additive Model (GAM) with a population offset to estimate incidence. Key climate inputs included specific hazard indices for "wet contamination" and "hot-dry" pathways derived from daily temperature and precipitation data. Static vulnerability covariates focused on WASH factors, such as access to improved water and sanitation, low exclusive breastfeeding, access to healthcare, and household crowding.

Climate associations and projections: The model captured non-linear and delayed effects of climate variables on diarrhoeal incidence using smooth functions. Future risk was projected by applying the finalised model to historical and future climate scenarios (SSP2-4.5 and SSP5-8.5) derived from NASA NEX-GDDP-CMIP6 data. These projections provided estimates of changes in diarrhoeal incidence for future time slices relative to the baseline period, incorporating both parametric and model uncertainty.

Validation: The model underwent extensive validation, including residual diagnostics and sensitivity analyses to compare different hazard specifications. Checks for spatial dependence (Moran’s I) and temporal hold-out validation were conducted to ensure the model's reliability. As with malaria, the risk of extrapolation was evaluated by restricting climate covariates in projections to the range observed during the training period.

2.4.4.2.3 <u>Heat impacts on preterm birth</u>

Data and model setup: Monthly counts of preterm births and live births were extracted from DHIS2 (January 2018–December 2024). A two-stage modelling approach was used. First, time-series regression models (distributed lag non-linear models) were fitted for each prefecture to estimate the delayed effects of heat over a 0–8-month lag period. Second, these prefecture-specific estimates were pooled using a random-effects meta-analysis to derive national-level associations.

Climate associations and projections: The final model estimated the cumulative risk of PTB associated with heatwaves, defined as two or more consecutive days exceeding the 95th percentile of maximum temperature. Future projections combined these exposure-response functions with 150-year time series of heatwave events from CMIP6 climate models. The analysis calculated the attributable fraction of PTBs due to heatwaves for scenarios, accounting for projected changes in live births and fertility rates.

Validation: Validation included assessing model residuals for independence and autocorrelation and testing the sensitivity of the results to different model specifications, such as removing humidity adjustments or changing lag structures. The projection pipeline's robustness was verified by testing alternative assumptions, such as holding birth rates constant or using global effect estimates instead of local ones. Uncertainty intervals for future projections incorporated both epidemiological and climate model variability.

2.4.5 Results

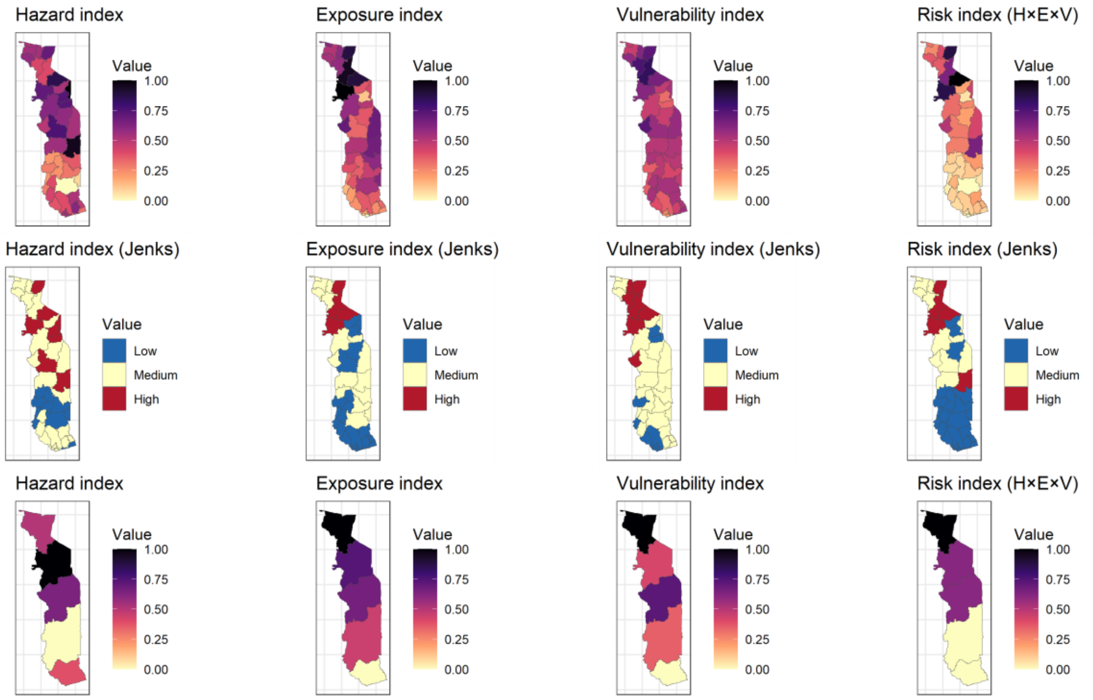
2.4.5.1 Stage 1: Results

2.4.5.1.1 <u>Malaria</u>

Hazard, exposure, and vulnerability indices were combined to estimate the multiplicative risk of malaria across Togolese prefectures. *Figure 30* shows the resulting relative risk, the corresponding low–medium–high classification, and the aggregated regional picture.

Both exposure and vulnerability are more heavily concentrated in the North, and the hazard itself increases in frequency in northern and, to a lesser extent, southern prefectures. Together, these patterns produce a distinct North–South gradient, with northern regions consistently exhibiting higher overall risk. Prefectures classified as high-risk typically display both high exposure and high vulnerability, again predominantly in the North. In contrast, Plateaux and Maritime regions show the lowest overall malaria risk.

Figure 30: Risk assessment for malaria in children under 5. Top row) Prefecture-level component indices (rescaled 0-1); Second row) Categorisation into low, medium, high based on the Jenks method; Bottom row) Aggregation of component indices to the region level.



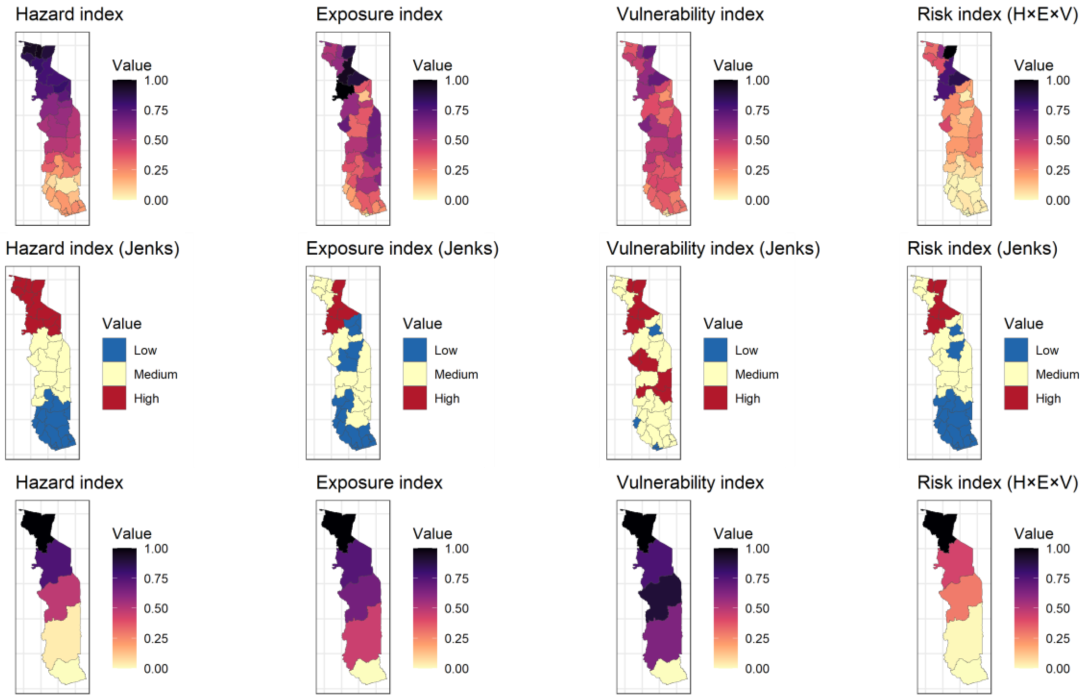
(Source: Own elaboration, 2025)

2.4.5.1.2 <u>Diarrhoeal diseases</u>

The diarrhoeal disease risk index and its distribution across Togolese prefectures are illustrated in *Figure 31*. A composite hazard index was developed by integrating data on extreme rainfall days and compound dry-hot days. The combined analysis revealed an intensified signal in Northern Togo, where exposure prevalence was also found to be notably higher. In contrast, vulnerability is more evenly distributed throughout the national territory.

Consequently, all prefectures identified as high-risk are situated in the North. While the majority of low-risk prefectures are located in the Southern regions, a few were also identified within the Centrale and Kara regions.

Figure 31: Risk assessment for diarrhoeal diseases in children under 5. Top row) Prefecture-level component indices (rescaled 0-1); Second row) Categorisation into low, medium, high based on the Jenks method; Bottom row) Aggregation of component indices to the region level.

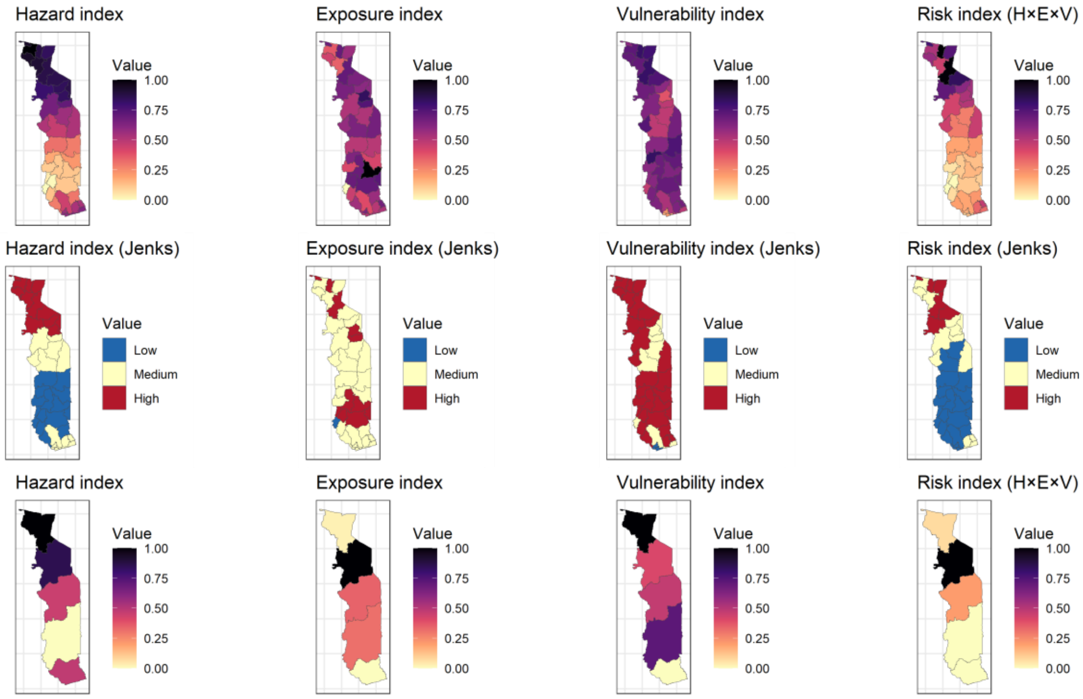


(Source: Own elaboration, 2025)

2.4.5.1.3 Preterm birth

Figure 32 shows the resulting relative risk of PTB at the prefectural and regional levels. Hazard frequency increased throughout the far north and south of the region, whilst exposure groups are most prevalent in the Plateaux region. The composite vulnerability index highlights high vulnerability across the country with areas of low vulnerability only surrounding Lomé. Although exposure and vulnerability co-occur in Plateaux, the low change in heatwave hazards means that this region is classified primarily as low risk. Coincidence of the three components occurs only in the northernmost regions of Savanes and Kara.

Figure 32: Risk assessment for preterm birth in children under 5. Top row) Prefecture-level component indices (rescaled 0-1); Second row) Categorisation into low, medium, high based on the Jenks method; Bottom row) Aggregation of component indices to the region level.



(Source: Own elaboration, 2025)

2.4.5.2 Stage 2: Results

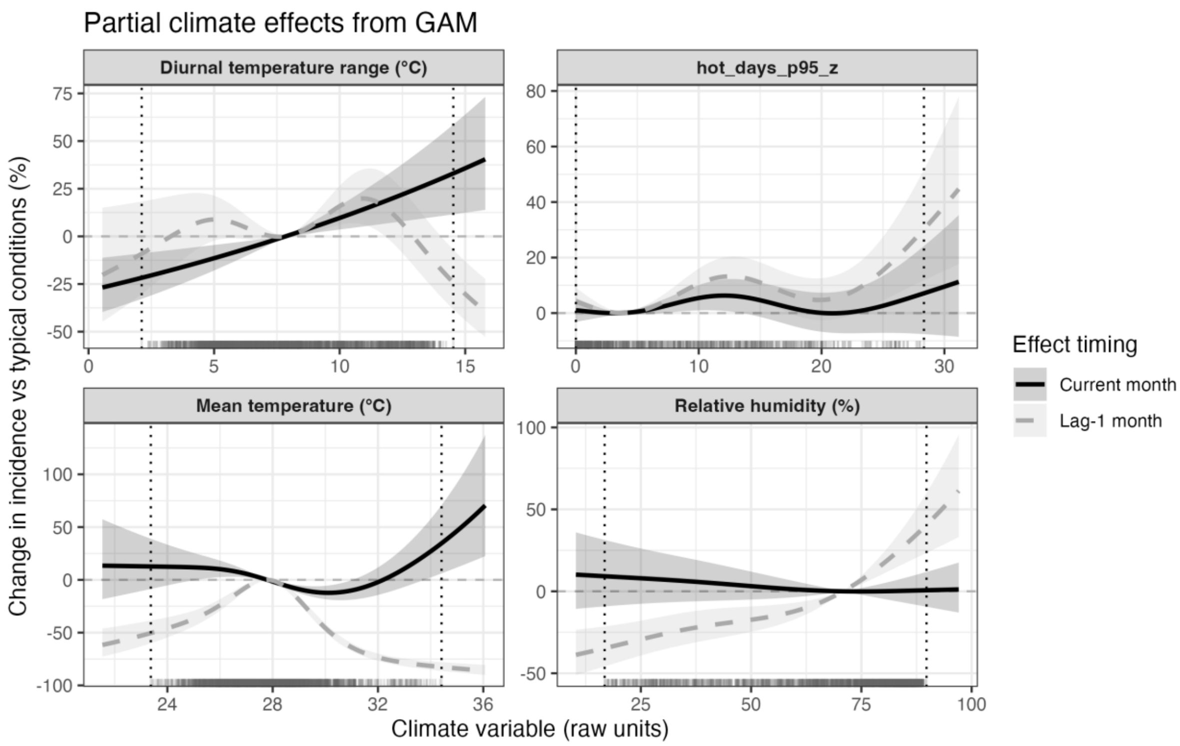
2.4.5.2.1 Malaria

The fitted model showed clear and biologically plausible relationships between climate and under-5 malaria incidence. Overall, the model suggests that malaria risk is most strongly driven by lagged heat, humidity and diurnal temperature range, with a limiting effect of high mean temperature (*Figure 33*).

Increase in the number of very hot days is associated with higher incidence, especially at 1-month lag. Lagged RH shows a large positive effect, as does lagged temperature range. In contrast, once these variables are included, total precipitation and extreme rainfall days have small, uncertain effects. Crucially, mean temperature itself shows a negative association, both in the current month and especially at 1-month lag, consistent with many locations already being close to or above the thermal optimum for transmission.

The following figure shows the estimated percentage change in under-5 malaria incidence versus the top four most influential climate variables (raw units), holding other covariates at typical values. Solid lines show effects in the same month, and dashed lines show 1-month lagged effects; shaded bands are 95% Confidence Intervals (Cis). Rugs indicate the distribution of observed climate values, with dotted vertical lines marking the minimum and maximum observed range in training data; curves are truncated to this range ±10% to limit extrapolation.

Figure 33: Partial climate effects from the GAM



(Source: Own elaboration, 2025)

2.4.5.2.2 Vulnerability factors

In contrast to the clear climate effects, most static vulnerability covariates showed relatively weak and statistically uncertain associations with malaria incidence at the prefecture level. The largest point estimate was for motorised travel time, where an increase in time to the nearest HF was associated with a higher incidence, suggesting that poorer physical access to care may amplify risk. Wealth and housing quality showed protective tendencies; an increase in mean wealth score and housing index corresponds to a roughly lower incidence. Mean education score and the proportion of children sleeping under bed nets had small positive coefficients of higher incidence, a non-significant pattern that likely reflects residual confounding or reporting artifacts (e.g. greater targeting of nets and better detection in historically high-burden areas). Overall, these results suggest that in this dataset, access to health services stands out as the clearest structural vulnerability, while other socioeconomic indicators probably interact with health-system performance and surveillance in more complex, less precisely estimated ways.

2.4.5.2.3 Future projections

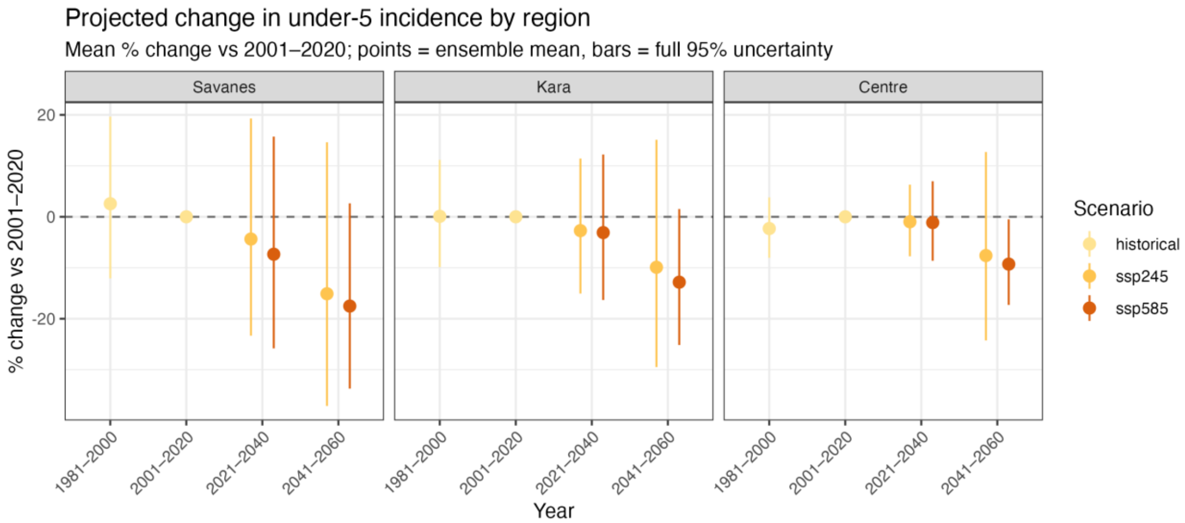
Malaria projections had relatively wide confidence intervals when full uncertainty (parametric plus inter-model variability) was accounted for, but overall, a moderate 5-10% declining trend in the ensemble mean per time slice emerged in projected malaria incidence across the three priority regions (

Malaria projections had relatively wide confidence intervals when full uncertainty (parametric plus inter-model variability) was accounted for, but overall a moderate 5-10% declining trend in the ensemble mean per time slice emerged in projected malaria incidence across the three priority regions (

Error! Reference source not found.). This is projected to continue in the near-term (2021-2040) and mid-century for both SSPs.

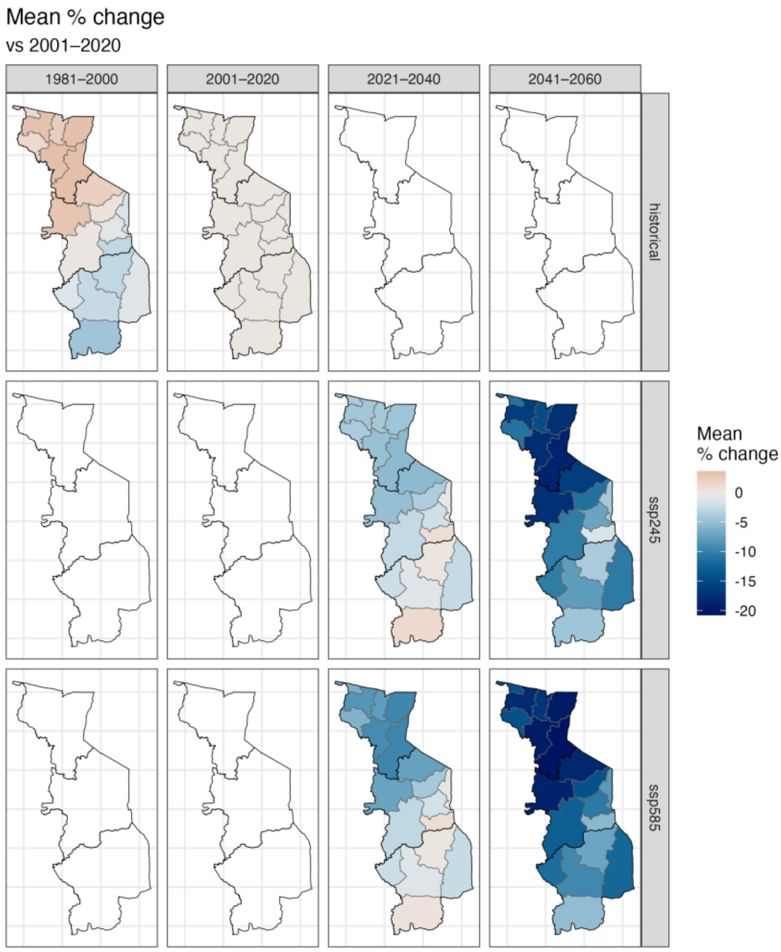
Despite projected overall declines, certain elevated areas in the Centrale region are anticipated to experience slight increases (up to 5%) in the near-term under both SSP scenarios. However, these increases are not sustained through mid-century, suggesting that long-term warming trends may eventually limit malaria transmission even in highland areas. Given the inherent modelling uncertainties, there remains a non-trivial potential for climate-driven increases in incidence across Togo's northern regions both in the near-term and by mid-century country.

Figure 34: Projected changes in malaria incidence in children under 5 years in the priority regions (Points are ensemble mean values relative to the 2001-2020 period mean (dashed line). Error bars are 95% CIs)



(Source: Own elaboration, 2025)

Figure 35: Projected spatio-temporal changes in malaria incidence in children under 5 years in the priority regions by prefecture

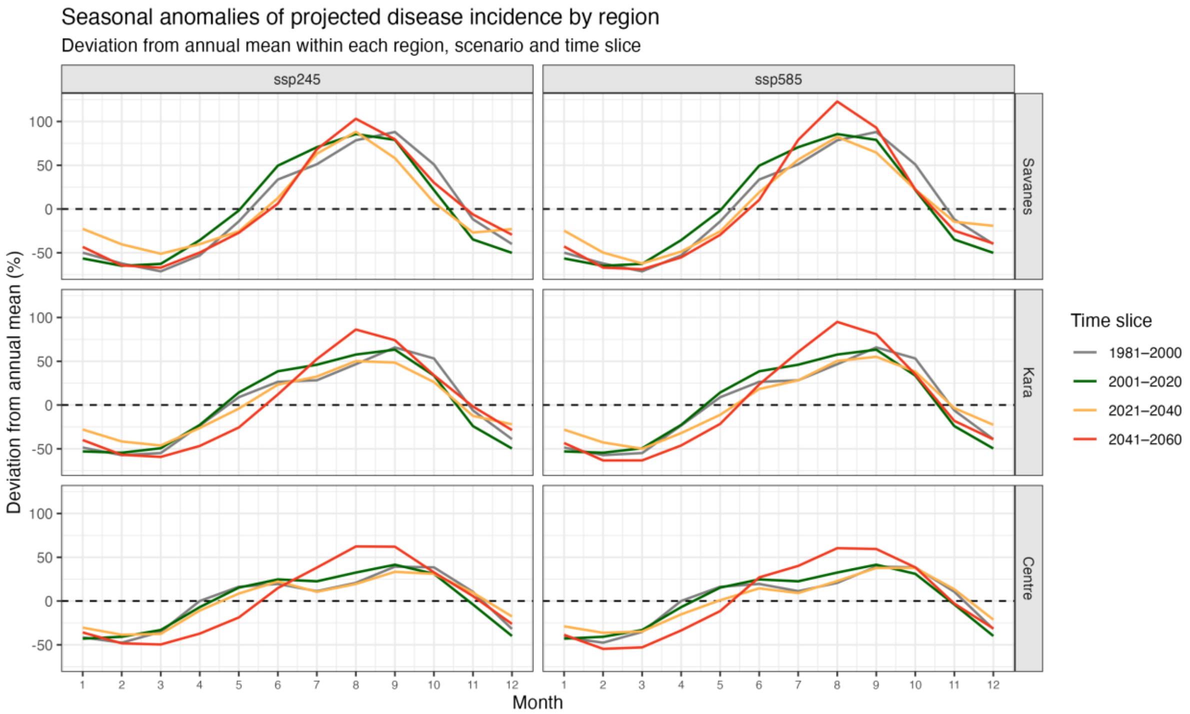


(Source: Own elaboration, 2025)

In all three northern regions, the model reproduced the strong baseline seasonality of malaria, with low incidence in February-March and a marked peak in the late rainy and early dry season (around August–September). Under future climate scenarios, this basic seasonal pattern is preserved, but the timing and relative magnitude of risk shift. Across the ensemble, early- and mid-year months (roughly April–June) are projected to remain fairly consistent with current conditions in the near term, but by mid-century under both SSPs, suppression in the early part of the malaria season is projected to be followed by higher peak incidence around August-September, particularly under SSP5-8.5.

Taken together, climate changes are projected to already be concentrating malaria incidence in children under 5 into higher elevation areas where this trend may continue in the near-term, while decreases in incidence are projected elsewhere and changing seasonal patterns may have impacts on off-season (reduction) and peak season (increase) incidence.

Figure 36: Projected seasonal changes in malaria incidence in children under 5 years in the priority regions by prefecture



(Source: Own elaboration, 2025)

2.4.5.3 Discussion

Synthesized across the modelling results, the findings indicate that under-5 malaria incidence in Togo responds non-linearly to multi-dimensional climate drivers, characterised by distinct contributions from both current and lagged environmental conditions. The most precise and significant predictors of incidence are lagged indicators of heat, humidity, and diurnal temperature range. Specifically, months characterised by a high frequency of extreme heat days (95th percentile), elevated RH, and wider day–night temperature fluctuations one month prior are associated with increased malaria cases. This is consistent with biological evidence that warm, humid environments optimise mosquito survival and accelerate parasite development cycles. In contrast, once these heat and humidity variables are accounted for, total rainfall and extreme precipitation frequency show only marginal and statistically uncertain associations with malaria. This suggests that broad-scale moisture availability may be a less critical driver than the specific hydrothermal combinations captured by relative humidity and temperature metrics.

Notably, the negative associations observed for mean temperature in both current and previous months suggest that many regions in Togo are already operating near or above the thermal optimum for malaria transmission. Consequently, while short-term hot and humid episodes remain important triggers, overall additional warming may shift environmental conditions into a range that is less favourable for the vector, potentially limiting transmission in the long term.

Future climate projections indicate moderate overall declines of approximately 5–10% in malaria incidence among children under five across the three northern priority regions; however, these trends exhibit significant spatial and temporal heterogeneity. In the near term, certain elevated areas in the Centrale region are projected to experience marginal increases in incidence of up to 5% as warming shifts conditions toward a more favourable thermal range. These increases are not sustained through mid-century in either SSP scenario, which is consistent with the theory that long-term warming eventually constrains transmission even in highland areas. Concurrently, the model ensemble retains a non-trivial possibility of near-term and mid-century increases in parts of the northern regions, highlighting that climate change may still exacerbate local malaria risk despite downward national-scale trends.

Seasonally, the model reproduces the established baseline pattern of low incidence in February–March followed by a pronounced peak during the late rainy and early dry seasons (approximately August–September). While this fundamental pattern is preserved under future scenarios, the early season is increasingly suppressed, and the late-season peak becomes more concentrated, particularly by mid-century under the SSP5-8.5 pathway. Overall, climate change is projected to shift transmission into cooler, higher-elevation parts of the north in the short term, while reducing incidence elsewhere and subtly reshaping the timing and intensity of the seasonal peak.

This pattern of modest, spatially heterogeneous change in risk aligns with regional mechanistic projections from the Vector-borne Disease Integrated Model (VECTRI) [10] and related studies, which also suggest limited net change in transmission for Togo by mid-century under both moderate and high emissions pathways (Fall et al., 2023). The finding that cooler, high-elevation areas may experience slight short-term increases supports earlier research identifying transitional zones where warming temporarily moves environmental conditions closer to the optimal EIR (Fall et al., 2023; Van Der Deure et al., 2025).

Regarding vulnerability, while climate effects were precisely estimated, most static covariates showed only weak and statistically uncertain associations with malaria incidence at the prefecture level. The primary exception was physical access to healthcare: a one-standard deviation increase in motorised travel time to the nearest health facility (approximately 12 minutes) was associated with a roughly 15% increase in incidence. This suggests that limited access to diagnosis and treatment remains a critical structural amplifier of malaria risk.

Wealth and housing quality showed protective tendencies, with higher mean wealth and improved housing associated with lower incidence. Conversely, mean education and treated bednet coverage displayed small positive coefficients that were not statistically significant. These counter-intuitive patterns likely reflect residual confounding and surveillance artefacts, such as more intensive intervention delivery and superior case detection in historically high-burden prefectures. Consequently, health-system access emerges as the most consistent vulnerability signal, while other socioeconomic indicators appear to interact with unmeasured differences in care-seeking and reporting quality.

2.4.5.3.1 <u>Diarrhoeal diseases</u>

The model identified a strong positive correlation between rainfall and diarrhoeal incidence. These findings suggest that wetter conditions, particularly when occurring in the preceding month, serve as primary drivers of diarrhoeal risk. While extreme rainfall was retained within the model, it demonstrated a comparatively weak and marginal positive association.

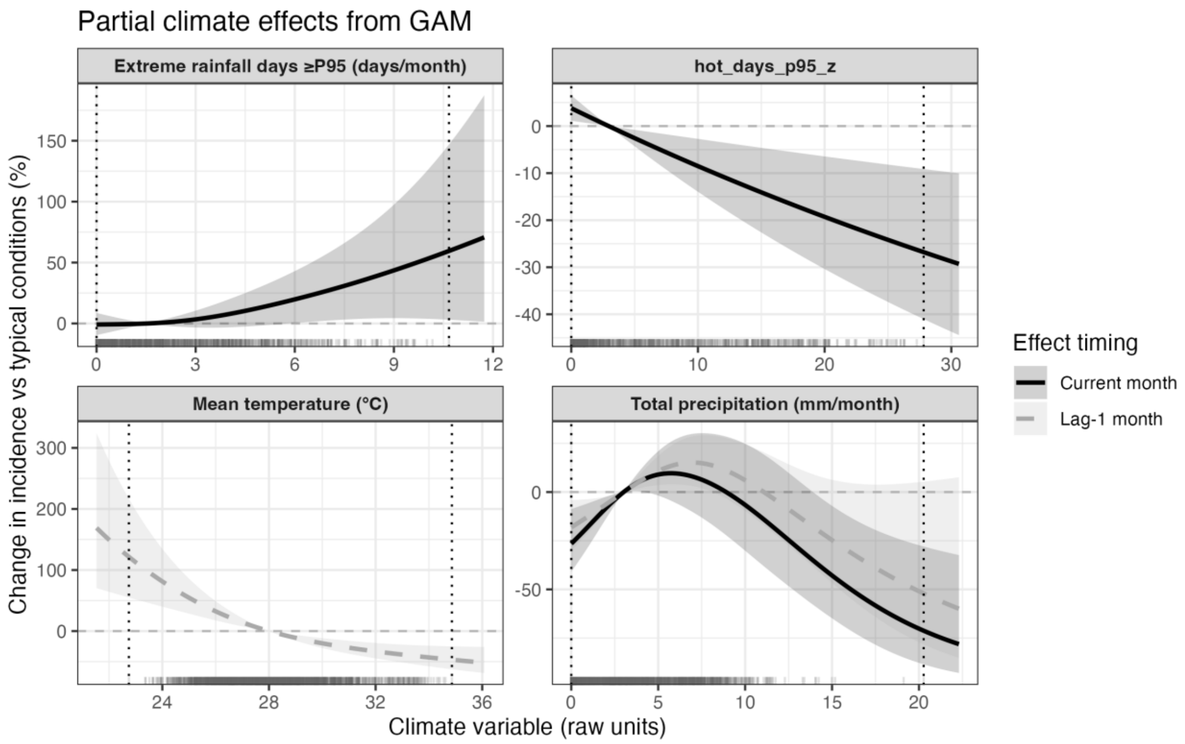
In contrast, temperature-related variables generally exhibited protective associations. Elevated mean temperatures were linked to lower incidence rates, and increased relative humidity was similarly associated with a reduction in diarrhoeal cases. Furthermore, periods featuring a high frequency of hot days (at or above the 95th percentile) showed a subtle but noticeable protective effect.

Overall, these results establish precipitation, specifically with a one-month lag and minor contributions from extreme wet days, as the dominant climatic risk factor for childhood diarrhoea in this context. Conversely, warmer and more humid conditions, alongside sustained periods of high temperatures, tend to alleviate the diarrhoeal burden.

Figure 37 shows the estimated percentage change in under-5 diarrhoeal incidence versus the top four most influential climate variables (raw units), holding other covariates at typical values. Solid lines show effects in the same month and dashed lines 1-month lagged effects; shaded bands are 95% CIs. Rugs indicate the distribution of observed climate values, with dotted vertical lines marking the minimum and maximum observed range in training data; curves are truncated to this range ±10% to limit extrapolation

Figure 37: *Partial climate effects from the GAM*

[10] *The Vector-borne disease Community model of ICTP (VECTRI) is a process-based malaria transmission model that simulates how temperature and rainfall influence mosquito populations, parasite development, and malaria transmission dynamics. It is widely used to assess climate-driven changes in malaria risk under future climate scenarios.*



(Source: Own elaboration, 2025)

2.4.5.3.2 Vulnerability factors

In relation to vulnerability factors, higher rates of exclusive breastfeeding and expanded access to improved sanitation facilities (toilets) were both associated with lower diarrhoeal incidence. While these findings suggest notable protective effects, the associations remained borderline in terms of statistical significance. Interestingly, coverage of improved water sources demonstrated no clear correlation with disease rates in this analysis.

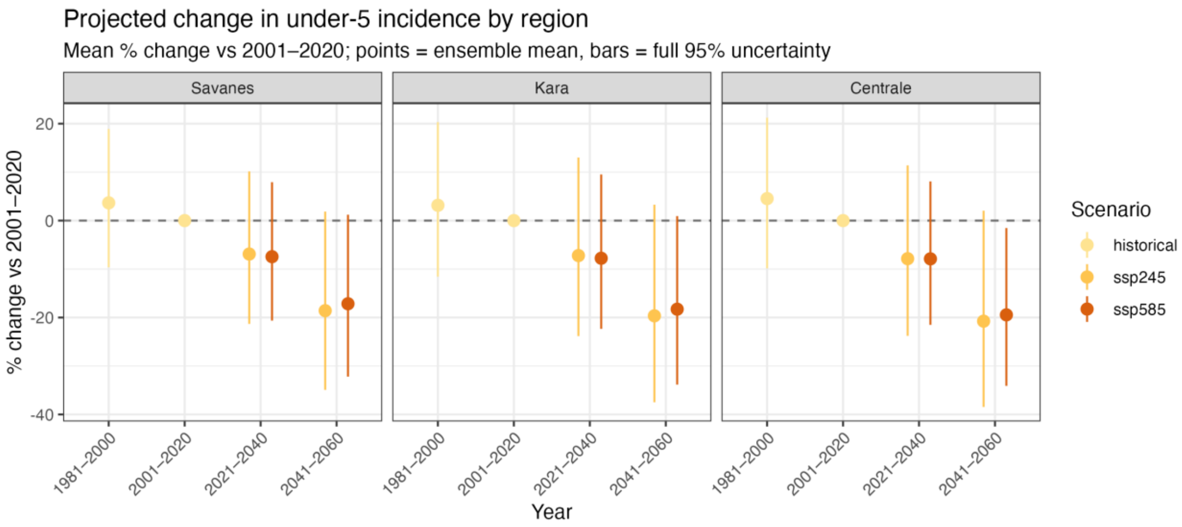
Conversely, increased travel time to motorised healthcare or transport was linked to a lower reported incidence. This statistically significant inverse association is interpreted as a reflection of under-ascertainment and reporting barriers in remote areas rather than a genuine protective effect of isolation. Finally, household composition emerged as a major risk driver, with a higher mean number of children under the age of five per household associated with a 32% increase in diarrhoeal incidence.

2.4.5.3.3 Future projections

Future climate projections for diarrhoeal diseases exhibit relatively wide confidence intervals when full uncertainty is accounted for; however, the model predicts an overall decline that is slightly more pronounced than that projected for malaria. The ensemble mean suggests that a marginal decrease in environmental suitability has already occurred across the three priority regions compared to the 1981–2000 baseline.

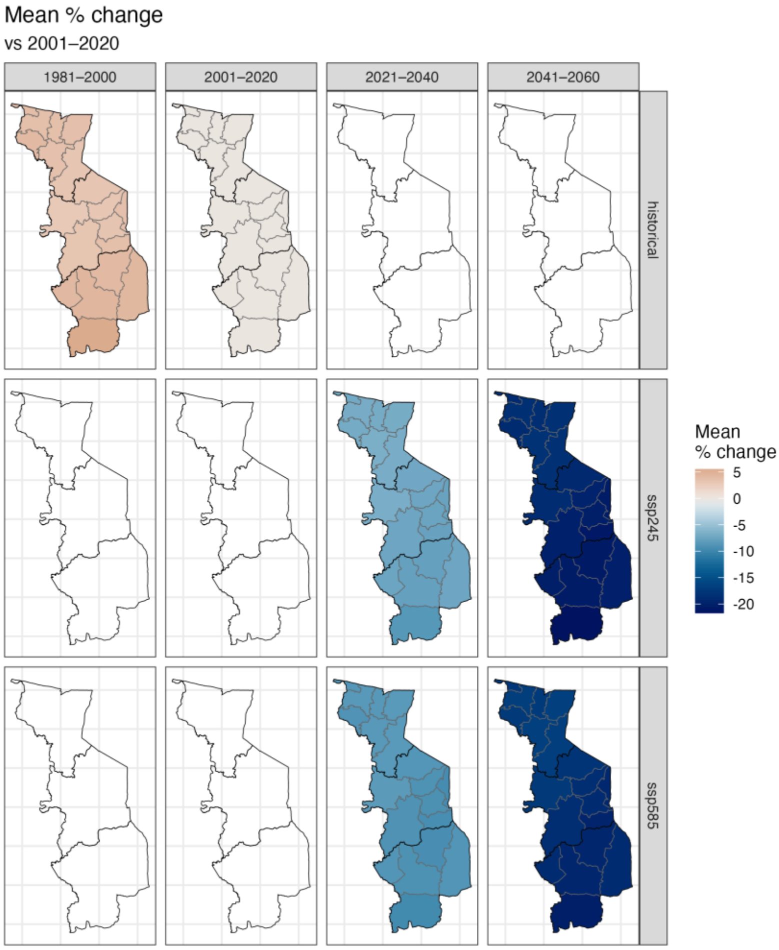
This downward trend is projected to persist through both the near term (2021–2040) and mid-century (2041–2060), with similar results observed under both SSP scenarios. As with the malaria projections, the presence of uncertainty means there remains a non-trivial potential—up to a 20% probability—for near-term increases in incidence, though this possibility declines steadily by mid-century, as shown in Figure 38 and*Figure* 39. While the model considers such increases unlikely, they are marginally more probable in the Kara and Centrale regions compared to the Savanes region.

Figure 38: Projected changes in diarrhoeal incidence in children under 5 years in the priority regions (Points are ensemble mean values relative to the 2001-2020 period mean (dashed line). Error bars are 95% CIs)



(Source: Own elaboration, 2025)

Figure 39: Projected spatio-temporal changes in diarrhoeal incidence in children under 5 years in the priority regions by prefecture

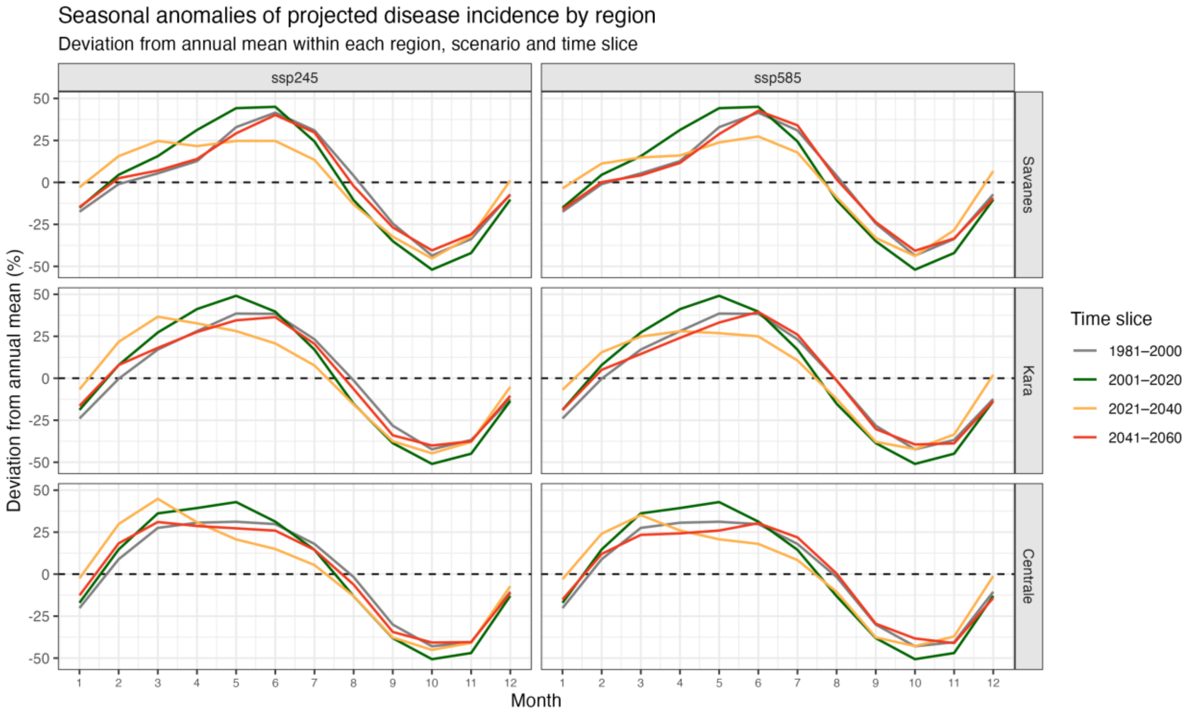


(Source: Own elaboration, 2025)

Across all three northern regions, the projections indicate a seasonal pattern for under-5 diarrhoea that remains broadly consistent with historical data, though the cycle becomes more pronounced under future climate scenarios. The models suggest that incidence peaks during the warmer, early phase of the rainy season, followed by a reduction in cases during the late wet and early dry seasons.

In the DHIS2 records, this is currently reflected by moderate positive anomalies occurring between March and July, with the peak appearing slightly earlier in the Centrale and Kara regions than in Savanes. Conversely, negative anomalies are typically observed from September through November.
When examining future time slices under both SSP scenarios, the timing and shape of the seasonal cycle suggest slightly elevated incidence during shoulder periods and declines during the traditional peak, a trend that is particularly evident in the SSP2-4.5 scenario. Overall, the model projects a decrease in incidence during peak periods alongside increases during the off-season, indicating a subtle delay in seasonality by mid-century.

Figure 40: Projected seasonal changes in diarrhoeal incidence in children under 5 years in the priority regions by prefecture



(Source: Own elaboration, 2025)

2.4.5.4 Discussion

Collectively, the climate associations indicate that under-5 diarrhoea risk in northern Togo is primarily driven by rainfall, modulated by temperature and humidity. Total precipitation in both the current and preceding months shows a clear positive correlation with incidence, suggesting that wetter conditions, particularly those occurring one month prior, are critical drivers of risk. This relationship likely stems from increased contamination of surface water, latrines, and household environments. While extreme rainfall days were retained in the model, they contribute only a weak, marginally positive signal, indicating that routine wet conditions are more influential than rare, intense events.

In contrast, temperature-related variables generally display protective effects: warmer and more humid conditions, alongside periods with more hot days, are associated with modest reductions in diarrhoeal incidence. This pattern is consistent with the reduced environmental survival of many enteric pathogens under hotter, more evaporative conditions, as well as shifts in water sources and behaviours during hot-dry spells. As with malaria, some of these patterns likely capture broader seasonal processes—such as changes in health-seeking, food security, or the circulation of other infections — that covary with climate.

Regarding projections, the model indicates a long-term decline in climate-driven diarrhoeal incidence that is slightly more pronounced than for malaria, though subject to substantial uncertainty. The ensemble suggests that suitability has already decreased modestly since the 1981–2000 baseline across the three northern regions and is projected to continue declining through 2060 under both SSP2-4.5 and SSP5-8.5 scenarios. Nonetheless, a non-trivial probability remains—up to 20% in some locations, for near-term increases, particularly in Kara and Centrale, although this probability diminishes by mid-century.

Seasonally, the model reproduces and sharpens the observed pattern of diarrhoea peaking in the warmer early rainy season (roughly March–July) and decreasing in the late wet and early dry months (September–November). Looking ahead, the seasonal cycle remains recognisable but shifts subtly: peak-season incidence is projected to decline, while shoulder periods become more prominent and the peak timing appears slightly delayed by mid-century. This implies that health systems may face a longer but less intense diarrhoea season.

Static WASH and demographic covariates behave broadly as expected but with mostly modest effects. Higher exclusive breastfeeding coverage and improved toilet access both show protective tendencies, suggesting approximately 15–20% lower incidence, though these results are not statistically definitive. Improved water coverage shows no clear association, which may reflect inconsistent water quality within the "improved" category or the significance of foodborne and person-to-person transmission.

In contrast, greater travel time to motorised healthcare is associated with significantly lower recorded incidence, a relationship that almost certainly reflects under-ascertainment and lower care-seeking in remote areas rather than reduced risk. Finally, households with more young children show markedly higher incidence (around one-third higher), consistent with greater within-household exposure among siblings sharing the same environment. Together, these findings emphasise that diarrhoea patterns are shaped by climate, WASH, health-system access, and demographic structure.

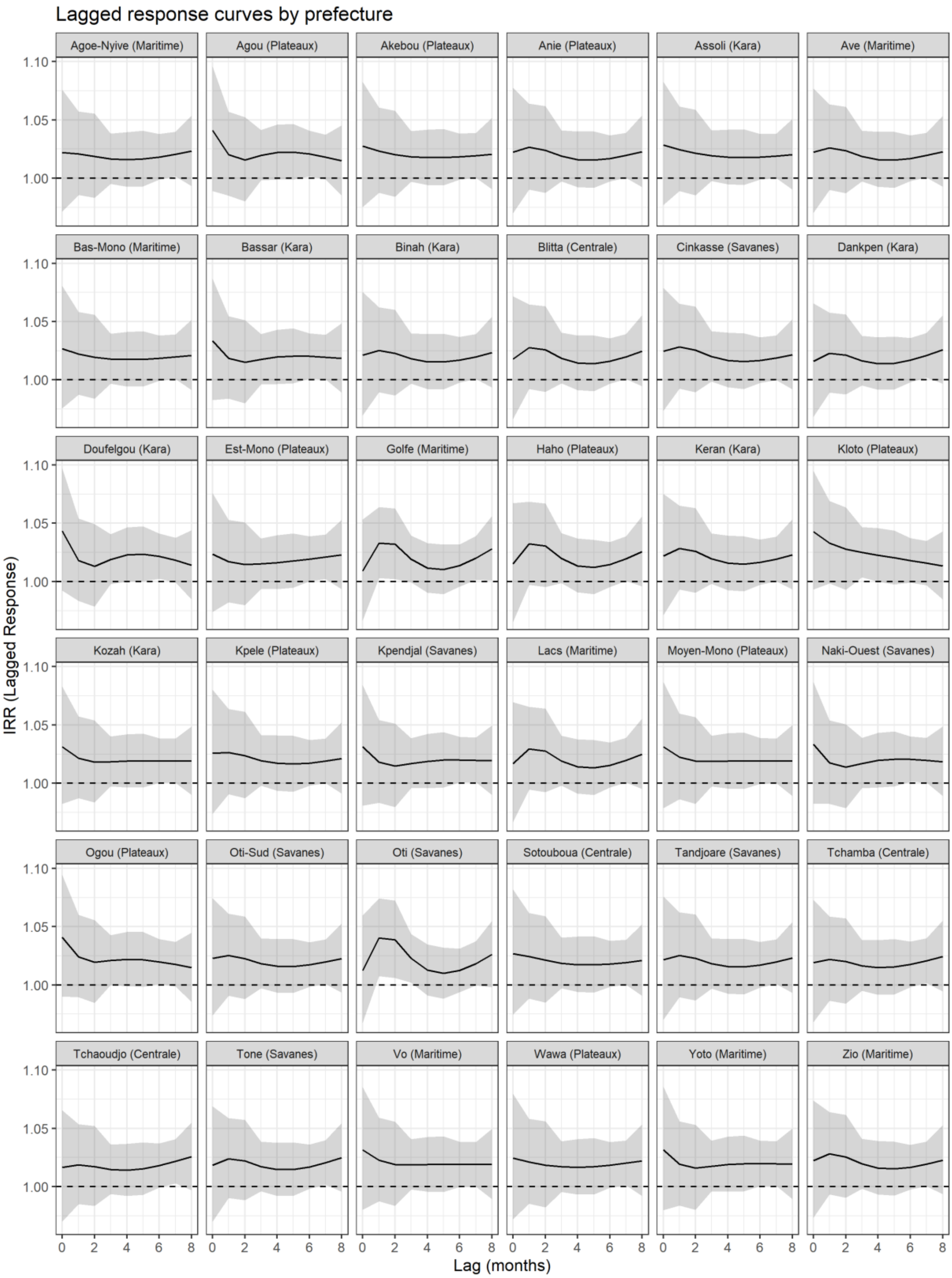
2.4.5.4.1 Preterm birth

The study identified an increased cumulative risk of PTB linked to heatwave exposure occurring between zero and eight months before delivery. Pregnancies exposed to at least one heatwave event showed higher incidence rates compared to those with no heatwave exposure.

When looking at specific timeframes, the risk was elevated throughout the pregnancy, with the strongest evidence of impact occurring at the 1, 2, 3, 6, and 7-month marks before birth. This suggests that extreme heat can affect pregnancy outcomes both in the early stages and in the weeks leading up to delivery.

These cumulative effects were mapped by prefecture across Togo; however, unlike other health outcomes, the risk did not follow a consistent North-South geographical pattern. This indicates that heat-related risks for preterm birth are widespread and influenced by local factors rather than a simple regional gradient.

Figure 41: Best Linear Unbiased Prediction lag-response plots for the relationship between heatwaves and preterm birth by prefecture



(Source: Own elaboration, 2025)

2.4.5.4.2 Vulnerability factors

The analysis revealed modest differences in the cumulative relationship between heatwaves and PTB based on prefecture-level vulnerability factors. Prefectures with lower levels of maternal education reported a higher cumulative incidence of PTB following heatwave exposure compared to areas with higher education levels. Similarly, incidence was higher in prefectures with lower air conditioning coverage than in those with more widespread access.

Household economic status also played a role, as lower household wealth was linked to a higher incidence of PTB compared to more affluent prefectures. In contrast, differences related to antenatal care attendance and adolescent motherhood were found to be small.

Across all these indicators, the statistical ranges (confidence intervals) overlapped substantially, suggesting that while trends are visible, the data is not yet definitive. Overall, these prefecture-level vulnerability indicators did not significantly change the overarching link between heatwave exposure and the risk of preterm birth.

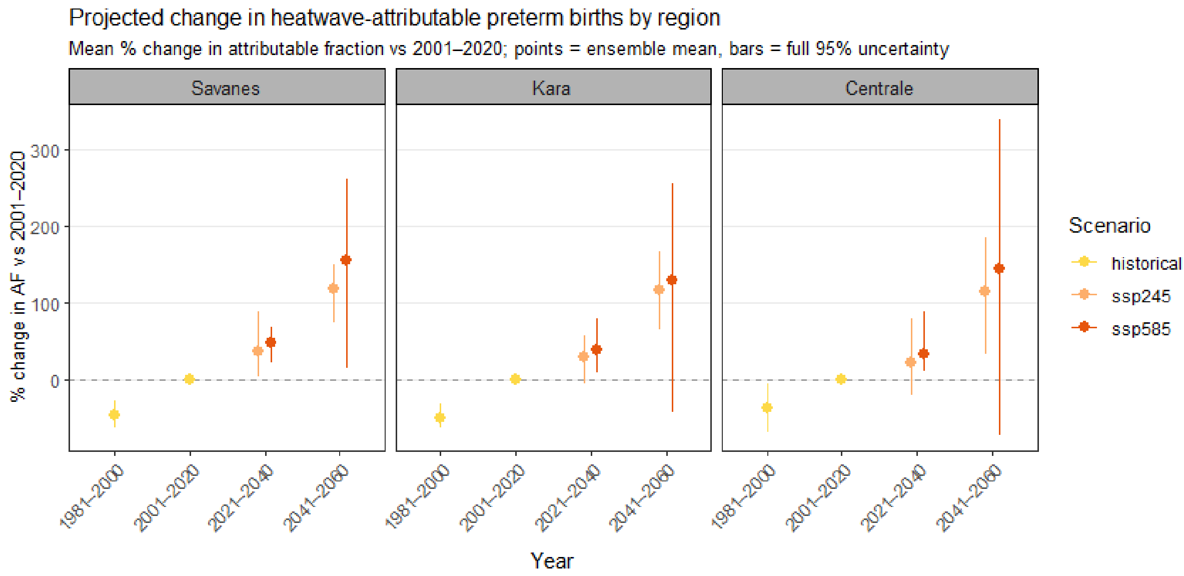
2.4.5.4.3 Future projections

Extreme heatwaves already significantly impact pregnancy outcomes in Northern Togo. The attributable fraction — the percentage of PTB directly linked to heatwave exposure during the month of delivery and the eight months preceding it — highlights a modest but meaningful historical burden. Between 2001 and 2020, the proportion of preterm births attributable to heatwaves was 1.3% in Centrale, 1.7% in Kara, and 1.8% in Savanes.

This attributable fraction is projected to rise across all future periods and climate scenarios. By the 2021–2040 period, the percentage of heat-linked preterm births will increase in Centrale, Kara, and Savanes under both the moderate (SSP2-4.5) and high-emission (SSP5-8.5) pathways. By 2041–2060, these attributable fractions are expected to roughly double or more compared to the 2001–2020 baseline across all three northern regions.

When measured as a percentage change relative to the historical baseline, the projected increases are substantial and consistent across the north. By the 2041–2060 period under the SSP2-4.5 scenario, the fraction of preterm births attributable to heat is expected to rise by approximately 115% in Centrale, 117% in Kara, and 118% in Savanes. Under the more extreme SSP5-8.5 scenario, these increases are even more pronounced, reaching 144% in Centrale, 130% in Kara, and 155% in Savanes.

Figure 42: Projected changes in heatwave-attributable preterm births by region (Points show ensemble mean percent change in attributable fraction relative to 2001–2020. SSP2-4.5 baseline; dashed line, with 95% uncertainty intervals)

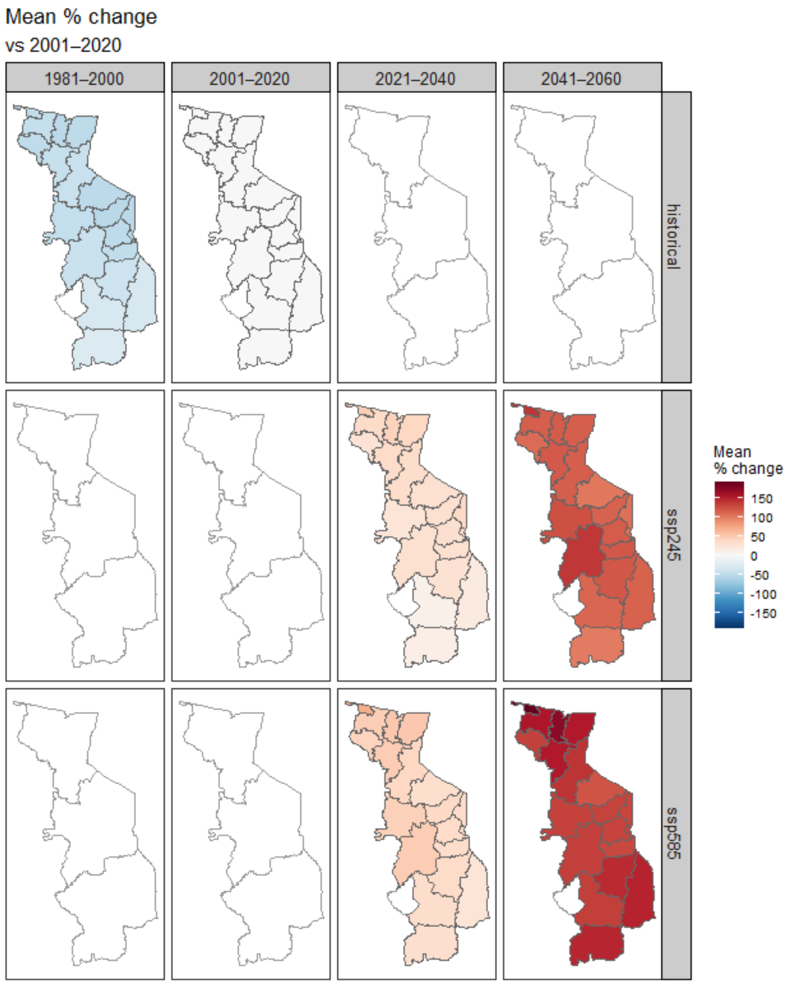


(Source: Own elaboration, 2025)

As illustrated in *Figure 43,* nearly all prefectures are projected to experience a significant rise in the attributable fraction of preterm births linked to heatwaves under both climate scenarios. During the 2021–2040 period, most prefectures demonstrate moderate increases, with more pronounced rises occurring more frequently under the high-emission SSP5-8.5 pathway.

By the 2041–2060 timeframe, substantial positive changes in the attributable fraction are evident across almost all prefectures. While some of the most significant increases appear within specific areas of the Kara and Savanes regions, the overarching trend indicates a broad, region-wide escalation of risk without sharp spatial contrasts between prefectures.

Figure 43: Projected spatio-temporal changes in the heatwave-attributable fraction of preterm birth in the priority regions by prefecture



(Source: Own elaboration, 2025)

While heat exposure is significantly greater under the high-emission SSP5-8.5 scenario, the projected absolute burden of preterm births is actually lower because birth rates are expected to decline more rapidly in this future. Essentially, SSP5-8.5 results in fewer heat-attributable preterm births not because the climate risk is reduced, but because the sharp decline in total births overshadows the escalating impact of extreme heat.

Incidence projections utilise a constant baseline preterm birth rate of 13%[11].

[11] *While DHIS2 reports a much lower PTB incidence (≈3 ‑ 4%), consistent with substantial under-ascertainment, projections assume a baseline PTB rate of 13%, aligned with regional epidemiological estimates, to avoid underestimating absolute future burden.*

By the 2041–2060 period, the incidence of heatwave-attributable preterm births per 1,000 live births is projected to rise to 3.6 and 4.3 in Centrale, 4.3 and 4.9 in Kara, and 4.4 and 5.2 in Savanes under the SSP2-4.5 and SSP5-8.5 scenarios, respectively. These figures represent substantial increases compared to the 2001–2020 historical baseline. In the Savanes region, for example, this represents a rise of between 120% and 150%.

Toward the end of the projection window, the two scenarios begin to diverge significantly. While incidence continues to climb under both pathways, the rate of increase becomes notably steeper under SSP5-8.5 during the late 2050s, widening the risk gap relative to the more moderate SSP2-4.5 scenario.

2.4.5.5 Discussion

The results demonstrate that PTB in northern Togo is a highly climate-sensitive outcome, driven primarily by cumulative heat exposure throughout pregnancy rather than short-term or seasonally concentrated events. This differs significantly from malaria and diarrhoea, where climate influences operate through ecological and environmental pathways that vary sharply across space and time. Instead, the heat–PTB association reflects a protracted exposure window spanning much of gestation. While lag-specific effects are individually modest, their persistence across multiple months results in a measurable cumulative increase in risk.

This interpretation aligns with emerging evidence from other low-income settings. In Johannesburg, South Africa, exposure to high environmental temperatures during early pregnancy has been linked to a substantially increased risk of pre-eclampsia at childbirth {Citation}. Hypertensive disorders of pregnancy are a recognised risk factor for both spontaneous and medically indicated preterm birth, offering a plausible biological pathway through which early and sustained heat exposure contributes to PTB risk.

Unlike malaria and diarrhoea, where climate change is projected to redistribute risk spatially or alter seasonal patterns, the projected heat-attributable PTB risk increases consistently across all prefectures under both emissions pathways. The absence of pronounced spatial gradients suggests that heat exposure during pregnancy acts as a pervasive physiological stressor rather than one confined to specific ecological or socio-environmental contexts. Prefecture-level vulnerability indicators provided little evidence of effect modification, implying that while socioeconomic conditions shape general maternal and neonatal health, they do not significantly alter the relative impact of heatwaves on PTB risk at this scale. However, the reliance on monthly, prefecture-level DHIS2 data may have limited the ability to detect finer-grained heterogeneity in vulnerability.

Projections further highlight the distinction between relative and absolute burden. Attributable fractions rise more steeply under SSP5-8.5 due to greater heat exposure; however, the absolute number of heat-attributable PTBs is lower than under SSP2-4.5 because projected fertility declines more rapidly in the higher-emissions scenario. If future live births do not decrease as sharply as assumed, the absolute heat-attributable burden would be higher than projected here. This reinforces the importance of reporting both attributable fractions and incidence alongside absolute counts, clarifying that regional variations in attributable fractions reflect the proportion of PTBs linked to heat rather than differences in underlying incidence rates.

Overall, these findings suggest that climate change is likely to amplify an already widespread heat-related risk for PTB, rather than concentrating it in specific locations or seasons. Consequently, adaptation requirements must cut across geographic and socioeconomic boundaries, focusing on reducing maternal heat exposure and strengthening heat-aware antenatal and delivery care. As heatwaves become more frequent and prolonged, these measures will be vital across northern Togo. Future analyses would be substantially strengthened by improvements in routine PTB surveillance, including clear documentation of gestational age and consistent classification, as well as finer temporal resolution data (daily or weekly) to more precisely align heat exposure with critical windows of pregnancy.

2.4.6 Synthesis and Interpretation of Key Results

2.4.6.1 Synthesis of Stage 1 and Stage 2 Risk Assessments

The two-stage assessment was structured such that Stage 1 provides a broad, screening-level overview of climate–health risks using the IPCC Hazard–Exposure–Vulnerability framework. Stage 2 then employs detailed epidemiological models to quantify specific climate–health relationships and project future disease incidence.

Taken together, these stages offer a consistent and mutually reinforcing perspective on climate-sensitive health risks in Togo. Crucially, the integrated approach highlights important nuances, such as specific lagged climate effects and localised vulnerability signals, that are not visible through risk mapping alone.

2.4.6.1.1 Malaria

In Stage 1, malaria risk was primarily driven by shifts in the Length of Transmission Season (LTS), the density of the under-5 population, and structural vulnerabilities, including low household wealth, inadequate housing, limited insecticide-treated net (ITN) coverage, and extensive travel times to healthcare facilities. This screening identified the three northern regions — specifically parts of Centrale and Kara — as priority areas where climate suitability remains high or is increasing, coinciding with large, exposed populations and substantial socioeconomic and health-system vulnerabilities.

Stage 2 modelling broadly confirms and refines these findings. The GAM results demonstrate that malaria incidence in children under five is most strongly associated with hot, humid, and thermally variable conditions at a one-month lag, while extreme mean temperatures serve as a limiting factor. Projections indicate gradual declines in incidence across hot lowland and northern areas. However, cooler, higher-elevation zones in the centre of the country may experience incidence increases or slower rates of decline as they warm toward more optimal thermal conditions. This aligns with the Stage 1 LTS results, which suggested that climate suitability has already expanded or remained stable in certain elevated zones while contracting in others.

Regarding vulnerability, Stage 1 identified poor healthcare access, low wealth, and inferior housing quality as the primary contributors to malaria risk. Stage 2 corroborates this by showing that longer motorised travel times to health facilities are associated with higher malaria incidence. Furthermore, wealth and housing quality display protective trends, even where statistical precision varies. This suggests that the structural vulnerability patterns identified in Stage 1 are directionally consistent with the epidemiological evidence: while climate signals drive transmission potential, the actual health impact is heavily modulated by health-system reach and household conditions. Collectively, the two stages identify the highland and fringe areas of the north and centre as emerging foci where climate suitability, vulnerable populations, and access-related barriers intersect.

2.4.6.1.2 Diarrhoeal diseases

In Stage 1, the assessment of diarrhoeal disease distinguished between two primary hazard pathways: "wet contamination," driven by extreme rainfall days, and "hot–dry" conditions, characterised by compound heat and minimal rainfall. This was evaluated alongside high under-5 exposure and WASH-related vulnerabilities, such as household crowding, low rates of exclusive breastfeeding, unimproved water and sanitation, and poor access to healthcare. This screening identified northern prefectures, where increasing heavy rainfall intersects with persistent WASH deficits, as the highest-risk areas.

Stage 2 modelling supports the central role of rainfall while providing a more nuanced understanding of temperature and seasonality. The GAM demonstrates that total precipitation, particularly at a one-month lag, is positively associated with diarrhoea incidence. This confirms the wet-contamination pathway, where heavy rains likely increase the exposure to pathogens through contaminated water sources.

In contrast, warmer conditions and periods with a higher frequency of hot days show generally protective associations. This potentially reflects the reduced environmental survival of enteric pathogens under extreme heat and shifts in water usage behaviours during hot–dry periods. While projections indicate a long-term, climate-driven decline in diarrhoeal incidence — slightly more pronounced than that for malaria — there remains a non-trivial probability of increases in certain prefectures, particularly within the Kara and Centrale regions during the early rainy season.

The WASH and crowding vulnerabilities identified in Stage 1 align closely with the Stage 2 findings. Exclusive breastfeeding and improved toilet access demonstrate modestly protective, albeit statistically imprecise, effects, while household crowding of children under five is clearly linked to higher incidence. Furthermore, the inverse association between travel time and reported diarrhoea, interpreted as under-ascertainment in remote areas, reinforces the Stage 1 concern that limitations in healthcare access and reporting can mask the true burden of disease.

Overall, Stage 1 highlights locations where diarrhoeal risk is structurally high due to inadequate WASH infrastructure and household crowding, while Stage 2 confirms that wet months in these settings remain hazardous, even if broad climate trends might lower average incidence. Collectively, these findings suggest that strengthening WASH systems and disease surveillance in the northern prefectures prone to wet-season hazards remain essential adaptation priorities, despite the projected overall declines.

2.4.6.1.3 Preterm birth

In Stage 1, the risk mapping for PTB integrated projected changes in heatwave frequency with the density of live births and specific vulnerability factors, including household wealth, maternal education, adolescent motherhood, air conditioning coverage, and timely access to antenatal care. This screening identified the three northern regions as primary priority areas for maternal and neonatal heat risk, as they face the intersection of escalating heat extremes and constrained adaptive capacity.

Stage 2 epidemiological modelling confirms that heatwaves already exert a measurable impact on PTB risk in Togo and that this burden will escalate under future climate scenarios. The analysis demonstrates that heatwaves contribute subtle but significant effects across multiple months of pregnancy (lags 0–8), which accumulate to increase the overall risk of preterm birth by approximately 20%. While the current attributable fractions — the percentage of preterm births specifically linked to heatwaves — are currently modest at 1–2% in the northern regions, these figures are projected to roughly double or more by mid-century, reaching between 3% and 4.5% across nearly all prefectures under both the SSP2-4.5 and SSP5-8.5 scenarios.

In contrast to the findings for malaria and diarrhoea, Stage 2 identifies only modest and statistically non-significant differences in heatwave-related PTB effects based on wealth, education, air conditioning access, antennal care attendance, or adolescent motherhood. This suggests that while these socioeconomic factors are critical for general maternal and child health, the specific risk of heat-driven preterm birth is relatively widespread across the population rather than being confined to specific vulnerability strata.

The synthesis of both stages indicates that rising heatwave frequency will increase the risk of preterm birth broadly across Northern Togo. There is limited evidence that current prefecture-level vulnerability indicators significantly amplify or reduce this specific climate effect. Consequently, heat-related preterm birth emerges as a highly climate-sensitive outcome where adaptation measures—such as active cooling, antenatal heat-health education, and enhanced healthcare facility preparedness, will be essential across the entire region, including areas not traditionally flagged as the most socio-economically vulnerable.

2.4.6.2 Overall synthesis

Together, the two stages establish a coherent narrative for climate risk and adaptation: climate change is fundamentally reshaping the health landscape in Togo. Hazards are evolving, characterised by extended malaria seasons in specific highland areas and increasingly frequent heatwaves, while exposure remains consistently high among children and pregnant women. Furthermore, underlying vulnerabilities in WASH infrastructure, housing quality, and health-system access persist as critical barriers. In this context, Stage 1 identifies the geographical areas where these risk factors currently intersect, while Stage 2 quantifies the magnitude and direction in which climate change is likely to shift disease incidence over the coming decades.

This integrated evidence base provides a robust foundation for strategic action. It supports the prioritisation of the northern regions for health-focused climate adaptation, specifically:

- Malaria: Targeting highland and fringe areas for enhanced surveillance and vector control as thermal suitability shifts.
- Diarrhoeal disease: Focusing WASH infrastructure and prevention efforts on crowded settings and those most prone to wet-season hazards.
- Maternal health: Mainstreaming heat–health protections and facility preparedness into maternal and newborn care across the northern territory to address the escalating risk of preterm birth.

2.5 Target Area Selection

Due to the need for a focused approach and effective promotion of integrated adaptation in the health sector, a prioritisation process was conducted for the proposed project, making it unfeasible to cover all regions. The preliminary prioritisation process was conducted during the concept note phase. The process was highly participatory and included consultation with the relevant Ministries, representatives of community-based organisations (CBOs) and academia. The methodology and results of the process are available at Annex 1 Pre-feasibility study Pre-Feasibility Study to the Concept Note.

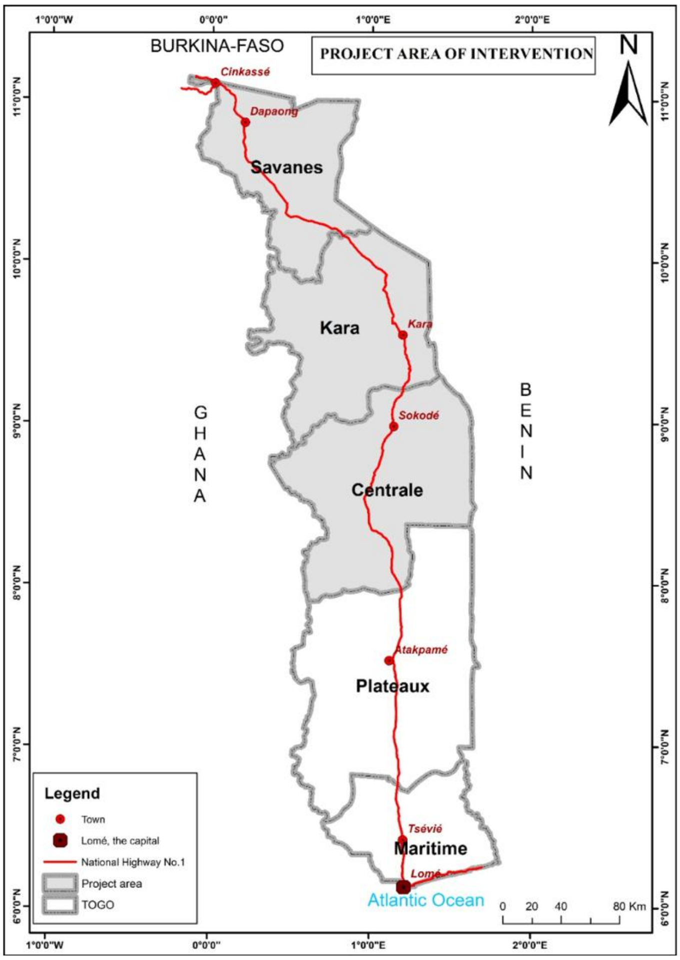
The selection of the target areas was based on a multicriteria decision analysis (MCDA) aimed at prioritising the most vulnerable regions of Togo among its five regions. The MCDA looked at vulnerability to climate change which refers to climate change. The proposed MCDA utilised three critical factors structured around three main types of indicators:

- Climate risk exposure,
- Vulnerability of the health system,
- Socio-economic indicators.

The regions identified by this process were the northern regions of Togo, namely Centrale, Kara and Savanes.

The process was corroborated by the Climate Rationale (Annex 2.a). An overview of the process is presented in *Section 2.4.4.1*. The analysis corroborated the original assessment, identifying Centrale, Kara and Savanes, as the regions with the highest risk for the prioritised CSHOs. The process triangulates the results and highlights the robustness of the selection. Therefore, the project will focus on these three regions to increase the potential replicability and scale up of project impacts in the remaining districts of the targeted regions.

Figure 44: Prioritised regions (Centrale, Kara, Savanes)



(Source: Own elaboration, 2025)

2.5.1 Implications for Adaptation

2.5.1.1 Malaria

From an adaptation perspective, the key message is that modest net declines in climate suitability do not remove malaria risk in northern Togo; instead, they redistribute it in space and time. The synthesis shows that short periods of hot, humid and thermally variable conditions, particularly at a one-month lag, will continue to drive transmission, while some cooler highland and fringe areas may become relatively more suitable as they warm. These results are consistent with other recent studies examining the implications of climate change for malaria impacts in children in Sub-Saharan Africa (Symons et al., 2025).

Adaptation planning therefore needs to anticipate more concentrated transmission in specific places and seasons, rather than a uniform decline. Surveillance and vector-control efforts should be adjusted so that preventive measures (vaccination, ITN distribution, indoor residual spraying (IRS), chemoprevention where relevant) are in place before the late–rainy / early–dry season peak, with particular attention to higher-elevation where risk may emerge or expand. This argues for more flexible, climate-informed micro-planning rather than fixed campaign timings based only on historical patterns.

The vulnerability analyses emphasise that health-system access is a central adaptation lever. Longer travel times to health facilities are associated with higher malaria incidence, and under-ascertainment is likely in the most remote areas. Priority actions include reducing geographical and financial barriers to effective diagnosis and treatment (e.g. outreach, CHWs, upgraded USPs); strengthening routine surveillance through sentinel sites and improved diagnostics (both rapid tests and laboratory analyses) to reliably detect shifts in incidence and seasonality; and ensuring that new or expanding high-risk areas are incorporated into routine vector-control programmes.

At household and community level, population growth, mobility, uneven housing quality or improvements, and patchy vector-control coverage will shape how climate signals translate into actual burden. Even small climate-driven increases in suitability in highland or newly receptive areas could produce substantial case increases if baseline immunity is low and primary care is weak. Conversely, in areas where climate becomes less favourable, maintaining strong intervention coverage will be important to consolidate potential gains and prevent resurgence.

Finally, these projections isolate the climate-driven component of malaria risk under an “all else equal” assumption. Should health systems and vector-control delivery become strained, even minor climatic shifts could exacerbate underlying vulnerabilities. Conversely, the continued scale-up of ITNs and IRS diagnostics, treatment and vaccines could effectively offset or outweigh negative climate effects. Climate adaptation for malaria in northern Togo should therefore prioritise aspects including strengthened, flexible vector-control programmes; improved surveillance and diagnostic coverage, especially in emerging high-risk and hard-to-reach areas; reduced access barriers to care; and, potentially, climate-informed communication campaigns or alert systems that integrate climatic indicators to anticipate periods and places of heightened transmission.

2.5.1.2 Diarrhoeal diseases

Modelling indicates that for diarrhoeal diseases, wetter months and heavy rainfall events remain the primary climate drivers of risk, even though broader climate trends suggest a gradual decline in average incidence. This implies that while climate change may lower the mean diarrhoeal burden, children in northern Togo will remain highly vulnerable to rain-driven spikes, particularly in areas with weak WASH and healthcare systems. Consequently, adaptation measures must pivot from a focus on long-term mean declines toward managing wet-season and extreme-event risks. Priority actions include investing in flood- and drought-resilient WASH infrastructure, such as water supply, drainage, and sanitation capable of withstanding heavy rainfall and dry spells, as well as protecting water quality during wet seasons through safe storage, point-of-use treatment, and the rapid repair of damaged infrastructure. Additionally, rainfall and flood data should be integrated into outbreak preparedness and medicinal supply management.

The vulnerability profile strongly identifies structural WASH deficits and household crowding as persistent drivers of the diarrhoea burden. While exclusive breastfeeding and improved toilet access appear modestly protective, the number of young children per household is clearly associated with a higher incidence. This suggests that climate-informed adaptation should reinforce behavioural interventions, such as the promotion of exclusive breastfeeding, safe food and water handling, and handwashing campaigns. Furthermore, efforts should be made to reduce overcrowding where feasible through housing and shelter programmes and to target WASH upgrades and hygiene promotion toward the high-burden, high-crowding prefectures identified in the Stage 1 analysis.

The counter-intuitive finding that longer travel times are associated with lower reported diarrhoea likely reflects under-ascertainment in remote communities rather than a lower true risk. For adaptation purposes, this underscores the necessity of extending surveillance and service reach through community-based reporting and mobile clinics. Enhancing these data streams will ensure that climate–diarrhoea relationships and emerging risks in remote areas are not overlooked, ultimately increasing the capacity for analysis and forecasting.

Given the wider evidence, climate shocks, including floods, localised heavy rainfall, and drought-related WASH failures, remain likely to trigger outbreaks that may be obscured by relatively coarse monthly prefecture averages. These results should be interpreted as a reminder of data limitations rather than evidence that extremes are unimportant. Improving diagnostic specificity, routine data quality, and spatial resolution will be essential for better risk assessment and more targeted adaptation, such as distinguishing between bacterial and viral diarrhoeas which exhibit different climate sensitivities.

Overall, climate adaptation for diarrhoeal disease in northern Togo must prioritise resilient WASH systems, the reduction of household crowding and exposure, climate-smart surveillance, and robust outbreak preparedness. Community-level WASH behaviour change, the sustained promotion of exclusive breastfeeding, and strategies to maintain safe water and sanitation are "no-regret" adaptation strategies. These measures will prove effective during wet seasons and climate extremes, helping to buffer climate-related variability and reduce the overall burden of childhood diarrhoea.

2.5.1.3 Preterm birth

Epidemiological models indicate a robust signal for PTB; rising temperatures and an increasing frequency of heatwaves are driving a significant increase in the fraction of preterm births attributable to climate change. Unlike malaria and diarrhoeal disease, where future trends suggest potential declines or complex geographical redistributions, the risk of heat-related PTB is projected to grow substantially across all regions. Indeed, attributable fractions are expected to roughly double by mid-century. This escalating burden will place additional pressure on maternal and neonatal health services, particularly in the northern regions of Savanes, Kara, and Centrale, where heat extremes are intensifying and adaptive capacity is already constrained.

Adaptation measures must therefore focus on mitigating thermal stress for pregnant women and ensuring health facilities remain functional during extreme heat events. Regarding infrastructure, priority actions should include the implementation of passive cooling techniques in health facility construction and refurbishment. These upgrades are essential for improving the thermal comfort of both patients and staff, particularly within labour wards and antenatal clinics.

Given that high-risk heat conditions are becoming more frequent, adaptation interventions should also focus on the readiness and resilience of the health supply chain. This includes the introduction and scaling of heat-stable medications, which reduce reliance on cold chain storage that is often vulnerable during heatwaves and associated power outages. Concurrent improvements to the Logistics Management Information System (LMIS) are required to ensure that these essential commodities are available exactly where and when they are needed.

Behavioural change and public awareness are critical components of resilience. Adaptation strategies should prioritise communication regarding the impacts of heat on maternal, newborn, and child health. Supporting health professionals to integrate heat-health education into routine antenatal care visits can significantly improve hydration, resting, and cooling behaviours among pregnant women. Since antenatal care attendance varies by region, these communication campaigns should also be extended through community health workers to reach the most vulnerable populations who may have limited access to formal healthcare facilities. Finally, improving the data availability baseline through the development of indicators to track heat-related conditions, alongside improved modelling, will allow for a more precise characterisation of risks and the development of targeted EWS.

Table 11: Proposed adaptation interventions per priority health outcome

Priority health outcome	Functional area	Suggested adaptation intervention	Rationale	Expected adaptation benefit
Malaria	**Evidence-based response**	Adjust surveillance and response to prepare for altered seasonality and geographic distributions.	Modest net declines in suitability but redistribution in space/time; cooler highland areas becoming suitable as they warm.	Anticipate more concentrated transmission; flexible, climate-informed micro-planning.
	Diagnosis and treatment	Reduce barriers to diagnosis (rapid and laboratory analyses) and treatment (including vaccination).	Longer travel times are associated with higher incidence; under-ascertainment is likely in remote areas.	Effective diagnosis and treatment in hard-to-reach areas.
	Surveillance / Modelling	Strengthen routine surveillance through sentinel sites and improved diagnostics.	Need to reliably detect climate-driven shifts in incidence and seasonality.	Reliable detection of epidemiological shifts; proactive identification of

Priority health outcome	Functional area	Suggested adaptation intervention	Rationale	Expected adaptation benefit
				transmission patterns.
	Vector control	Identify high-risk areas into routine vector-control programmes and maintain strong coverage.	Small climate-driven increases in suitability could cause substantial case increases if immunity is low and care is weak.	Consolidate potential gains and prevent resurgence.
	HEWS and communication	Implement alert systems integrating climatic indicators and climate-informed communication campaigns.	Need to anticipate periods and places of heightened transmission.	Proactive anticipation of transmission peaks.
Priority health outcome	**Functional area**	**Suggested adaptation intervention**	**Rationale**	**Expected adaptation benefit**
Diarrhoeal disease	**WASH infrastructure**	**Flood- and drought-resilient WASH infrastructure** in public buildings.	Manage wet-season and extreme-event risk; vulnerability is linked to structural WASH deficits.	Withstand heavy rainfall and dry spells.
	Diagnosis and treatment	Reduce barriers to diagnosis (rapid and laboratory analyses) and treatment (Oral rehydration solutions - ORS, zinc).	Longer travel times are associated with higher incidence; under-ascertainment is likely in remote areas.	Effective diagnosis and treatment in hard-to-reach areas.
	Behaviour campaigns	Reinforce behavioural interventions for hygiene and breastfeeding.	Behaviours and crowding are drivers; breastfeeding and hygiene are protective.	Reduce overall burden; "no regret" strategies that pay off during extremes.
	Surveillance / modelling	Extend surveillance, service reach and improve diagnostic specificity.	Lower reported diarrhoea in remote areas suggests under-ascertainment.	Ensure emerging risks in remote areas are not missed, improved analysis and forecasting.
Priority health outcome	**Functional area**	**Suggested adaptation intervention**	**Rationale**	**Expected adaptation benefit**
Preterm birth	**Infrastructure**	Develop and implement passive cooling techniques for health facility construction	Mitigate thermal stress for pregnant women; ensure facilities remain functional during heat extremes.	Improved thermal comfort for patients and staff; functional health facilities.
	Resilient supply chain	Introduce and scale heat-stable medication and improve the Logistics Management Information System.	Cold chain storage is vulnerable during heatwaves and power outages.	Resilience of the supply chain; availability of essential commodities when needed.
	Behaviour campaigns	Awareness raising **on heat impacts** on Maternal, Newborn, and Child Health integrated into Antenatal care visits.	Behaviour change is critical; vulnerable populations may have limited access to formal care.	Improved hydration, resting, and cooling behaviours among pregnant women.
	Data collection / Modelling	Improve data availability baseline and capacity for modelling.	Need for precise characterisation of heat-related risks and surveillance.	Baseline for targeted EWS.

3. Institutional, Policy, and Regulatory Frameworks

3.1 National Climate Goals and Priorities

Reflecting Togo's strategic commitment to building national climate resilience and mitigating climate-related risks, the following section provides a comprehensive overview of the most relevant and recent climate change adaptation and environmental policies, plans, and strategies, with particular emphasis on their provisions and relevance to strengthening the health sector.

Table 12: Plans and policies related to climate change and their relevance to the health sector

Name	Description
National Civil Protection Policy 2017-2030 (*Politique Nationale de Protection Civile* - PNPC) (MSPC, 2016)	The overall objective of this policy is to foster accelerated, sustainable and inclusive growth by ensuring Togo's robust preparation for disasters and threats. Its five specific objectives include significantly reducing mortalities, household property losses, and infrastructure damage, as well as mitigating climate-related environmental hazards. To effectively achieve these Disaster Risk Reduction (DRR) goals, the National Civil Protection Policy advocates for dedicated legislation, acknowledging that the absence of such law currently hinders anchoring the sector in Togo's legal landscape. The PNPC consequently defines priority actions across prevention, response, and post-catastrophe management.
2021 National Determined Contribution (NDC) to UNFCCC (MERF, 2021a)	The fourth strategic objective of the NDC is to reinforce adaptive capacity within human sectors through enhancing healthcare access for the population and reducing mortality rates from infectious diseases and other pathogens. This objective encompasses priority adaptation measures such as i) establishing an EWS for floods ii) reinforcing socioeconomic structures to make them more resilient and iii) preventing and combatting vector-borne diseases. This strategic objective involves strengthening the regulatory framework for health and environment, equipping rural areas with adequate health infrastructure, and implementing protective measures against pathogens.
National Adaptation Plan to Climate Change (*Plan National d'Adaptation aux Changements Climatiques* - PNACC) (MERF, 2018b)	The goals of the PNACC include: • Ensuring the systematic integration of climate change into planning and budgeting; • Building the capacity of stakeholders; • Raising awareness among decision-makers of the need to integrate climate change adaptation into planning documents; • Raising awareness among the general population to enhance resilience to climate change; • Improving local knowledge and best practice in relation to climate change; and • Strengthening coordination between relevant stakeholders. The Plan identifies health as one of the priority sectors in accordance with the 2021 NDC.
National Action Plan for the Implementation of the National Framework for Climate Services (NFCS) 2018 (*Plan d'Action National pour la mise en place du Cadre National pour les Services Climatologiques*) (MIT, 2018)	This Plan responds to the need for improved climate services that are tailored to sectoral needs, including health. Regarding DRM, the Plan notes that the most important information that users need is water level in rivers to predict flooding. For the health sector, the information required relates to air quality, pollution, and extreme events due to the seasonality of diseases such as malaria, diarrhoea and meningitis (see *Section 3.4.3.1.1*).
National Multi-Risk Contingency Plan 2020 (*Plan*	Developed in the aftermath of Covid-19, this plan addresses five identified risks—epidemics, flooding, extreme winds, pollution, and wildfires—by

***National de Contingence Multirisques du Togo - PNCM*) (MSPC, 2020)**	clarifying roles across ministries and divisions. It establishes a planning framework for natural catastrophe response and integrates disaster risk planning (prevention, preparation, and response) into national development plans (see *Section 3.2.1.4.1*).
National Plan for Agricultural Investment, Food Security and Nutrition 2017-2026 (*Programme National d'Investissement Agricole, de Sécurité Alimentaire et Nutritionnelle-* PNIASAN) (MAEH, 2017)	This plan was drawn up in 2017 for the period 2017-2026. The aim of implementing the PNIASAN is to achieve a growth rate in gross domestic agricultural product of at least 10% by 2026, to improve the agricultural trade balance by 15%, to double the average income of farming households, to help reduce malnutrition by combating food insecurity and to halve the poverty rate in rural areas to 27%. The PNIASAN, structured around four axes, incorporates climate change adaptation measures under Impact 3: "Access to food and nutrition is improved, as is the resilience of vulnerable populations". This directly addresses food security, a key determinant of public health. To improve population health outcomes, the plan encompasses a comprehensive approach: it includes building research service capacity, establishing national systems for food crisis management and agricultural natural disaster response, and developing social safety nets for vulnerable rural communities. Furthermore, it prioritises strengthening nutritional security and promoting sustainable farming techniques, all of which are designed to contribute directly to better health outcomes.
National Gender-Sensitive Electric Mobility Strategy 2026-2030 (*Stratégie Nationale de Mobilité Électrique Sensible au Genre*) (MERF, 2025)	The strategy's long-term objective is the drastic reduction of CO_2 emissions in the transport sector (which accounted for 56% of energy sector emissions) to meet Togo's revised NDC target (50.57% GES reduction by 2030). It seeks to couple electrification with decentralised renewable energy to enhance national energy independence. Its key strategic axes are: i) improve governance, ii) accelerate the adoption of electric vehicles (EV), prioritising two and three-wheeled EV, iii) deploy necessary equipment for electric mobility and iv) reinforce the environmental durability of electric mobility. The strategy yields direct public health co-benefits by eliminating exhaust pollutants during use, thus reducing the high prevalence of respiratory illnesses linked to air pollution.

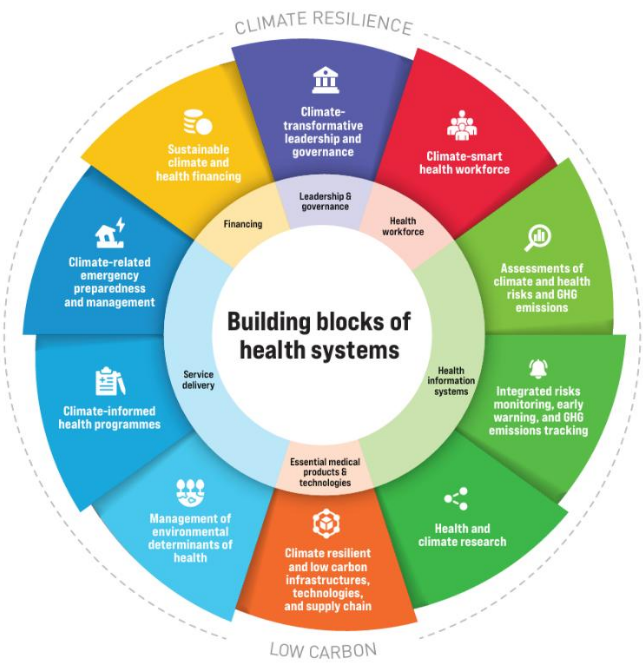
3.2 The Health Sector in Togo

The subsequent sections are structured around the WHO's Operational Framework for Climate Resilient and Low Carbon Health Systems, using its 10 key elements to provide a baseline for climate resilient health systems (WHO, 2023a):

i. Climate-transformative leadership and governance
ii. Climate-smart health workforce
iii. Assessment of climate and health risks, and GHG emissions
iv. Integrated risks monitoring, early warning, and GHG emission tracking
v. Health and climate research
vi. Climate resilient and low carbon infrastructures, technologies, and supply chain
vii. Management of environmental and determinants of health
viii. Climate-informed health programmes
ix. Climate-related emergency preparedness and management
x. Sustainable climate and health financing

Each component plays a crucial role in strengthening the health system to address and adapt to the impacts of climate change. As a systemic approach, there are strong connections between the various components that serve to reinforce one another. The following sections give a description of Togo's current health sector, its operational deficiencies, and the gaps in mainstreaming climate change into planning and policy-making processes.

Figure 45: WHO Operational Framework for Climate Resilient and Low-Carbon Health Systems



(WHO, 2023a)

3.2.1.1 General health sector governance framework in Togo

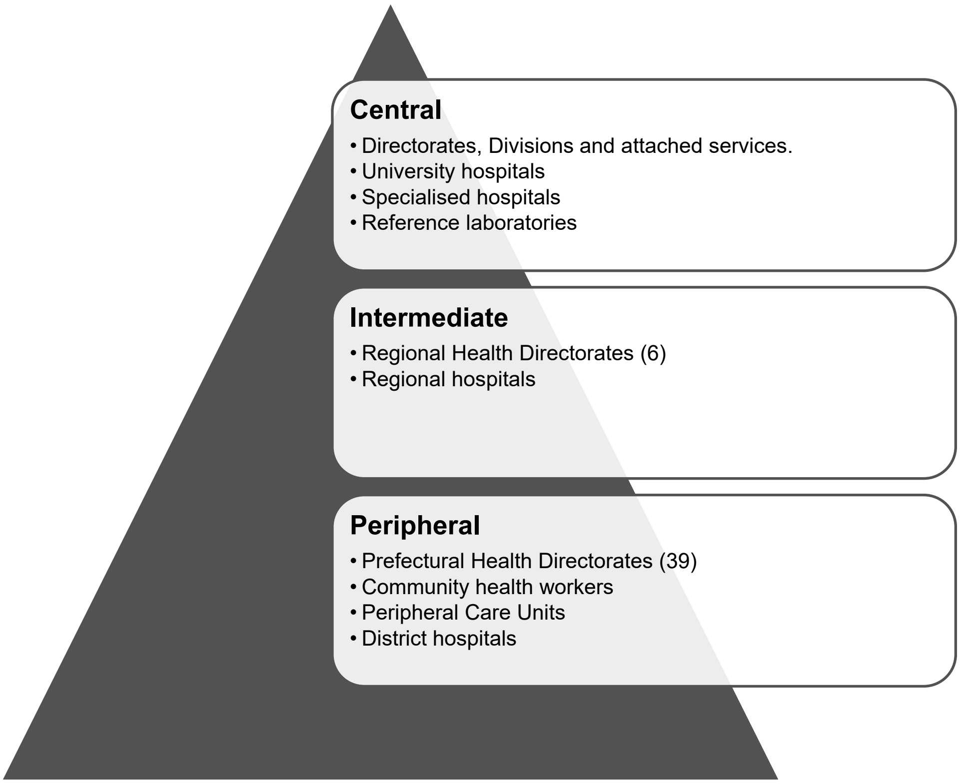
The MSHPCSUA is the public body responsible for the formulation, coordination, and implementation of national health policies, plans, and programmes. Its organisation and responsibilities are defined by Decree No.109-004/PR, of January 2019. The Ministry's structure reflects its broad mandate and comprises the following main entities:

i. The Minister's Cabinet and attached services, which provide political, strategic, and technical support to the Minister;

ii. The Central Administration, consisting of the General Secretariat and the General Directorates responsible for the planning, management, regulation, and oversight of the health system;
iii. External services, which ensure the decentralised implementation of health policies across health regions, prefectures/districts, and communes; and
iv. Affiliated institutions and bodies, including specialised HFs, teaching hospitals, institutes, and other public or semi-autonomous organisations under the Ministry's supervision.

The healthcare system in Togo is structured in a pyramidal model with three levels of care: the peripheral, intermediate, and central.

Figure 46: Pyramidal organisation of Togo's health system



(MSHP, 2023a)

At the peripheral level, the provision of healthcare and services is organised around three tiers:

i. CHWs, who provide healthcare at the household and community levels by delegation and act as the interface between the community and health services.
ii. USPs, which form the foundation of the healthcare system and serve as the first point of contact for primary healthcare through both fixed and outreach strategies;
iii. HD, which constitute the first level of reference care (MSHP, 2023a).

The intermediate level serves as a reference and referral level, composed of Regional hospitals (*Centres Hospitaliers Régionaux* - CHR) that coordinate and supervise the health districts and provide secondary healthcare services adapted to regional specificities.

At the central level, tertiary healthcare is delivered in three University hospitals (*Centres Hospitaliers Universitaires* - CHU) and in specialised reference hospitals, offering advanced diagnostics and treatment services.

In accordance with Decree No.171/2020/MSHP/CAB/SG of 19 June 2020 on the administrative organisation of health regions, the country's health system is decentralised into six health regions, 39 prefectures/health districts, covered by Prefectural Health Directorates (*Direction des Districts Sanitaires* – DDS), and 117 health communes (MSHP, 2023a). This organisation brings together a dense network of both public and private healthcare facilities. The number increased from 1,320 in 2021 to 2,152 HFs in 2022 (MSHP, 2023a). However, the regional distribution of healthcare facilities is uneven, with most facilities located in the greater Lomé region. The table below shows their geographical distribution as of 2022 (MSHP, 2022b).

Table 13: Number and distribution of healthcare facilities by region in 2022

Types of healthcare facilities	Grand Lomé	Maritime	Plateaux	Centrale	Kara	Savanes	Total
University Hospital	2	0	0	0	1	0	3
Regional Hospital	1	1	1	1	1	1	6
Specialised Hospital	1	1	1	0	0	1	4
District Hospital 2	9	3	9	3	4	4	32
District Hospital 1	70	13	11	3	5	5	107
Peripheral Care Unit II	252	40	62	24	36	19	433
Peripheral Care Unit I	671	219	260	113	130	97	1490
Primary Care and nursing services	29	4	10	9	9	7	68
Other	4	1	4	0	0	0	9
Total	**1039**	**282**	**358**	**153**	**186**	**134**	**2152**

3.2.1.1.1 Decentralisation and local governance

Togo is undergoing an institutional transition following the adoption of the 2024 Constitution, which established the Fifth Republic and transitioned the country toward a parliamentary governance model (see *Section 1.4*). This shift is unfolding alongside a decentralisation reform guided by the National Decentralisation Policy 2025-2034 and its corresponding action plan. The government's objective is to strengthen local governance, empower communes, and promote integrated local development.

Despite this momentum, the transition remains gradual. Local governments continue to face limited administrative capacity, constrained financial resources, and uneven transfer of competencies — factors that affect the quality of decentralised service delivery, particularly in public health, hygiene, sanitation, and climate resilience.

Under Decree No. 2023-046/PR, communes hold key responsibilities in public health, hygiene, and sanitation. They are mandated to develop communal hygiene and sanitation plans, adapt national regulations to the local context, monitor sanitary conditions in public spaces, and mobilise resources to improve health outcomes.

In practice, despite the legislative mandate, most communes lack the budgets, and technical expertise to effectively carry out these functions. This is evident in local planning, where Municipal Development plans (*Plans de Développement Communaux* - PDC) rarely incorporate vector control. Furthermore, few communes possess formal hygiene and sanitation plans, and health surveillance measures, including home visits remain limited due to insufficient training and operational resources. These structural challenges are exacerbated by financial constraints, resulting in limited operational effectiveness (see *Table 14* for details on the scope and status of these planning tools).

3.2.1.2 Overview of climate-informed health policies

The following table summarises the key sectoral policies and strategic plans that shape health system governance, climate adaptation, and digital transformation in Togo, highlighting their main objectives and relevance.

Table 14: Summary of health sectoral policies and plans

Name	Content
Sectoral policies	
National Health Policy 2030 (*Politique Nationale de Santé* — PNS)	The Policy's objective is summarised as follows: i. Improve the availability and use of specific health services by mothers, children, young people, and the elderly. ii. Strengthen the capacity to prevent and manage diseases and address the social determinants of health. iii. Strengthen the resilience of the health system and its capacity to respond to epidemics and other public health emergencies. iv. Improving access for populations, particularly the most vulnerable, to essential services, medicines, and other quality health products (e.g. vaccines)
Sectoral plans	
National Plan for the Development of the Health Sector 2023-2027 (*Plan National de Développement Sanitaire* — PNDS)	The PNDS for the 2023-2027 period is guided by 5 strategic objectives. i. Health system and community health- activities will improve geographic accessibility from 76.45% to 90%, the use of curative care from 56.5% to 70%, coverage of the need for health workers at the primary care from 42.1% to 80%, coverage of essential health services from services from 68% to 80%. ii. Essential health services including nutrition for mothers, children, young people adolescents and the elderly: activities will reduce maternal, neo-natal and infant mortality and increase life expectancy up to 64 years (from 61.34). iii. Disease control and management of social and environmental determinants of health: activities will improve the percentage of people who received at least three doses of intermittent preventive treatment (IPT for malaria) at antenatal visits during their last full-term pregnancy in the last two years from 53% to 80%, amongst other objectives. iv. Responses to epidemics and other public health emergencies: strengthening early detection of and effective response to epidemics and other public health emergencies (maintain the proportion of epidemics receiving a response within 14 days of notification at 100%). Strengthening the implementation of the "One Health" approach. v. Protection against the financial risk associated with the use of healthcare services: its implementation should make it possible to reduce healthcare expenditure by direct household payment as a percentage of current health expenditure from 66.2% to 21.9%, Increase the proportion of the population covered by the single health insurance scheme from 5.37% to 60%.

National Adaptation Plan for the Health Sector 2020-2025 (*Plan National d'Adaptation pour le secteur de la Santé aux effets des changements climatiques —* PNAS)	The PNAS is the only planning document that specifically links climate change and health (see *Section 3.2.1.2.1)* for more information)**.** It aims to reduce population vulnerability to diseases, particularly those that are worsened by climate change. Specific objectives include: i. Building climate change knowledge and adaptive capacity within healthcare staff, ii. Strengthening integrated monitoring of population health risks and EWS, iii. Strengthening actions that improve the environmental determinants of health, especially those that play a major role in climate sensitive diseases, iv. Strengthening technologies and infrastructure to ensure they are resistant to climate change effects, amongst others.
Togo Digital 2025 Strategy (MENTD, 2022)	The Strategy provides the national framework for digital transformation and institutional modernisation to strengthen climate resilience and the health sector. It advances UHC and the digitalisation of healthcare services (see *Section 3.3.2*).
Communal plans	
Municipal Development Plan	This is the overarching long-term planning tool for local development and land-use planning, governing local development, as mandated by Law No.2019-006 (Article 82). These plans rarely incorporate vector control or specific environmental health measures.
Communal Hygiene and Sanitation Plan	This is a strategic local document mandated by Decree No.2023-046/PR, outlining local priorities and actions for disease prevention, environmental health management and adapting national regulations to the local community context. The Plan guides key functions like ensuring sanitary inspections of public spaces (hotels, restaurants, public transport) and mobilising local resources for implementation. Few communes possess formal plans, and their implementation is hampered by a lack of budget and technical expertise. Health surveillance and home visits, which are mandated under the decree, remain limited due to insufficient training and operational resources.

3.2.1.2.1 The National Adaptation Plan for the Health Sector – PNAS (2020)

There remains a persistent global adaptation gap in health systems, though formal planning has accelerated in recent years. The 2022 Lancet Countdown report found that only 48 out of the 95 countries analysed had identified the need to enhance health system resilience to climate change (Romanello et al., 2022). By contrast, the 2025 Lancet Countdown shows substantial improvement, with 112 countries (58% of 193 WHO member states) having completed a Vulnerability and Adaptation Assessment, and 116 countries (60%) a PNAS. Notably, countries that are members of the Alliance for Transformative Action on Climate and Health (ATACH) demonstrate higher progress, with 74% having finalised a PNAS (Romanello et al., 2025).

In this context, Togo, as a member of the ATACH led by the WHO, developed its PNAS. Established in 2020 for the 2020-2025 period, the PNAS serves as the main strategic framework for integrating climate resilience into Togo's national health planning. It remains the primary document that specifically addresses climate adaptation in the health sector outside of a disaster-risk context (MSHP, 2020b). Created to operationalise the health priorities identified in Togo's updated PNACC, its overarching goal is to strengthen health-system resilience to anticipate, prevent and manage climate-related health risks through 2050. The PNAS is grounded in the findings of a 2019 vulnerability study, which demonstrated how rising temperatures, changing precipitation patterns, and more frequent extreme events intensify CSHO. The revision of the PNAS has already begun, and an updated version is expected to be completed in the first quarter of 2026.

As a strategic framework, the PNAS establishes the foundations for long-term health-system adaptation through a multidimensional approach aligned with national and sectoral development plans, including the PNACC, the PNDS (2023-2027), and the PND (2018–2022) (MERF, 2018a, 2021a; Romanello et al., 2022a). The PNAS translates the WHO's ten components for resilient health systems into national priorities, including governance reform, strengthening climate-health surveillance and early warning capacities, advancing research on climate and health interactions, and ensuring that health infrastructures and technologies become climate-resilient. Additional components cover environmental determinants such as WASH, emergency preparedness, and the mobilisation of financial resources, which are further discussed in *Sections 3.2.5*, *3.2.6, 3.2.7, 3.2.9,* and *3.2.10.*

3.2.1.3 Governance framework for climate-sensitive health outcomes

3.2.1.3.1 Governance and coordination of malaria control

The governance and coordination of malaria control in Togo operate through a hierarchical and multi-level system steered by the PNLP. This programme is embedded within the MSHPCSUA, specifically under the Division of Transmissible Diseases (DivMT), itself part of the Directorate for Disease Control and Public Health Programmes (DLM-PSP). It reports to the General Directorate for Sanitary Action within the Secretariat-General. The PNLP is orchestrated by a national coordinator and structured into five functional units: Administration & Finance; Prevention; Epidemiological Surveillance & Research; Case Management; and Procurement & Supply Management. These functions are carried out within the decentralised health system structures described in *Section 3.2.1.1*, with malaria-specific roles defined for regional and district levels (MSHP, 2023).

A key element of Togo's surveillance architecture is the network of malaria sentinel sites, designed to monitor trends in disease incidence (epidemiological), mosquito population dynamics (entomological), and parasite behaviour (parasitological). Since 2017, a pilot system has been operational in 17 HFs in four districts, providing weekly reporting on malaria morbidity and mortality. This system is intended to generate near-real-time information to support case management, guide control interventions, and detect shifts in transmission patterns.

However, the current network offers limited geographical and functional coverage. Entomological surveillance is not systematically integrated, and environmental indicators are rarely incorporated into routine reporting. Persistent issues, including inconsistent data quality, delays in reporting, staff turnover, weak site management, and limited use of collected data, undermine the system's effectiveness and reduce the ability of decision-makers to identify early warning signs. Broader systemic limitations affecting surveillance and early warning across CSHO are described in *Section 0* on EWS in Togo.

Recognising these shortcomings, the Malaria Programme's 2023-2026 Strategy prioritises strengthening surveillance, with a particular focus on revitalising and improving the performance of existing sentinel sites (MSHP, 2023b).

3.2.1.3.2 Governance and coordination in diarrhoeal disease control

Building on the Integrated Disease Surveillance and Response (IDSR) principles (WHO, 2010) as well as the foundations established through the national Cholera Strategic Plan 2015-2017 and subsequent outbreak responses, the system integrates policy guidance, surveillance, WASH interventions, and outbreak management across administrative levels (MSHP, 2014).

The organisation of central, regional and district health actors follow the pyramidal model outlined in *Section 3.2.1.1*, with diarrhoeal disease-specific responsibilities added to these general functions.

Diarrhoeal disease management follows the full epidemic cycle, from preparedness and early detection to response and recovery. Planning and readiness are structured around a three-phase approach encompassing preparedness, response, and long-term risk reduction or resilience, supported by detailed activity matrices and predefined budgets. To ensure rapid deployment during emergencies, essential supplies, such as oral rehydration salts, intravenous fluids, IPC materials, and diagnostic tools such as rapid diagnostic tests (RDT) with transport media, are pre-positioned at strategic levels of the system. District-level micro-plans provide operational guidance for hotspot mapping, chlorination of water points, and community-based trigger actions, drawing on the experience of the Platform Cholera as a model for coordinated response. During outbreaks, coordination mechanisms intensify through incident management structures, daily technical meetings, and, when required, activation of national situation rooms. After-action reviews are undertaken once outbreaks are contained, ensuring continuous learning and alignment with IDSR WHO standards (WHO, 2010).

Clinical management is guided by national protocols aligned with WHO recommendations, ensuring consistent triage, rapid rehydration, and antibiotic use, and referral across the health system. Cholera Treatment Centres (CTCs) and Cholera Treatment Units (CTUs) are established or reinforced during outbreaks, supported by strict IPC measures to prevent transmission.

A defining feature of diarrhoeal-disease governance in Togo is the close integration of WASH interventions with health actions. Health and WASH actors collaborate to implement water-quality improvements, including chlorination of water points, provision of safe water supplies, disinfection of latrines, and hygiene promotion campaigns in high-risk areas. Additional interventions include the distribution of household water-treatment products and community-level hand-washing campaigns, coordinated with health risk assessments to maximise epidemiological impact.

The system is grounded in principles of good governance, decentralised implementation, multi-sectoral coordination, and community participation, bringing together health authorities, municipalities, water utilities, civil protection services, and partners such as WHO, UNICEF, the Red Cross, the Global Task Force on Cholera Control (GTFCC), and NGOs. Governance structures emphasise transparent data sharing, joint decision-making, and alignment with the Global Roadmap to End Cholera by 2030.

Despite ongoing efforts, diarrhoeal disease surveillance is affected by the broader systemic limitations in surveillance and diagnostic capacity outlined in *Section 0*, including fragmentation of information systems and limited decentralised laboratory infrastructure. The fragmentation between IDSR and cholera-specific/WASH information systems, coupled with limited monitoring and evaluation of elimination plans, undermines comprehensive situational awareness (WHO, 2022). At the peripheral level, HFs lack the capacity to identify the bacterial or parasitic pathogens of diarrhoeal infections, while only two central-level laboratories possess the capability to diagnose viral diarrhoeal diseases. Although routine diagnosis is generally timely, the limited decentralised laboratory infrastructure constrains the generation of pathogen-specific, real-time data, thereby impeding the precision of outbreak detection, transmission mapping, and targeted interventions (see *Section 3.2.8.2*).

Structural sustainability challenges further exacerbate these limitations. Emergency WASH interventions, including chlorine tablets and water trucking (temporary water delivery by tanker trucks), are often implemented in isolation from long-term investments in safe water and sanitation infrastructure in recurrent hotspots. The incorporation of climate and hydrometeorological forecasts into district-level micro-plans and EWS remains nascent, despite the increasing influence of climatic variability on diarrhoeal disease risk. Strengthening the integration of diagnostics, surveillance, and climate-informed planning—consistent with global public health and DRR guidance — is critical to enhance outbreak anticipation, preparedness, and the overall resilience of health systems.

3.2.1.3.3 Governance and coordination in maternal, infant and child health

In Togo, the DSME (Direction de la Santé de la Mère et de l'Enfant) is the central directorate within the Ministry of Health and Public Hygiene, responsible for providing strategic leadership on maternal, neonatal, infant, and child health. It oversees the development of national policies, norms, and guidelines, and ensures their implementation across all levels of the health system to reduce morbidity and mortality among women and children.

Beyond its technical mandate, the DSME plays a key coordination role. It serves as the main institutional platform for aligning actors and interventions in maternal and child health, including central programmes (immunization, nutrition, reproductive health), regional and district health services, and technical and financial partners. The DSME coordinates planning, implementation, and monitoring of interventions to ensure coherence with national strategies such as the National Health Development Plan (PNDS) and sectoral priorities.

The directorate also contributes to cross-cutting coordination with other ministries and structures—particularly on issues such as nutrition, adolescent health, and increasingly climate-sensitive risks affecting mothers and children—helping translate national priorities into harmonised action at decentralized levels. Through this role, the DSME helps reduce fragmentation, strengthens accountability, and promotes more integrated and effective service delivery for maternal and child health in Togo.

Despite its strong mandate, climate change remains a relatively new and not yet systematically integrated domain within the DSME's work. While the directorate addresses climate-sensitive health outcomes in practice—such as maternal and neonatal complications exacerbated by heat, floods, or service disruptions—these risks are not yet explicitly analysed, planned for, or monitored through dedicated climate–health tools. The DSME currently lacks access to structured climate risk analyses, tailored indicators, and operational decision-support tools that would allow climate risks to be routinely integrated into maternal and child health programming. For instance, the DSME cannot yet rely on a heat-health early warning system to anticipate periods of elevated risk for pregnant women, newborns, and infants, or to trigger targeted preparedness and service adaptations.

At the same time, the DSME has recently introduced heat-stable formulations of essential medicines, notably the adoption of carbetocin (heat-stable) for the prevention of postpartum haemorrhage, reflecting growing awareness of climate-related constraints on cold-chain reliability. This represents an important entry point for broader, more systematic integration of climate resilience considerations into maternal and child health policies, planning, and service delivery.

3.2.1.4 Cross-sectoral collaboration for climate change

3.2.1.4.1 <u>At the planning and institutional levels</u>

At the institutional level, the MSHPCSUA developed a multi-hazard contingency plan (PNCM) in 2017, grounded in a health risk assessment based on STAR (Strategic Tool for Analysis of Risks). The plan outlines cross-sectoral collaboration mechanisms for managing climate-sensitive health risks and clarifies the responsibilities of health, water, sanitation, environment, and disaster management institutions. In line with WHO guidance, it describes governance structures, risk scenarios, institutional capacities, and stakeholder accountability lines to strengthen preparedness and response to public health emergencies influenced by climate variability.

However, the plan has not been updated or formally evaluated since 2017. The lack of revision limits the MSHPCSUA's ability to assess its effectiveness, identify persistent gaps, and integrate emerging climate-driven risks. As a result, the PNCM is now misaligned with current epidemiological realities, evolving institutional capacities, and cross-sectoral coordination needs, reducing its utility as a planning and preparedness tool.

Beyond the contingency plan, the MSHPCSUA participates formally in national DRR and climate governance mechanisms through its participation in the National Platform for Disaster Risk Reduction (*Plateforme Nationale pour la Réduction des Risques Climatiques* – PNRRC), the National Civil Protection Agency (*Agence Nationale de la Protection Civile* – ANPC), and the National Framework on Climate Services (NFCS) (see *Section 3.4.3.1.2*). This presence — strategic at the level of the Secretary General and technical through focal points and the Climate-Health Task Force — demonstrates institutional commitment to addressing climate-sensitive health risks within multisectoral systems. Yet the Ministry remains absent from the NFCS Scientific and Technical Committee, limiting its ability to influence climate-health research agendas and forecasting products relevant for public health decision-making.

To strengthen internal coordination on climate and health, the MSHPCSUA established a Climate-Health Task Force in January 2024 by service note of the Secretary General. The Task force brings together representatives from key technical departments and programmes, including immunisation, IDSR, nutrition, laboratories, medicines and health products, health infrastructure, public hygiene and basic sanitation, statistics and research, training and human resources development, malaria control, and the Health Emergency Operations Centre (*Centre d'Opération d'Urgences de Santé Publique* - COUSP) (see *Section 3.2.9.2*). It is chaired by the Secretary General with support from a designated climate-health focal point (MSHPAUS, 2023).

While the Task Force provides an important initial anchor for climate-health coordination within the Ministry, it remains a temporary, non-institutionalised structure without a legal mandate, permanent staff, or dedicated budget. Members contribute in addition to their core functions, limiting the Task Force's capacity to drive strategic planning, sustained implementation, and effective intersectoral collaboration with meteorology, environment, and civil protection. These limitations underscore the need to transform the Task Force into a fully institutionalised CCU with a clear mandate, adequate resources, and formalised linkages to national DRR and climate-adaptation mechanisms. Such a unit would provide a permanent institutional anchor for climate-health coordination, strengthen leadership within multisectoral governance platforms, and ensure that health expertise systematically informs activities. In turn, this would enhance the Ministry's leadership in multisectoral governance, ensuring that health expertise systematically informs national DRR efforts and climate-adaptation strategies.

3.2.1.4.2 At the operational level

Operationally, the MSHPCSUA has established structures for emergency preparedness and response, including COUSP, the national epidemiological surveillance system, and the National Committee for the Management of Public Health Emergencies. COUSP functions as the sectoral unit responsible for health-related risk reduction, coordinating operational activities in response to public health emergencies, managing surveillance data, and deploying rapid response teams down to the community level through integrated data collection networks. While COUSP provides operational leadership within the health sector, the overall coordination for DRR lies with the ANPC, which oversees multi-sectoral coordination and national-level contingency planning (see *Section 3.4.1.2 on integrated risk and early warning monitoring*).

Despite these internal capacities, operational collaboration with other climate-sensitive sectors remains limited. Preparedness and response mechanisms are still predominantly sectoral, with health interventions activated primarily once climate-related disasters or epidemics have already been detected. Upstream prevention remains modest and is generally confined to annual contingency planning with ANPC, rather than proactive involvement in climate risk monitoring or the design of early warning and forecasting systems (see *Section 3.4.3*).

This reactive posture is increasingly problematic given the central role of climate hazards — such as floods, droughts, and heatwaves — in driving waterborne, foodborne, and vector-borne diseases. The absence of formal mechanisms to embed health considerations into broader climate risk monitoring systems prevents the implementation of a comprehensive One Health approach. It also limits the integration of health indicators into national disaster prevention systems, reinforcing the segmentation between sectors and early action.

These operation limitations and the need for institutionalisation are addressed by the proposed establishment of a dedicated CCU within the MSHPCSUA, building on the initial work of the temporary Climate-Health Task Force (see *Section 3.2.1.4.1*).

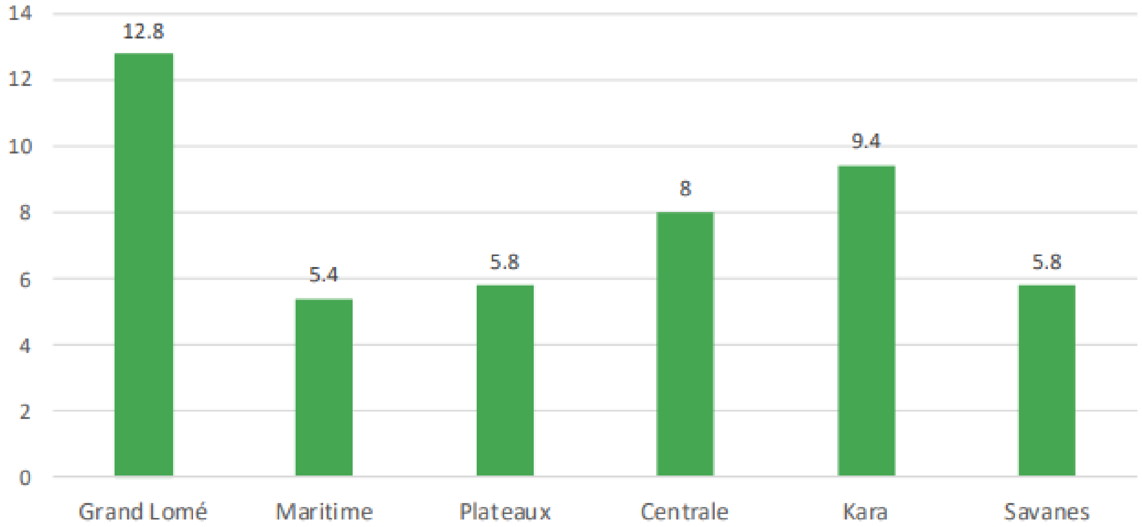
3.2.2 Climate-Smart Health Workforce

To achieve adequate universal primary healthcare coverage, the WHO recommends a target of 23 key health professionals (doctors, medical assistants, nurses, and midwives) per 10,000 inhabitants. As of December 2021, Togo had approximately 3.15 of these professionals per 10,000 people, representing around 2,514 individuals for a population of approximately 8 million (MSHP, 2023a). By 2022, with the population reaching 8,095,498 according to the annual census (INSEED, 2023), the estimated density had declined to 2.54 health professionals per 10,000, corresponding to roughly 2,056 health professionals. This figure indicates that the number of these specific medical professionals would need to increase approximately ninefold to meet WHO targets by 2030, underscoring the significant challenge in expanding the qualified health workforce.

While the overall number of healthcare staff (including auxiliary and administrative personnel) in both public and private sectors saw a slight increase to 18,794 in 2021 from 18,372 in 2020, the public sector accounts for the majority at 68.11% (MSHP, 2023a). However, despite these broader figures, the availability of qualified personnel, especially doctors, remains critically low, further highlighting the scale of the human resource challenge in the health sector.

There is also a need for more CHWs, as the 2023-2027 PNDS calls for hiring an additional 1,126 CHWs. Only 36.2% of peripheral-level HFs met the required standards in 2020. This is caused by a lack of recruitment of health staff during the year, retirements, deaths, and resignations. The figure below shows the density of medical staff by region at the end of 2020. The Lomé region has the highest density, and the Maritime region has the lowest (GIZ, 2021e).

Figure 47: Health personnel density by region in 2020



(GIZ, 2021e)[12]

The 2022 statistical yearbook's retirement table explicitly includes biomedical technicians (recording two retirements in 2022), confirming this cadre exists in the public system (MSHP, 2022a). However, the yearbook does not differentiate technical personnel from technical *medical* personnel into specific sub-cadres (e.g., distinguishing biomedical technicians from electricians or plumbers), making it impossible to accurately determine the national count of biomedical maintenance staff.

To achieve the targets of the most recent PNDS, it is estimated that an additional 10,126 healthcare workers, 7,775 healthcare providers and 2,351 support staff (administrative, hygiene and maintenance) are needed. At the community level, 1,126 additional CHW are needed to achieve the PNDS targets, particularly in the Grand Lomé greater area and the Plateaux region, demonstrating the lack of human capacity at all levels of the healthcare system (MSHP, 2022b).

CHWs are central to health communication and community-based surveillance in Togo, serving as the primary interface between the formal health system and households. They are indispensable agents within health systems, playing a critical role in delivering promotive, preventive, and basic curative care (WHO, 2018b). As first responders at the community-level, CHWs multiply health knowledge, provide initial care, and facilitate early referral. Their close integration within communities enables them to directly address local determinants of health and risk profiles linked to livelihoods, mobility, and social norms. Core responsibilities include preventive services such as vaccination outreach, health education, and support to community-based surveillance. In Togo, the profile and role of CHWs are formally defined under the national Community-Based Interventions (IBC) policy, which sets clear eligibility criteria to ensure community legitimacy and effectiveness. According to the policy, CHWs may be women or men that must be 18 years or older, reside in the beneficiary community, speak the local language, and be literate. Additional requirements include engagement in an economic activity, availability for community service, good physical condition, and good moral standing. While some partners have historically applied more stringent selection criteria, the IBC policy provides a harmonised national framework to guide CHW recruitment and deployment, ensuring alignment, inclusiveness, and sustainability.

Crucially, their involvement in community-based surveillance – strengthened through the Pandemic Fund Grant in collaboration with WHO and UNICEF – not only enables early outbreak detection but also positions CHWs as indispensable actors within any EWS (see *Section 3.4.4*). Their role and presence also within communities makes them key communicators of health information, creating an essential bridge to the wider health communication ecosystem. Furthermore, under a One Health approach, their role can be expanded to include basic monitoring of animal health, reinforcing the interconnectedness of human, animal, and environmental health in disease prevention (Henley et al., 2021).

[12] The figure from GIZ (2021e) presents total health personnel density across regions in 2020, including a wide range of health professions. By contrast, the MSHP (2023a) estimate of 3.15 professionals per 10,000 inhabitants (of 2021) refers specifically to key health professionals – doctors, nurses, midwives, and medical assistants. As per WHO classification. The difference in scope explains the apparent discrepancy between the two data points.

To build a climate-smart health workforce, targeted capacity-building is essential. In collaboration with WHO and GIZ, the ProSanté project has translated and adapted a comprehensive set of 17 climate and health training modules originally developed for Asia. These modules cover topics such as weather and climate basics, CSHO, mitigation and adaptation strategies, vulnerability assessment, and communicating climate risks. In 2024, GIZ headquarters and ProSanté, working with consultants from the Centre for Planetary Health Policy and a local climate-change professor, revised the full package for the African context, updating all figures and examples with the latest evidence from the IPCC Sixth Assessment Report and West African case studies. Before this revision, the original version of the modules was tested during a five-day regional training on climate change and health in Togo, which brought together participants from Togo, Benin and Cameroon. That workshop used the earlier module set, and feedback from participants, together with the new scientific evidence, directly informed the 2024 African adaptation and the design of a regional pool of francophone climate-health trainers.

3.2.2.1 Health communication

Research on Social and Behaviour Change Communication (SBCC) and health communication in Africa highlights recurring weakness. Campaigns often fail when frontline communicators lack adequate support and trusted interpersonal channels (Handebo et al., 2024), when institutional coordination is weak, leading to parallel or even conflicting interventions (Gonah & Nomatshila, 2024), when advice is not linked to practical and locally available options, and when communities lack feedback mechanisms to shape message design and delivery (GPMB, 2019). Another weakness is the heavy reliance on fear-based communication. Evidence shows that fear without agency can paralyse audiences (Glanz & Bishop, 2010), while approaches that emphasise solutions, hope, and agency/self-efficacy are far more effective in fostering protective action. Globally and in West Africa, communication on climate and health is often perceived as abstract and dominated by technical language, making it difficult for audiences to recognise direct, personal relevance. Best practice highlights that effective messages must be simple, localised, solution-oriented, and emotionally resonant. They should avoid jargon, empower people with actionable strategies, and balance urgency with hope (WHO, 2024a).

Building on these wider lessons, the communication environment in Togo offers both opportunities and constraints. The country counts more than 90 radio stations, about a dozen television networks, and over 200 print outlets (RSF, 2023). Distribution of newspapers is largely urban, and prices limit their reach outside Lomé (Friedrich Ebert Stiftung, 2021). Radio and television remain the dominant mass communication channels, with community radio stations playing a critical role in rural areas (Ekwa Bébé, 2025). Togo's media ecosystem also includes associations such as the Union of Free Radio and Television Stations of Togo (*Union des Radios et Télévisions Libres du Togo* - URATEL, the Togolese Media Observatory (*Observatoire Togolais des Médias* – OTM*)*, and the Independent Journalist Union of Togo (*Union des Journalistes Indépendants du Togo* - UJIT), which support advocacy and professional standards (MFWA, 2021). Yet this diversity operates under political influence, with suspensions of independent outlets such as *L'Alternative* and foreign broadcasters like RFI and France 24 (Kaglan, E., 2025). The media regulatory authority, the High Authority for Audiovisuals and Communication (*Haute Autorité de l'Audiovisuel et de la Communication* – HAAC) regulates broadcasting and broadcasting media in Togo. In June 2024, it issued a formal notice to the French television station France 24 for allegedly unbalanced dissemination of information. At the same time, assessments of press freedom (e.g., Reporters Without Borders (Reporters sans Frontières – RSF)) indicate that journalists come under pressure during election campaigns and tend towards self-censorship (Kaglan, E., 2024; Reuters, 2025).

Digital access is expanding but remains uneven. In early 2025, Togo recorded approximately 7.53 million mobile connections, covering 78 % of the population, but only 3.56 million individuals (37%) were active internet users. Social media reach is modest, at about 934,000 users (9.7% of the population) (Kemp, S., 2025). While infrastructure is improving, challenges remain: internet resilience stands at just 39%, e-government readiness at 34%, and 63% of the top 1,000 websites are locally cached, while the African average is 36% (ITU, 2022). However, affordability remains a significant barrier: low-use mobile data packages cost approximately 8.17% of GNI per capita (ITU, n.d.). Overall, this means that while digital engagement is growing, radio continues to be the most reliable mass-reach channel, with richer digital formats more suited to younger and urban segments.

Structural features of Togo's health system have shaped the design of major health communication initiatives. One notable national SBCC effort was the *Confiance Totale* family planning campaign (2020–2021), which used radio spots in multiple languages and showed measurable associations with improved ideation and contraceptive intentions in a household survey (USAID, 2023). During the COVID-19 pandemic, authorities relied on a mix of broadcast and digital channels, including the PassCovidTG mobile application used for health pass verification (MESPTN, 2021) and broader digital tools to support risk communication and community engagement (UNSDG, 2021). Other national communication efforts have addressed nutrition, child health and WASH. For example, the West Africa Coastal Areas Management Programme (WACA) supported radio-based awareness activities on coastal erosion through the "Radio du Littoral" initiative (WACA, 2024). Taken together, these campaigns show that large-scale communication mobilisation is feasible in Togo. However, available evaluations also highlight systemic gaps — notably a reliance on a limited set of mass-media channels, weak linkage to interpersonal communication structures, and limited measurement beyond output indicators. Oversight typically involved the MSHPCSUA together with technical and financial partners, with NGOs frequently implementing activities on the ground.

Looking ahead, several further challenges require attention to strengthen climate–health communication. Misinformation remains a significant risk, but counter-capacity is growing. TogoCheck and the Centre for Web Analysis and Observation (*Centre d'Observation et de l'Analyse du Web* - COAWEB) (International Fact-Checking Network (IFCN)-recognised), together with CFI Media, has launched RadioCheck Togo, enabling 12 northern community radios to broadcast local-language debunks; an important mechanism for rumour management during shocks (TogoCheck, 2024). Language and literacy also shape communication effectiveness as detailed in *Section 1.21.23.3.2* on digital health systems and services, which highlights how skills and language barriers influence access to digital and climate-health information. These realities underscore the need to prioritise multilingual, audio-based, and visual content, and to design strategies that are inclusive of women, rural audiences, and low-literacy groups.

3.2.3 Assessment of Climate and Health Risks

Togo's capacity to systematically assess, monitor and manage climate-sensitive health risks remains constrained by the absence of fully institutionalised mechanisms for multisectoral risk assessment and information integration. International guidance underscores the need for health authorities to routinely assess and regulate risks originating in non-health sectors — such as water, sanitation, agriculture, land use, energy, and DRM (WHO, 2023a). In practice, the institutional and technical structures required to support such integrated climate-health risk assessment are only partially developed.

The National Adaptation Committee is the interministerial body mandated to oversee the implementation and periodic revision of Togo's National Adaptation Plan and to ensure alignment of sectoral strategies, including health, with national climate priorities and international commitments. While it provides a formal platform for sharing climate-risk information and guiding adaptation measures, its engagement with health-specific risk assessment remains limited and irregular. Similarly, the One Health Platform constitutes a critical institutional entry point for integrated climate-environment-health risk analysis, but it has not yet been fully operationalised, and climate-health risks are not systematically embedded in its routine and analytical agenda.

Within the health sector, technical capacity for climate-health assessment is weakened by fragmented information systems. Meteorological and climate data generated by the ANAMET are not yet integrated into the DHIS2 or routine surveillance analysis (*see Section 3.4.3.1.3*). Standardised protocols for joint analysis and information sharing across health, meteorology, civil protection, and WASH actors are also lacking. As a result, climate information is seldom translated into structured health risk profiles, seasonal risk outlooks or anticipatory planning tolls at national or district levels.

At decentralised levels, the capacity to assess climate-related health risks is even more constrained. Cross-sector collaboration between health services, municipal authorities, environmental services, education, and land-use planning remains weak or ad hoc. Most municipalities lack the technical tools, data access, and institutional mandate required to conduct climate-health risk assessments that could guide resilient service delivery and targeted prevention. Engagement with academic institutions and civil society in climate-health assessment is sporadic and largely project-driven.

Collectively, these gaps illustrate fragmented governance arrangements, siloed data systems, and limited interoperability between climate and health information. and weak, Strengthening the operationalisation of the One Health integration, formalising multisectoral climate-heath mandates, and establishing interoperable information platforms are therefore essential for enabling proactive, evidence-based and climate-informed health planning and decision-making.

The 2019 Country Risk and Vulnerability Assessment (CRVA) for Togo examined how different risks, including climate change, affect the population and national systems, with a particular component analysing health sector vulnerabilities. One key focus was on the impact of climate hazards on major diseases and the health system's capacity to respond. The study, carried out in collaboration with the Togolese Ministry of Health and Public Hygiene and GIZ identified climate-sensitive diseases —notably malaria, acute respiratory infections, and meningitis—as significant risks that could worsen with changing weather patterns. These diseases were mapped and analysed to understand how exposure, hazard, and vulnerability intersect in Togo's diverse regions. The assessment highlighted how rainfall variations and temperature changes influence the prevalence and spread of vector-borne and infectious diseases and pointed to gaps in adaptive capacity within the health system, including limited surveillance and preparedness for climate-linked health events. The CRVA also emphasized the need for more robust health system planning and climate adaptation strategies to protect vulnerable populations and strengthen service delivery, particularly in rural and high-risk areas. These findings are intended to support national policy planning and resilience building for health in the face of climatic and other systemic risks.

The CRVA served as a foundational analytical reference for this funding proposal and was updated and refined using more advanced statistical modelling conducted in partnership with a highly specialised technical institution, the London School of Hygiene & Tropical Medicine (LSHTM). Building on the original CRVA, the updated analysis applied improved methods and datasets to better capture climate–health risk dynamics and future trends. In parallel, the disease focus was slightly adjusted following in-depth scoping undertaken during the Concept Note stage, ensuring alignment with the most relevant climate-sensitive health risks, national priorities, and available evidence. This approach strengthened the robustness and policy relevance of the climate and health rationale underpinning the proposal.

Moreover, Togo has produced multiple National Communications (NCs) to the UNFCCC—with at least four submissions to date (NC1, NC2, NC3, and the Fourth National Communication) that report on greenhouse gas inventories, climate impacts, and adaptation measures across key sectors, including health. These national communications synthesise data on climate risks and adaptation responses and help integrate health resilience into national adaptation planning. In Togo's NCs the health sector analysis focuses on climate-sensitive outcomes including malaria, diarrhoeal diseases, meningitis, acute respiratory infections, and maternal, neonatal and child health impacts, reflecting the populations and diseases most vulnerable to climate variability and extremes.

3.2.4 Integrated Risk and Early Warning Monitoring

This section analyses the ability of Togo's health system to anticipate changing health risks through the surveillance of extreme climate events and how these affect the transmission of vector and waterborne diseases, complementing the vulnerability assessment in *Section 3.2.3. 0*

3.2.4.1 Health surveillance and information

Health surveillance activities in Togo are centrally coordinated by the Division of the National Health Information and IT System (*Direction du Système National d'Information Sanitaire et de l'Informatique* – DSNISI) within the MSHPCSUA. This department manages the DHIS2 and supports both indicator-based (IBS) and event-based surveillance (EBS) under the IDSR framework (see *Section 3.3.2.1* on digital health systems and services). Epidemiological data originate at the community level, are reported by USPs and HFs and are transmitted to the district, regional and national levels. At each level, databases are used to identify alerts or monitor epidemic thresholds. In 2016, a total of 47 diseases and other events, including 18 with epidemic potential, were monitored weekly (GIZ, 2021d).

Central coordination is led by the Integrated Surveillance of Health Emergencies and Response Division (*Division de la Surveillance Intégrée des Urgences Sanitaires et de la Riposte* – DivSIUSR), which organises emergency responses, collaborates with the national laboratory network, and contributes to annual risk and vulnerability assessments and multi-hazard contingency plans alongside COUSP and ANPC (see *Sections 3.2.1.4.2* and *3.4.2.2*). annual risk and vulnerability assessments. It ensures the availability and quality of necessary equipment as well as human and financial resources and supports the preparation of national and district-level risk maps. A toll-free number (111), established in response to the West African Ebola outbreak, provides a 24-hour channel for alerts, guidance, and reporting (GIZ, 2021d). Despite this structure, a 2021 GIZ assessment highlighted limited technical staffing, insufficient training, constrained operational budgets and communication gaps between peripheral, district, regional and central levels, which reduce the effectiveness of climate-sensitive early warning functions (GIZ, 2021d) (see *Section 3.4.1.2)*.

Togo's National Health Information System (*Système National d'Information Sanitaire* – SNIS) has used the open-source DHIS2 platform since 2018 for the collection, reporting, analysis, and dissemination of aggregates and individual-level data, forming the backbone of the surveillance system (see *Section 3.3.2)*. Strengthening integrated monitoring of population health risks and early warning through this platform is a core objective of the PNAS (see *Section 3.2.1.2*).

Nevertheless, community engagement in surveillance remains limited, and linkages between health information systems and climate information services are still nascent, which constrains the development of fully operational climate-sensitive EWS (see Sections 3.3.2 and 3.4.1).

3.2.4.1Health Early Warning Systems

Health Early Warning Systems (EWS) are increasingly used in low- and middle-income countries to anticipate and manage climate-sensitive health risks, particularly outbreaks of malaria, cholera, dengue, heat-related illness, and health impacts of floods and droughts. A limited number of countries have relatively advanced or operational health EWS in Africa, notably Madagascar, Ethiopia, Kenya, Uganda, Ghana, and Rwanda, where routine disease surveillance is combined with epidemiological thresholds and, in some cases, climate and environmental information to inform preparedness and response.

In fragile and humanitarian contexts, including Nigeria, South Sudan, Somalia, the Democratic Republic of the Congo, Burkina Faso, and Mali, health EWS are commonly implemented through EWARN/EWARN+ systems. These systems are effective for rapid outbreak detection and situational awareness but are typically reactive and focus less on predictive forecasting and anticipatory action.

Key challenges to establishing effective health EWS include fragmented multi-sectoral governance, limited interoperability between climate, environmental, and health information systems, gaps in data quality and spatial coverage, insufficient human and financial resources, and weak mechanisms to translate early warnings into timely health action. Overcoming these barriers requires sustained institutional coordination, investment in data systems and capacities, and clear operational pathways from warning to response.

In Togo meteorological and disaster risk EWS are increasingly functional, but institutional linkages with the health sector remain limited, and health-specific triggers and response protocols are not yet fully operational (see details under Section 3.3).

3.2.5 Health and Climate Change Research

Togo developed its first National Strategic Plan for Health Research (*Plan Stratégique National de la Recherche en Santé* – PSNRS) for the period 2015-2020. However, implementation remained limited due to weak national coordination of health research activities, insufficient funding, and the absence of a functional governance mechanism to monitor research activities (MSHPAUS, 2025). The 2024 Annual Performance Report of the Health Sector confirms these structural deficiencies, highlighting the need to: i) evaluate the expired PSNRS 2015-2020, ii) develop a new national research plan, iii) establish both a national coordination committee and a technical committee for health research, and iv) create a permanent mechanism for financing and monitoring health research (MSHPAUS, 2025). The report further notes that the Division for Studies and Research (*Division des Études et de la Recherche* - DER) suffers from low visibility among research actors, slow processing of research protocols, insufficient follow-up of authorised studies, and a lack of resources to disseminate research findings – factors that contribute to the scarcity of published scientific literature specific to the Togolese context.

Despite these constraints, several recent initiatives are beginning to lay the foundation for a more structured climate-health research ecosystem. The West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL), which hosts a regional node in Lomé, is a key partner in building scientific capacity on climate change (WASCAL, 2014). With support from GIZ, WASCAL has prepared and submitted a proposal to Wellcome's Climate Impact Awards, signalling an ambition to consolidate Togo's position within global climate and health research (Wellcome, 2023). In parallel, GIZ is financing a one-year qualitative research initiative on climate change and health led by WASCAL in collaboration with the John Hopkins Centre for Communication Programs (CCP). This initiative will inform the development of Togo's first national climate and health Social and Behaviour Change (SBC) Strategy and Toolkit, with a focus on climate-related health risks in the northern regions (John Hopkins, 2025). GIZ also intends to provide targeted support to WASCAL to develop a dedicated master's curriculum in climate change and health, designed to build a critical mass of national and regional expertise in climate and health.

At the national level, reforms in public-health higher education are reinforcing these efforts. The Togolese Public Health Training and Research Centre *(Centre de formation et de recherche en santé publique du Togo* – CFRSP) has launched a research-oriented Master's programme in One Health, explicitly designed to address the interconnections between human, animal and environmental health (CFRSP, 2025). This programme, alongside emerging postgraduate training in public health, epidemiology, and digital health, contributes to building a new generation of Togolese researchers capable of working at the interface of climate, ecosystems, and health systems. The proposed project can leverage this evolving ecosystem by supporting applied research on CSHO, strengthening national and regional research networks, and promoting systematic use of climate-health evidence in planning, decision-making and EWS.

3.2.6 Climate Resilient and Low-Carbon Infrastructures, Technologies, and Supply Chain

3.2.6.1 Adaptation of current infrastructure, technologies and supply chain

Adaptation of the health system to current and future climate risks require the systematic integration of climate resilience and low-carbon principles into the revision and upgrading of infrastructure, technologies, products and operational processes. Recent assessments, including the 2025 Construction Study and an assessment by the Laboratories Division (Division des Laboratoires – DivLab) and sector reviews, confirm that Togo's health infrastructure and supply systems remain structurally vulnerable to climate hazards, with risks expected to intensify under future climate scenarios.

Current national health infrastructure standards (MSHP, 2013) are outdated and do not fully reflect the climate-resilient and low-carbon design requirements set out in the PNAS. Climate hazards have already affected a significant share of facilities: floods have impacted approximately 2.1% of HFs, violent winds 2%, and sea-level rise and coastal erosion 0.15%, particularly in Maritime and Lomé districts (GIZ, 2021c). Although fewer than 5% of facilities report complete service disruption, structural, thermal and hydrological vulnerabilities are widespread.

Thermal stress represents the most critical structural weakness. The majority of HFs are roofed with uninsulated metallic corrugated sheets, resulting in severe indoor overheating. Most buildings lack passive cooling features such as cross-ventilation, solar protection or insulated ceilings. These conditions compromise patient recovery, staff working conditions and the stability of temperature-sensitive medicines and vaccines.

Hydro-climatic risks are compounded by weak drainage and storm-water management. Rainwater evacuation systems are frequently absent or non-functional, leading to uncontrolled runoff, foundation erosion and recurrent water stagnation. This not only accelerates structural degradation but also creates mosquito breeding sites, increasing exposure to vector-borne diseases. In flood-prone zones, insufficient building elevation and poor road access further disrupt service continuity during the rainy season, while dysfunctional WASH infrastructure heightens water- and sanitation-related CSHO risks.

Health infrastructure management is centrally coordinated by the MSHPCSUA's Infrastructure Department (*Direction des infrastructures sanitaires, des équipements et de la* maintenance – DISEM), while sanitation and hygiene fall under the Hygiene and Wastewater Department (*Direction de l'hygiène et de l'assainissement de base* – DHAB). However, both directorates face persistent capacity and resource constraints. Over 90% of HFs lack formal preventive maintenance plans, and maintenance remains largely reactive. The recent validation of the National Strategy for the Maintenance of Health Infrastructure and Equipment (2026-2030) provides an essential policy framework for strengthening resilience, but operationalisation remains at an early stage, with no dedicated maintenance budget lines currently secured (Edoh, E., 2025).

Adaptation challenges extend across the pharmaceutical and logistical supply system. The national pharmaceutical supply chain (SNAP) continues to exhibit structural weaknesses, including fragmented procurement, limited centralised logistics data and constrained last-mile delivery capacity. These weaknesses are amplified by climate-related stress on energy supply and transport infrastructure, directly affecting the reliability of cold chain-dependent products (Ethan Soe, 2023; WHO-Togo, 2024).

At the central and peripheral levels, vaccine storage and distribution infrastructure remains below international benchmarks. The 2021 Effective Vaccine Management (EVM) assessment showed that temperature management (74%), storage capacity (71%) and infrastructure and equipment (63%) all fall below the 80% global standard (EVM, 2021). These challenges persist at district and facility level, particularly in the northern regions, where electricity supply is unstable, solar systems are frequently undersized, and backup power is insufficient. Preventive maintenance of cold chain infrastructure is not institutionalised, accelerating equipment degradation and increasing the risk of temperature excursions.

Laboratory and transfusion services face similar climate-sensitive infrastructure constraints, including persistent gaps in cold chain systems, reagent storage, and energy reliability (Ayenigbara et al., 2021). These deficiencies undermine diagnostic continuity and emergency response capacity during climate-related shocks. Strengthening laboratory and storage infrastructure therefore remains a core adaptation priority requiring financing and integration into national supply-chains reform efforts.

Table 15 provides a detailed overview of current projects, including new hospitals and renovations of existing HFs. *Table 16* resumes possible climate-resilient investments according to Togolese health infrastructure standards.

Table 15: Summary of ongoing health infrastructure investments in Togo in 2024

N°	Institutions	Projects	Geographical area of intervention	Project period	Financing amount
1	World Bank (WB)	Quality Essential Health Services Project for Universal Health Coverage (*Projet Services de Santé Essentielle de Qualité pour une Couverture Sanitaire Universelle - SSEQCU*) : • Rehabilitation of 300 HFs • Construction of 200 HFs	National Territory	2021-2026	$70 million
2	*Kreditanstalt für Wiederaufbau* (KFW)	Health System Strengthening in Togo (Gesundheitssystemstärkung - Sexuelle und Reproduktive Gesundheit und Rechte I bis III - SDSR I-III)): • Construction, rehabilitation of 19 emergency and obstetric care centres	Centrale, Kara, Savanes	2018-2028	$69,15 million
3	Islamic Development Bank (IsDB)	Strengthening Health System and Primary Health Care in Togo: • ~56 health infrastructures (23 HFs: 6 new ones, 17 rehabilitations)	National Territory	2023-2027	$46,5 million
4	National Health Insurance Institute (*Institut National d'Assurance Maladie* - INAM) in Private Public Partnership	Modern mother and childcare centres: • Construction of 5 reference hospitals for mother and child health (in each region)	National Territory	~2022-2025	TBD

Table 16: Possible climate-resilient investments according to Togolese health infrastructure standards

Standards in Togo (MSHP, 2013)	Current status/observed gaps	Possible climate-resilient investments
Site & Environment		
Location: calm and clean area **Accessibility: connected to a road network** **Slope of the land: ≤ 10% to facilitate proper water drainage**	Criteria often determines by availability rather than suitability. In newly elaborated communal development plans, suitable sites ought to be indicated[13]. Many sites suffer from erosion, water stagnation due to lack of drainage, and flooding during the rainy season.	**Drainage:** Installation of effective slopes, gutters and downspouts to manage stormwater runoff and prevent foundation erosion. **Landscaping:** Planting vegetation/trees (e.g., vegetated walls) to limit erosion, provide shade and improve the microclimate. **Protective sidewalks:** Construction of peripheral sidewalks to protect walls from splashing and infiltration.
Climate & bioclimatic design		
Orient buildings according to prevailing winds and protect windows from direct sunlight (Passive solar design, natural ventilation and cooling)	Orientation is often dictated by space limits rather than climate. Windows are exposed to direct sunlight (overheating); simple metal roofs transfer heat; ceilings are missing or degraded.	**Passive cooling:** Installation of double ventilated roofs with secondary insulation layers to reduce indoor temperatures. **Solar protection:** "Sunshade" installation and extended roof overhangs to protect windows from direct sun. **Ventilation:** Orientation of openings to facilitate cross-ventilation; use of louvered windows with mosquito nets.
WASH		
1 toilet per 20 users (including staff, patients and accompanying persons) (WHO, 2010)	35% of HFs lack running water and insufficient numbers of toilets. Reliance on "ventilated improved pits (VIP) latrines" that are often filled/broken.	**Water supply:** Installation of solar-powered hybrid pumps and elevated water storage tanks for gravity-fed distribution. **Sanitation (urban/peri-urban):** Precast sanitation blocks connected to septic tanks.

[13] *Law No. 2019-006 of June 20, 2019, amending Law No. 2007-011 of March 13, 2007, on decentralisation and local liberties, as amended by Law No. 2018-003 of January 31, 2018, Art. 62, 82.*

Adequate waste and wastewater management **Continuous water quantity and quality**	Inadequate waste segregation. Lack of gender separation.	**Sanitation (rural/remote):** Installation of DEWATS (decentralised wastewater treatment systems) where emptying services are unavailable. **Hygiene:** Handwashing stations with durable taps connected to the water network; gender-separated toilets with menstrual hygiene facilities.
	Accessibility & safety	
Universal accessibility (ramps, handrails) and fire safety measures	Ramps are often non-compliant (too steep, no rails) or missing. Lack of accessible toilets for persons with disabilities.	**Accessibility:** Construction of norm compliant access ramps (slope ≤8%, handrails) and universally accessible toilets. **Safety:** Installation of fire extinguishers, emergency lighting, and secure fencing/enclosures.
	Construction Materials	
No specific standards available in Togo **Materials must be implemented according to the “rules of the art” and technical specifications**	Poor quality execution leading to thermal bridges; use of standard cement blocks with low thermal inertia; degraded coatings due to humidity.	1 **Sustainable materials:** Use of Compressed Earth Bricks where feasible for better thermal inertia. **Low-carbon cement:** Use of limestone calcined clay cement technology (via partnership) **Finishes:** Use of washable, humidity-resistant paints and anti-slip tiling in clinical areas.
	Energy	
Continuous energy source (preferably alternative sources)	Heavy reliance on unstable grid or undersized/malfunctioning solar kits. Frequent power cuts affecting cold chain and lighting.	**Renewable energy:** Installation of solar PV systems (hybrid systems with battery backup) ensuring autonomy for critical loads (lighting, cold chains). 2 **Efficiency:** Use of Light Emitting Diode (LED) lighting and energy-efficiency medical equipment; solar water heaters for maternity wards. Technologies non suitable for the context or non-retained activities include: 1. Renewable energy systems: Existence of electrification programme to electrify 800 HFs with solar kits (AfBD), 2019)

3.2.6.2 Promotion of new technologies

The promotion of innovative technologies is central to enabling a transition towards climate-resilient and low-carbon health service delivery. This includes scaling up climate-responsive construction methods, renewable energy deployment, digital logistics systems and modern diagnostic technologies.

Climate-resilient construction and bioclimatic design principles must be systematically integrated into all new and rehabilitated HFs. Construction site selection should explicitly account for flood risk, erosion, drainage conditions and local microclimates. Passive solar design, natural ventilation, controlled solar exposure and thermally efficient envelopes are priority measures to reduce overheating and energy demand. The feasibility of alternative construction materials with higher thermal inertia and lower carbon footprints, such as compressed earth bricks and low-carbon cements, should be assessed and progressively adopted.

Energy insecurity represents a major barrier to climate resilience and service continuity. The national programme to electrify 800 HFs with solar systems constitutes a critical foundation for decarbonising energy supply and stabilising power for essential services, particularly cold chains. However, system sizing must be aligned with real load requirements, and hybrid solutions with battery storage prioritised for facilities providing maternity, emergency and laboratory services. In cold chain operations, the strategic deployment of WHO-approved solar direct-drive (SDD) refrigerators and freezers is essential in zones with unreliable grid electricity.

Digital technologies offer transformative potential for climate-sensitive supply-chain management. The integration of digital temperature monitoring devices, asset tracking and stock management into the national electronic Logistics Management Information System (e-LMIS) is a priority to enable real-time visibility of temperature excursions, equipment performance and stock levels (see *Section 3.3.2.1*). This supports early corrective action, better demand forecasting, reduced wastage and improved preparedness for climate-induced supply disruptions.

In diagnostics, the feasibility of deploying rapid and decentralised technologies such as Loop-mediated Isothermal Amplification (LAMP) for priority climate-sensitive diseases warrants further assessment, particularly for peripheral and remote HFs where laboratory access remains limited.

3.2.6.3 Environmental sustainability of health operations

Environmental sustainability of health operations is integral to long-term climate resilience and mitigation. It requires the systematic procurement and use of low-environmental-impact technologies across infrastructure, supply chains, energy systems, WASH and waste management.

Cold chains are a growing source of greenhouse gas emissions globally, accounting for up to 1% of total emissions. In Togo, demand for cold chain capacity is projected to rise as temperatures increase and new vaccines are introduced. Transitioning to energy-efficient refrigeration, deploying high-performance cooling boxes for products such as the R21 malaria vaccine, and replacing high-global-warming-potential hydrofluorocarbon (HFC) refrigerants with low-GWP alternatives are critical mitigation measures aligned with the Kigali Amendment (GIZ, 2021a).

Healthcare waste management remains a major environmental and public health challenge. Only around one-third of HFs have proper infectious waste storage, and functional incinerators are available in only about one-fifth of facilities, with fewer than 10% fully operational. Large volumes of biomedical waste are still incinerated in open air or mixed with household waste, leading to toxic emissions, groundwater contamination and avoidable greenhouse gas production. Priority interventions include protected waste storage areas, systematic waste segregation, environmentally sound treatment technologies and improved regulatory enforcement.

WASH infrastructure is a central environmental determinant of health and a key component of climate resilience. Approximately 35% of facilities lack reliable running water, and many rely on vulnerable latrine systems that fail under increased rainfall and flooding. Climate-resilient WASH investments focus on solar-powered hybrid water pumping systems, elevated water storage for gravity-fed distribution, reinforced latrines, decentralised wastewater treatment systems in rural areas, and durable handwashing infrastructure. These measures strengthen infection prevention and control while reducing the environmental footprint of health operations.

3.2.7 Management of Environmental Determinants of Health

3.2.7.1 Water, sanitation, and hygiene

Access to appropriate WASH infrastructure remains a critical determinant of health outcomes in Togo. Integrating WASH into health infrastructure policy and standards contributes to the prevention and control of communicable diseases, including diarrhoea and malaria (WaterAid, 2023). Transmission of diarrhoeal diseases primarily occurs via faecal-oral pathways, making adequate WASH infrastructure essential for prevention (see *Figure 24*). Similarly, improved water and sanitation services can reduce malaria transmission, as stagnant water serves as mosquito breeding sites (Yang et al., 2020).

Togo demonstrated progress across water, sanitation, and hygiene (WASH) sectors between 2000 and 2024, with notable increases in basic water coverage and significant reductions in open defecation, though progress was uneven between urban and rural areas. Data on sanitation, water, hygiene, and waste management in healthcare facilities remain unavailable for Togo.

Overall, the national population using at least basic drinking water services rose by 20-percentage point over this period, increasing from 45% in 2000 to 65% in 2024. In rural areas access nearly doubled from 30% to 58%, while urban coverage stagnated and then declined from 78% to 74%, indicating that urban water infrastructure failed to keep up with population growth. Survey data from 2017 reveals a significant gender disparity in water collection responsibilities and time investment. Women and girls were the primary water collectors in 40% of households, compared to 20% for men and boys. The disparity becomes even more pronounced when considering lengthy collection times: 23% of households relied on women and girls for trips exceeding 30 minutes daily, compared to just 11% for men and boys.

Progress in achieving at least basic sanitation services was modest, while substantial progress was made in reducing open defecation. Access to at least basic sanitation services increased nationally from 18% in 2000 to 25% in 2024, with rural coverage raising from 8% to 14% and urban coverage from 32% to 38%. The national proportion of the population practicing open defecation fell sharply, dropping from 44% in 2000 to 32% in 2024, with rural rates dropping from 64% to 51% and urban rates from 15% to 9%.

Between 2015 and 2020, Togo made remarkable progress in expanding access to basic hygiene services nationwide. National coverage surged from just 10% in 2015 to 39% in 2020 (a 29-percentage point increase in only five years). Rural areas had just 4% coverage for basic hygiene services, far below the 20% in urban areas. By 2020, urban coverage had more than doubled to 45%, and rural coverage experienced an even more dramatic rise, jumping to 35% (WHO-UNICEF Joint Monitoring Programme, 2025).

Recent surveys highlight persistent gaps: 69.1% of households consume water contaminated by *E. coli,* with higher prevalence in rural areas (80.2%) versus urban areas (49.1%). Older data from the 6th MICS (2017) indicate variations between the three target regions, with 43.6% of Savanes, 57.7% of Kara's and 66.7% of Central's population having access to basic drinking water services. Regarding sanitation, basic facility access remains low: 14.3%, 12.3% and 9.7%, and of the population of the Centrale, Kara and Savanes regions, respectively (MICS 6, 2017). In terms of latrine quality, 27% of concessions[14] had no latrines, 25.5% had latrines in poor condition and 47.1% in good condition (MSHP, 2022b).

Togo has been a member of the Sanitation and Water for All (SWA) partnership since 2014, committing to improving inter-sectoral coordination. The third axis of the PNDS 2023-2027 is based on the "Fight against diseases and the social and environmental determinants of health", and the National Development Programme's strategic goal #3 includes sub-outcomes related to access to potable water and improved sanitation.

Since 2017, Togo has developed the "Togo SANDAL (*Sans Défécation à l'Air Libre*)" roadmap to 2030, aiming to eliminate open defecation. The plan prioritises the Community Led Total Sanitation (CLTS)

[14] *'Concession' refers to a plot of land, usually enclosed, grouping together around a courtyard, a series of dwellings occupied by multiple people.*

strategy, particularly in rural and semi-urban areas, enabling households to build latrines according to locally available resources. CLTS has demonstrated notable successes, especially in Kara, Savanes, and Plateaux regions, helping over 2,000 villages achieve open defecation-free status and adopt improved hygiene practices.

Despite these achievements, many latrines built from local materials cannot withstand the increased rainfall and flooding. In some areas, communities that had previously achieved open defecation-free status are reverting due to climate impacts. To address these challenges, several initiatives have been implemented with UNICEF and other partners, including:

- Training communities and bricklayers to account for climate variables in WASH facility construction;
- Training craftsmen in building prototype climate-resilient latrines, including biogas and ecological designs;
- Analysing community-level flood and climate risks to guide safe latrine placement and promote adaptive infrastructure;
- Establishing latrine credit/revolving funds to provide affordable financing for sustainable, climate-resilient infrastructure; and
- Implementing market-based sanitation approaches to engage private sector actors, strengthen supply chains, and promote climate-adapted construction materials and hygiene products.

The private sector plays a key role in both drinking water and sanitation services. Strategies to make drinking water supply infrastructure more resilient include partnerships with companies providing solar pumps, water towers, and other technical equipment to enhance durability and functionality.

The assessment of community and health infrastructure in Centrale, Kara, and Savanes identified critical WASH vulnerabilities that reinforce the need for additional resilient interventions (see *Table 16*):

- Existing facilities lack adequate rainwater management (gutters, downspouts, protective sidewalks), causing water stagnation, foundation damage, and increased mosquito breeding;
- Many latrines are structurally fragile, particularly those made with local materials, and are susceptible to flooding and heavy rainfall;
- Inconsistent and unreliable water supply, limited storage capacity, and insufficient protection of water points compromise functionality during climate events; and
- Latrines and communal sanitation facilities are poorly ventilated and exposed to heat, reducing usability during extreme weather and increasing vulnerability to vector-borne diseases.
- The majority of latrines are connected to a permeable or semi-lined pits allowing excreta to seep into the ground and groundwater to enter the pit. This can contaminate groundwater and cause pit overflow during heavy rainfall.
- Limited water availability reduces users' ability and willingness to maintain proper sanitation, leading to hygiene issues and rendering water-based sanitation systems ineffective. This often results in open defecation as a last resort.
- Outside provincial capitals, there is a significant absence of services for emptying, transporting, and treating wastewater and faecal sludge. This gap contributes to unsafe sanitation practices, such as permeable pits, illegal dumping, and open defecation.
- Local authorities lack the financial resources to develop and promote wastewater and faecal sludge management infrastructure (e.g., emptying services, transport, and treatment plants). Additionally, weak regulations and poor enforcement discourage private sector involvement, such as vacuum truck operators, from utilising municipal

These findings underscore the need to strengthen climate-resilient WASH infrastructure and integrate environmental health planning into broader community adaptation strategies. Approaches that combine technical reinforcement, climate-informed construction, private sector engagement, and financing mechanisms are crucial for ensuring sustainable access to safe water and sanitation in the face of climate risks.

3.2.7.2 *Healthcare waste management*

HFs in Togo generate an estimated 580 tonnes[15] of healthcare-sector waste each year (MSHPAUS, 2021). Yet, waste management in this sector remains under-financed and inadequately implemented. According to the Hazardous Waste Management Plan 2021-2025 for the Togo Essential Quality Health Services for Universal Health Coverage Project (P174266), safe disposal of medical waste depends heavily on the knowledge, skills, and access to appropriate technologies among healthcare staff, including environmentally sound incineration and chemical or alternative sterilisation methods (MSHPAUS, 2021).

Approximately 15% of the total waste generated in the healthcare sector is classified as hazardous (infectious, toxic or radioactive). The complexity of its disposal is compounded by the fact that only about a third of HFs have proper storage facilities for infectious waste, and roughly half are unable to ensure appropriate final disposal pathways. Moreover, only one in five HFs is equipped with a functional incinerator. As half of establishments do not systematically separate waste at source, existing incinerators often operate beyond capacity (World Bank, 2021). Consequently, a significant portion of biomedical waste is incinerated in open-air conditions or mixed with household waste streams, resulting in the emission of toxic gases and the infiltration of leachates into groundwater. This also contributes to GHG emissions, including methane, with around 21 times the warming potential of carbon dioxide (EESI, 2013).

Recent research from Togo highlights the scale and systemic nature of the problem. A 2024 national survey of 264 public HFs found that only 17.8% achieved an “acceptable” biomedical waste management (BMWM) score ≥80%. The majority scored between 40–60%, demonstrating major deficiencies across governance, operations, and infrastructure. Governance indicators were the strongest predictors of performance: facilities with active BMWM committees, trained staff, and a designated waste-management agent were 3.79 times more likely to meet acceptable standards. This demonstrates that waste-management quality improves most dramatically when governance and human resources are strengthened — not only when infrastructure is added (Niman et al., 2025).

The same studies shows that operational gaps are equally significant. Only 27% of facilities have internal regulatory documents, 34% have colour-coding systems, and 50% display sorting posters. Sorting is inconsistent across departments: only 59.1% of consultation rooms and 53.8% of delivery rooms perform segregation at source. Quantification of waste, essential for planning incinerators, autoclaves and transport logistics, is almost absent: only 31.1% of facilities quantify sharps waste and 23.9% quantify infectious waste. Transport practices are unsafe in 38% of facilities, often involving unprotected handling or non-dedicated equipment (Niman et al., 2025). Infrastructure deficiencies remain acute. While 57.9% of facilities report owning incinerators, only 8.5% of these are functional, reflecting poor procurement standards, lack of maintenance, and inadequate technology (Niman et al., 2025).

A similar picture is painted for Lomé, where only 42.25% of healthcare workers had received training on biomedical-waste management, and 55.56% of units reported at least one accident linked to poor handling of biomedical waste. Poor segregation at source was widespread, directly increasing the risk of infection and environmental contamination (Nakoro et al., 2022).

Evidence from Togo’s CHU further underscores the scale of the challenge. A 2021 assessment of three CHU found that only 25.9% of providers reported systematic segregation of biomedical waste, and none of the hospitals had a wastewater-treatment unit, despite producing significant volumes of hazardous liquid waste daily (Gnaro et al., 2022). This highlights that the problem extends beyond solid waste and includes laboratory and liquid biomedical waste streams, which require specialised management systems.

A nationwide survey of medical laboratories in 2021 showed that waste from diagnostics, sample preparation and laboratory chemicals is frequently improperly stored or disposed of, reflecting an absence of standard protocols. This adds another layer of complexity to the country’s biomedical-waste landscape (Agbere et al., 2021). The health risks linked to poor management practices are profound. WHO estimates that improper handling of sharps and contaminated waste leads to 1.7 million hepatitis B, 315,000 hepatitis C, and 33,800 HIV infections annually among health workers worldwide (WHO,

[15] *Estimation extrapolated from CHU Campus data (MSHPAUS, 2021)*

2024d). These risks are directly relevant to Togo, where open burning, mixed waste streams, and unsafe handling remain widespread.

While development partners have supported isolated interventions — training, provision of bins, construction of incinerators — these efforts have not resolved systemic challenges. BMWM indicators are still not integrated into national performance monitoring, budgets are inconsistent, and maintenance systems are weak. Although the MSHPCSUA developed a Biomedical Waste Management Strategic Plan in 2021, implementation remains partial due to limited financing, insufficient technical standards, and lack of routine supervision (MSHPAUS, 2021).

3.2.7.3 Food and nutrition security

Food security is also a major determinant of health, and it will also be impacted by climate change through a series of knock-on and cascading impacts on food systems (IPCC, 2019). Contaminated food can lead to the transmission of infectious diseases, while malnutrition (encompassing undernutrition and micronutrient deficiencies) can lead to an impaired immune system (WHO, 2017).

In 2022, Togo faced significant food insecurity challenges: 280,000 people (3.45% of the population) were at risk of falling into food insecurity in Togo (INSEED, 2022; WFP, 2022), while 10.9% of the population experienced severe food insecurity (WBG, 2022a). Chronic malnutrition, acute malnutrition and low weight affect 27.5%, 6.5% and 16% of children under 5, respectively. This is particularly evident in the regions of Savanes, Kara and Plateaux. Similarly, 6.9% of young women suffer from low-weight problems (MAEH, 2017).

The PNIASAN 2017-2026 aims to i) achieve a growth rate in the gross domestic agricultural product of at least 10% by 2026, ii) improve the agricultural trade balance by 15%, iii) double the average income of farming households, iv) help reduce malnutrition by combating food insecurity and v) halve the poverty rate in rural areas to 27%. The PNIASAN is divided into four axes. It considers measures to adapt to climate change under Axis 3, entitled “Access to food and nutrition is improved, as is the resilience of vulnerable populations”. This axis will have an impact on people’s food security, which is one of the determinants of health. The plan includes capacity-building for research services, a national system for managing food crises, and a national system for preventing and managing responses to natural disasters in the agricultural sector. It also provides for the development of social safety nets for the most vulnerable rural populations; the strengthening of the nutritional security system; and the encouragement of practices aimed at promoting sustainable farming techniques. All these actions will contribute to improving the health of the population.

3.2.7.4 Air quality

Air pollution has become a pressing environmental determinant of health in Togo. Recent studies led by Passike and colleagues in Grand Lomé and the Savanes region show that seasonal peaks in dust, heat and pollution are closely associated with surges in asthma attacks and respiratory consultations (Passike Pokona et al., 2024b, 2024a, 2025). These studies highlight that rapid urbanisation, biomass fuels for cooking, open waste burning and insufficient waste management all contribute to elevated exposure to pollutants such as sulphur dioxide, nitrogen oxides and ozone (Passike Pokona et al., 2024b). At the same time, the PNDS 2023–2027 acknowledges that air-quality data and information on chemical risks remain limited within health surveillance systems, constraining the sector’s ability to address pollution as a determinant of health (MSHP, 2022b). To begin addressing these gaps, the MSHPCSUA Climate-Health Task Force installed functional air-quality sensors in three districts (Agoè-Nyivé, Golfe and Kozah) as part of its 2023 performance framework (MSHPAUS, 2024b).

In parallel, the Ministry of Environment, Forest Resources, Coastal Protection, and Climate Change (*Ministère de l’Environnement, des Ressources Forestières, de la Protection Côtière et du Changement Climatique* - MERFPCCC) adopted a National Plan for the Reduction of Air Pollution and Short-Lived Climate Pollutants, launched in March 2021, which identifies fine particulate matter, black carbon, methane, carbon monoxide and other short-lived pollutants as major contributors to premature mortality (MERF, 2021b). The plan estimates that more than 8,000 deaths in 2016 were attributable to ambient and household air pollution and sets out 14 mitigation measures, projecting a 32.8% reduction in short-lived climate pollutant emissions by 2040 if fully implemented (CCAC, 2021; MERF, 2021b). This strategy is aligned with Togo’s 2021 NDC, which commits the country to reducing GHG emissions by 20.51% unconditionally and 30.06% conditionally by 2030 (MERF, 2021). Building on this framework, the Government launched the Air Quality Project in Togo (*Projet Qualité de l'Air au Togo* - PQAT) in April 2025, a five-year, state-financed programme implemented by the National Environmental Management Agency with technical support from WHO and the Climate and Clean Air Coalition (MERF, 2025). PQAT is deploying air-quality monitoring stations across 11 cities (23 communes) to measure key pollutants including carbon monoxide, carbon dioxide, nitrogen oxides, sulphur oxides, ozone and fine particulate matter (PM_{10}, $PM_{2.5}$, PM_1), and will generate data for urban planning, transport policy and preventive health interventions (MERFPCCC, 2025). Early analyses used by the Ministry of Environment suggest that approximately 1.4 million residents of Grand Lomé were exposed to pollution levels four to five times above WHO guideline values between 2019 and 2021, and that respiratory infections were the leading cause of outpatient consultations in 2021 (MERFPCCC, 2025).

Taken together, these initiatives indicate a gradual shift towards integrating air-quality considerations into health planning and climate policy. However, the PNDS still notes the absence of a comprehensive national strategy explicitly linking air-quality management, climate change and respiratory health, and highlights limited capacity within the health sector to interpret and use air-quality data (MSHP, 2022). Sustained investments in surveillance, capacity-building and inter-sectoral coordination, particularly between the MSHPCSUA, the National Agency for Environmental Management (*Agence Nationale pour la Gestion de l'Environnement* - ANGE), the meteorological service and academic partners such as WASCAL, will therefore be essential for translating air-quality monitoring into effective public-health action and for reducing the burden of pollution-related disease under a changing climate.

3.2.8 Climate-Informed Health Programmes

3.2.8.1 Malaria and diarrhoeal disease prevention interventions

The delivery of malaria and diarrhoeal disease prevention interventions in Togo is increasingly required to integrate climate change considerations into Standard Operating Procedures (SOPs), both to strengthen the resilience of service delivery under climate stress and to promote low-carbon, environmentally sustainable intervention modalities.

3.2.8.1.1 Malaria prevention interventions

For malaria, prevention is implemented through a well-established national programme under the Department of Disease Control and Public Health Programmes (*Direction de la Lutte contre la Maladie et des Programmes de Santé Publique* — DLM-PSP) within the MSHPCSUA. At the central level, decision-makers set policy, define technical standards (case definitions, reporting timelines and alert thresholds) and steer multi-sectoral coordination with WASH, municipal services and partners. During outbreaks, a national coordination cell oversees epidemiology, case management, laboratory support, risk communication and WASH interventions. Regional and district teams adapt guidelines to local contexts, manage supplies, supervise HFs and engage communities (PMI, 2023; WHO, 2024e).

Core interventions include the distribution of ITNs through mass campaigns every three years: seasonal malaria chemoprevention (SMC) for children aged 3–59 months, currently delivered in 19 districts across the Savanes, Kara and Centrale regions and supported by the Global Fund, UNICEF and Malaria Consortium, with plans to expand to Plateaux and increase cycles per season; intermittent preventive treatment in pregnancy (IPTp) delivered via antenatal care; free diagnosis and treatment of uncomplicated malaria at all ages since 2013, extended to severe malaria in 2019; and CHWs who perform rapid diagnostic tests, treat positive cases and help identify zero-dose children for vaccination (PMI, 2024). However, the delivery models of these interventions remain only partially climate informed. Poor drainage, flooding and standing water associated with intensifies rainfall continue to drive vector proliferation, yet routine planning of Long-Lasting Insecticidal Nets (LLINs), campaigns and SMC cycles is only weakly aligned with local climate and hydrometeorological risk patterns.

Despite repeated national distribution campaigns, the effective utilisation of LLINs remain low, and uptake of IPTp through antenatal care also remains sub-optimal GIZ, 2021e). Climate variability further constrains delivery through seasonal access limitations in flood-prone zones, disruptions to outreach activities and increased pressure on HFs during peak transmission periods. The nationwide rollout of the R21/Matrix-M malaria vaccine on 1 September 2025 represents a major climate-relevant prevention milestone, as Togo became the first African country to introduce it, integrating the vaccine into its Expanded Programme on Immunisation (EPI).

The R21 vaccine is given in four doses at five, six and seven months, with a booster at 15 months. The programme targets about 270,000 infants each year across all six health regions and aims to reduce severe disease and deaths in children (GAVI, 2025). The launch was supported by GAVI, WHO and UNICEF, with the Togolese government covering 15% of the cost and GAVI financing the remainder. Preparations included training vaccinators, developing a national communication strategy and mobilising community and religious leaders to counter misinformation. This vaccine complements existing interventions rather than replacing them (PMI, 2024). However, its long-term effectiveness will depend on the robustness of cold chain delivery systems under rising temperatures and energy instability, as well as on climate-sensitive micro-planning of outreach and routine immunisation sessions.

3.2.8.1.2 <u>Diarrhoea prevention interventions</u>

Diarrhoeal disease prevention does not operate under a dedicated vertical programme but is delivered through routine preventive and curative services coordinated by the MSHPCSUA, in close linkage with WASH actors. Prevention relies primarily on behaviour change communication, access to safe drinking water, sanitation, food hygiene, exclusive breastfeeding, and the use of ORS and zinc supplementation. Cholera and rotavirus vaccination are integrated into the EPI. However, the delivery of diarrhoeal disease prevention remains weakly climate-adapted, despite the high sensitivity of diarrhoeal transmission to flooding, water contamination and temperature increases. Recurrent damage to latrines, wells and drainage infrastructure during heavy rains directly undermines prevention outcomes.

Across both disease areas, public health delivery systems have not yet systematically revised their operating procedures to integrate climate risk management and low-carbon delivery models. Outreach strategies, campaign scheduling, commodity transport, cold chain management and community engagement are still largely designed around historical climate conditions. Strengthening climate-informed delivery will therefore require: i) explicit integration of climate data into micro-planning of preventive campaigns; ii) adaptation of outreach modalities in flood- and heat-exposed zones; and iii) alignment with low-carbon logistics solutions, particularly for vaccine and pharmaceutical distribution.

The table below summarises the preventive measures currently used for malaria and diarrhoeal diseases in Togo.

Table 17: Prevention measures for malaria and diarrhoeal diseases

Disease	Communication	Medication	Vaccination	Other prevention measures
Malaria	- Awareness-sessions and community outreach campaigns - Radio, TV, and social media communication (national & district levels)	- Drug: Sulfadoxine Pyrimethamine - Annual subsidised campaigns over 4 months for children under 5 years of age - Included in antenatal care for pregnant women (IPT) - Continuous availability of the product in pharmacies	- R21/Matrix-M malaria vaccine introduced nationally in September 2025 (4-dose schedule at 5,6,7, and 15 months) (Abdel Ozih, 2025) - Integrated into the Essential Programme on Immunisation (EPI)	Vector control: - LLINs (national distribution campaigns; low effective usage rate; limited availability in pharmacies) (GIZ, 2021e) - Mosquito repellents (insecticides, coils, sprays)
Diarrhoeal diseases	- Public communications, awareness campaigns - Media communication	ORS, intravenous fluids, zinc supplements and nutrition (WHO, 2024b)	Cholera and rotavirus vaccination included in the EPI vaccination strategy	- Access to safe drinking water, improved sanitation, personal and food hygiene - Newborn health: exclusive breastfeeding for the first 6-months

3.2.8.2 *Diagnostic capacity for malaria and diarrhoeal diseases*

Malaria diagnosis in Togo relies on RDTs for *Plasmodium falciparum* malaria at all levels of the health system. These tests are designed to detect parasite densities of at least 200 parasites/μL, in line with WHO recommendations, but less reliable below this threshold (GIZ, 2021e). Laboratories across the health pyramid can confirm infections from *Plasmodium falciparum* in the blood, measure haemoglobin for anaemia and count white blood cells to detect biological signs of infection. However, diagnostic capacity within the malaria sentinel-site network remains limited, especially for routine parasitological monitoring and molecular surveillance of antimalarial resistance markers (see *Section 3.4.3* on integrated risk and early warning monitoring for a detailed overview of surveillance capacities and data flows).

For diarrhoeal diseases, the USPs are not equipped to identify the bacteria and parasites responsible. Only two laboratories at the central level are equipped to diagnose viral diseases. Despite these constraints, available data indicate that routine diagnosis for malaria and diarrhoeal diseases is generally timely, with no systematic delays reported in the most recent assessments (GIZ, 2021b). Rapid diagnostic tests based on loop-mediated isothermal amplification (LAMP) exist for diarrhoeal diseases caused by *E. coli*. and *Shigella* bacteria quickly (Connor et al., 2022)[16], and could be a possible technology to diagnose diarrhoeal diseases at the peripheral (district laboratory) level.

3.2.8.3 *Treatment capacity for malaria and diarrhoeal diseases*

To standardise treatment across all levels of the health pyramid, a manual of care protocols has been published and made available to all HFs since 2015. Nevertheless, USPs cannot fully treat and care for people with serious illnesses (generally anaemic and neurological malaria, suspected meningitis, and suspected cholera) because of the number of staff available and the level of equipment.

At the peripheral level, health workers can administer medicines to treat malaria, pneumonia, and diarrhoea. If there is no improvement, they are required to refer the patient within 24 hours (GIZ, 2021e).

Table 18: Treatment and care ability by type of health facility

Disease	USPs	District Hospital 1	District Hospital 2	Regional Hospital	University Hospital	Specialised Hospital
Malaria	Yes, except extreme cases (anaemic and neurological malaria)	Yes	Yes	Yes	Yes	Yes
Diarrhoeal diseases	Yes	Yes	Yes	Yes	Yes	Yes

For both malaria and diarrhoeal diseases, government subsidies exist at a national level. However, when subsidised product supplies are insufficient, health facility managers are often forced to buy the products and sell them to the patients, thereby maintaining the cost of treating these diseases for facilities and patients (GIZ, 2021e).

Table 19: Nationally subsidised medication/treatments for malaria and diarrhoeal diseases

Disease	Nationally subsidised essential medication/treatments
Malaria	• Artemisinin-based combination therapy (ACT) • Quinine • Artemether Injection • Artesunate Injection
Diarrhoeal disease	• Venous rehydration solutions • Oral rehydration solutions • Cotrimoxazole • Injectable Ampicillin • Injectable Ceftriaxone

[16] *Loop-mediated isothermal amplification (LAMP) is a nucleic acid amplification method offering the rapid, accurate, and easy to use diagnosis of infectious diseases.*

(GIZ, 2021e)

3.2.9 Climate-Related Emergency Preparedness and Management

This section analyses the health system's capacity for emergency preparedness and management in the context of climate-change-triggered emergencies, which also encompasses disaster risks. See *Section 0* for more information.

3.2.9.1 Overview of emergency response frameworks and strategies

For a detailed description of the National Civil Protection Policy, refer to *Section* ***Error! Reference source not found.***.

Table 20: Summary of emergency response frameworks and strategies

Name	Description
National Strategy for DRR 2013-2017 *(Stratégie nationale de réductions des risques de catastrophes naturelles —* SNRRCN) (MERF, 2013)	The strategy aims to increase the resilience of Togo and its local authorities to disasters by 2017 in order to provide people with acceptable and safe living conditions. It specifically aims to: • Improve the policy, legal, regulatory and institutional framework for DRR; • Strengthen the technical, material and financial capacities of institutions and other stakeholders in DRR; • Improve the DRR information system; • Reduce the risks underlying the prevention and management of disasters; • Strengthen disaster preparedness. The strategy emphasises local actors and reinforcing community warning mechanisms.
The National Development Plan 2018-2022 (*Plan National de Développement —* PND*)* (République Togolaise, 2018)	The PND 2018-2022 was revised through the Togolese Government Roadmap 2025, launched in 2020 to reflect emerging national priorities and integrate lessons from the COVID-19 crisis (République Togolaise, 2020). This updated roadmap maintains the PND's focus on inclusive growth and sustainable development while emphasising resilience, crisis anticipation, and modernisation of state structures. The plan identifies mainstreaming risk management and education, particularly related to climate change as a priority. In addition, the Plan also aims to strengthen alert and emergency response mechanisms to combat disasters. Within this framework, the roadmap defines priority projects ("P") that turn national goals into concrete actions. P4 strengthens the health system's preparedness for emergencies through improved response plans and essential medical infrastructure, while P35 addresses major climate risks via coastal protection, reforestation, and flood management.
National Multi-Risk Contingency Plan 2020 (*Plan National Contingence Multirisques —* PNCM*)* (MSPC, 2020)	In the context of the Covid-19 aftermath, this plan identifies five disaster risks for Togo: epidemics, flooding, extreme winds, pollution and wildfires. It clarifies the roles and responsibilities of different divisions, bodies and ministries provides a planning framework to respond to natural catastrophes and risks, and integrates disaster risk planning (prevention, preparation and response) to national development plans in general.

Action Plan for the Development and Adaptation to Climate Change in Togo's coastal areas 2017 (*Plan d'action pour le développement de l'adaptation aux changement climatiques du littoral Togolais*) (MERF, WBG, 2017)	Major issues addressed by the Coastal Plan include coastal erosion and marine and rainwater flooding along the Togolese coast. These have impacts on public health and its success. The Action Plan lays out an investment plan, where one of the categories of investment are actions to prevent and manage flooding and erosion risk.

3.2.9.2 The MSHPCSUA's role in climate-related emergency preparedness and management

The central national coordination body for health emergencies is the COUSP (see *Section 3.2.1.4.2*). However, this committee has never been fully established. In practice, the MSHPCSUA relies on ad-hoc coordination frameworks for emergency management, which are created specifically for each event (GIZ, 2021d).

As of 2023, the operationalisation and strengthening of the WHO's One Health platform for better coordination in terms of health emergency response has remained a challenge (MSHP, 2022b). The One Health approach, as advocated by the WHO, FAO, WAHO and the United Nations Environment Programme (UNEP), emphasises the importance of cross-sectoral collaboration when designing and implementing programmes, policies, legislation and research to improve public health outcomes. The One Health approach underscores the interconnectedness of human, animal, and environmental health, aiming to address health threats at this interface comprehensively. This includes tackling issues like food safety, environmental health, control of zoonotic diseases, as well as addressing the health challenges at the intersection of climate change and health. However, One Health does not solely focus on isolated health issues; rather, the approach serves as a framework for projects to leverage synergies across different sectors.

Regional health emergency management committees and district crisis units also exist to coordinate operations to respond to health emergencies. At the national level, the MSHPCSUA also coordinates with the ANPC in disaster risk response, as detailed in *Section 3.4.1.2*.

The table below summarises relevant MSHPCSUA departments with areas of expertise in climate-related risk management.

Table 21: Summary of MSHPCSUA departments related to climate-related risk management and response

Services/name	Responsibilities
Health Emergencies Operation Centre (*Centre des Opérations d'Urgence Santé Publique — COUSP*)	• Develop the national emergency care strategy; • Coordinate the implementation of the policy to revitalise emergency care and evaluate it periodically; • Oversee the implementation of the national emergency care strategy in collaboration with the other ministries and institutions involved; • Contribute to the definition and implementation of emergency management training programmes.
Department of Disease Control and Public Health Programmes (D*irection de la Lutte contre la Maladie et des Programmes de Santé Publique* — DLM-PSP)	• Coordinate strategic planning and evaluation of disease control programmes; • Oversee epidemiological surveillance and analyse health program data; • Shape national health policy, set direction, and update public health indicators.
Communicable Disease Division (*Division des*	• Develop strategies to combat endemic diseases and coordinate their implementation;

***Maladies Transmissibles* — DivMT)**	• Monitor the implementation of measures to combat endemic and communicable diseases; • Collect and manage of epidemiological information, coordinate integrated surveillance, and update national epidemiological map. There are multiple sections/units attached to the Communicable Diseases Division. The relevant one for this project includes: • Diarrhoeal diseases and other communicable diseases section
Integrated Surveillance for Health Emergencies and Response Division (*Division de la Surveillance Intégrée des Urgences Sanitaires et de la Riposte* — DivSIUSR)	See *Section 3.2.4.1* for a more detailed description. • Collect and manage epidemiological information for endemic disease surveillance; • Coordinate implementation of surveillance activities and create a national epidemiological map; • Analyse data on priority diseases, monitor health, and participate in epidemiological studies. This Division includes sections such as: • Section for surveillance of diseases with epidemic potential; • Section for Disaster Preparedness and Response.
Health Infrastructure Division (*Division des Infrastructures Sanitaires* — DivIS)	• Design infrastructure construction programmes; • Design master plans for HFs; • Coordinate the construction of HFs; • Ensure compliance with norms and standards for public and private health infrastructure; • Participate in the development and update of national norms and standards for health infrastructure with international standards.
Hygiene and Sanitation Department (*Direction de l'Hygiène et de l'Assainissement de Base* — DHAB)	• Coordinate hygiene activities and community protection in emergency situations; • Participate in environmental health activities; • Coordinate response to crises and natural disasters.
Division for Health Communications (*Division de la Promotion de la Santé* — DivPS)	• Develop and monitoring the implementation of national policy on health promotion communication policy; • Draw up a health promotion communication plan and its implementation.
Department of the National Health Information and IT System (Direction (DSNISI)	• Manage and oversee the national DHIS2 platform as part of the Health Management Information System (HMIS); • Coordinate indicator- and event-based epidemiological surveillance; • Lead data integration for early warning and alert generation within the Health EWS (H-EWS); • Support modelling and predictive analysis for climate-sensitive diseases; • Oversee DHIS2-based antimicrobial resistance (AMR) surveillance and its interoperability with laboratory systems; • Validate thresholds, algorithms, and SOPs for automated alerts and data exchange.

(GIZ, 2021d)

3.2.9.2.1 *Challenges for emergency management and response*

While the gaps related to hazard detection, surveillance, forecasting and alert dissemination are addressed under the Early Warning System in *Section 0*, the capacity to act upon alerts in Togo faces a distinct set of structural, operational and sectoral constraints.

Institutional preparedness for emergency response remains limited by weak formalisation and sustainability of coordination mechanisms. Although the COUSP and ad hoc crisis committees are activated during major events, permanent, legally mandated and fully resourced cross-sectoral emergency coordination structures remain insufficiently operational. The PNCM has not been updated since 2017, significantly reducing its relevance for current climate, epidemiological and urban risk profiles.

There is a particular need to develop and strengthen response capacities, alongside surveillance, including the implementation of community-based surveillance and monitoring and the strengthening of the strategic interface between health and the environment. In response to these challenges, the PNDS recommends strengthening infection prevention and control and strengthening health monitoring of drinking water and foodstuffs. This monitoring is carried out by laboratories of the National Institute of Hygiene (*Institut National de l'Hygiène* – INH), including the Water and Food Microbiology Laboratory at the Kara branch, which is currently being supported in the International Organisation for Standardisation/International Electrotechnical Commission (ISO/IEC) 17025 accreditation process by ProSanté III. However, these capacities are not yet fully integrated into coordinated emergency response operations and rapid field deployment mechanisms.

Concerning climate change and health, there is an acknowledgement that the One Health platform has not been operationalised to date, and that there is a need to set up and operationalise a dedicated CCU, focused solely on the impact of climate change on public health (MSHP, 2022b). This institutional gap significantly weakens preparedness for climate-sensitive health emergencies.

At the decentralised level, municipalities lack the financial resources, technical expertise and emergency planning capacity required to implement hygiene, sanitation and rapid response measures during crises. Local response therefore remains largely reactive and dependent on external support from central government and humanitarian partners.

Operational response is further constrained by logistical and resource gaps, including the absence of pre-positioned emergency stockpiles, limited availability of ambulances and field logistics, and the lack of dedicated and predictable budget lines for rapid emergency deployment. Human resource shortages and limited specialised training in disaster risk reduction, emergency medicine and crisis logistics further undermine response effectiveness.

Together, these constraints limit Togo's ability to translate early warnings into timely, coordinated and effective field action, highlighting that strengthening preparedness, decentralised response capacity, health–environment operational integration and emergency logistics is as critical as improving upstream early warning functions.

3.2.10 Sustainable Climate and Health Financing

3.2.10.1 Health sector financing

Over the last five years, Togo has mobilised a total of CFAF 444.698 billion (EUR 680 million) to improve the healthcare sector, against a forecast of CFAF 537.195 billion (EUR 820 million) [17] under the previous PNDS, representing an 82.8% achievement rate (MSHP, 2022b). This funding has been sourced primarily by the State's own resources (40.7%), technical and financial partners, including UN agencies, bilateral cooperation agencies, international CSOs (33.7%), and revenue generated by HFs (25.6%). This financing pattern underscores the continued significant dependence of the health sector on external technical and financial support (MSHP, 2022b).

Despite progress in mobilising resources, the share of the total State budget allocated to the health sector remains well below the 15% target set by the Abuja Declaration. An analysis of expenditures (Compte de Santé) in 2017-2019 showed an average of 7.2% of the total budget, with 6.5% in 2017, 7.9% in 2018 and 7.3% in 2019. Planned budgets for the subsequent years showed only marginal increases, with allocations of 7.2% in 2020 (EUR 125 million), 7% in 2021 (EUR 119 million), 8.8% in 2022 (EUR 163 million), and 9% in 2023 (EUR 194 million). The real budget for health increased markedly over the past decade, tripling from FCFA 41 billion (EUR 63 million) in 2015 to FCFA 127 billion (EUR 194 million) in 2023, reflecting substantial nominal growth even if the sector's share of the total State budget remains below international targets (GIZ, 2022a; MSHP, 2022). In 2024, preliminary data indicate a slight decrease in allocation, with only 6.9% of the total State budget directed to the health sector, highlighting ongoing challenges in sustaining the necessary funding levels (MSHPAUS, 2025).

Health funding continues to be characterised by low revenue realisation at the facility level, estimated at 67.2% of their forecasts over the period 2017 to 2021 (GIZ, 2022a). Structural limitations, low absorption capacity and weak financial management contribute. Household out-of-pocket expenditures

[17] *Exchange rate as of 17th July 2023.*

remain a major barrier to accessing healthcare, accounting for 51% of total health expenditure in 2023, although this represents a decrease from 66% in 2021 (WHO, 2022). At the same time, domestic government expenditure has increased as a share of total health spending, rising from 13.5% in 2021 to 21.2% in 2023, reflecting a growing role of the State in financing health services (MSHPAUS, 2025). While certain curative, and preventive interventions, such as the *Wezou* Programme aimed at reducing maternal and neonatal mortality, have alleviated some financial burden, the high level of direct payment continues to pose a significant barrier, particularly in a context where 43.8% of the population lives below the poverty line (INSEED, 2021).

Resource allocation within the health sector reflects the government's priorities. Strengthening the health system towards universal coverage, including community health services, accounts for approximately 49% of mobilised resources. Interventions aimed at reducing maternal, infant, and child mortality, as well as family planning and adolescent health, account for 32%, while the fight against communicable diseases absorbs another 14% (GIZ, 2022a). Collectively, these priority areas receive over 86% of resources, leaving a persistent gap in financing epidemic control, management, and treatment.

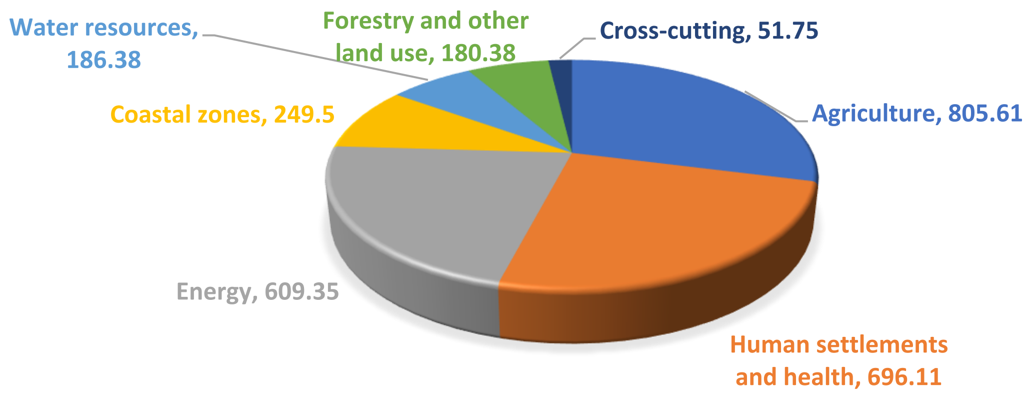
A critical component of health financing reform is Togo's UHC. The UHC aims to provide universal health insurance coverage and reduce reliance on direct household payments. Implemented by the INAM and the National Social Security Office (*Caisse Nationale de Sécurité Sociale* – CNSS), UHC covers formal sector workers, retirees, informal sector workers, and vulnerable populations through a contributory system for formal workers, flexible contributions for informal workers, and targeted subsidies for vulnerable groups. The system provides a defined benefits package, including consultations, hospitalisation, essential medicines, and maternal, infant and child health services, with a third-party payer system allowing patients to access care without upfront payment. Between 2021 and 2023, the proportion of the population covered by UHC increased significantly from 5.4% to 39.4%, a performance that is far above the 2023 target of 16.3% (MSHPAUS, 2025). This increase is due to the expanded coverage that included new beneficiaries registered under the UHC schemes, as well as the *Wezou* Programme and "School AMU (UHC)" insurance plans, following the official operationalisation of the system in October 2023 (MSHPAUS, 2025). Challenges remain, particularly in extending coverage to informal workers, raising public awareness, and strengthening digital and operational systems for enrolment and claims management. Planned expansions include scaling coverage to school children through the insurance programme and integrating UHC data with broader health information platforms for monitoring and planning purposes.

3.2.10.2 Financing climate change adaptation

To implement its revised 2021 NDC, Togo requires a total investment of USD 5.47 billion, replacing previous estimates of over USD 3 billion. Of this amount, USD 2.78 billion is specifically needed for climate change adaptation (MERF, 2021a). The sector categorised as "Human settlements and health" requires an adaptation investment of USD 696.11 million, representing 26% of total adaptation financing, second to "agriculture" at 29%. This total financing requirement does not include separate investments in capacity reinforcement (USD 234.6 million) or technology transfer (USD 66.48 million).

The figure below shows the estimated funding needs in million USD for climate change adaptation in Togo.

Figure 48: Funding requirements for climate change adaptation in different sectors for Togo's NDC, in millions of USD



(MERF, 2021a)

The revised NDC confirms that Togo remains heavily reliant on external support for implementation. Approximately 78% of total funding is conditional on international support, while only 22% is expected to come from national resources. For adaptation specifically, 82% of the required funding is dependent on external support, highlighting the critical role of international financing in protecting vulnerable population and key economic sectors from climate change impacts (MERF, 2021). Since 2018, Togo has mobilised more than USD 19 million from the Global Environment Facility (GEF) (MERF, 2018). At the same time, its GCF engagement has grown, with approximately USD 33.6 million secured to date, including readiness support, and in February 2025, the country's first-ever single-country GCF project to establish a national climate EWS (see *Section 4.1.2.1*). Despite this progress, domestic financing remains insufficient, and overall national capacities to mobilise climate resources continue to be limited.

Strategic frameworks, such as the PNAS 2020-2025, and the PNACC provide essential guidance for financing climate-health interventions. The PNAS, with an estimated budget of 897,178,500 FCFA (~EUR 1.37 million), prioritises the financing of health adaptation, serving as a key tool to access international mechanisms such as the GCF and the Adaptation Fund (AF). The PNACC identifies systemic challenges, including limited capacity among national actors to develop financeable projects, variable integration of adaptation across sectoral policies, and generally weak implementation levels. Nevertheless, the health sector has demonstrated encouraging progress, reflecting improved alignment between climate and health planning.

In recent years, the MSHPCSUA has also made tangible progress in integrating climate considerations into public financial management through Togo's national green-budgeting ("budget vert") reform (MEF, 2024). Since 2023, the Ministry has actively engaged in the national process of tagging, classifying, and tracking climate-relevant expenditures. Within this framework, it has begun identifying and marking priority adaptation expenditures—including climate-resilient health infrastructure, surveillance and EWS, emergency preparedness, and WASH in HFs — ensuring that climate-health actions are visible within the annual budget cycle and aligned with national commitments under the NDC, PNACC, and PNAS. This integration has strengthened the Ministry's capacity to mobilise climate finance by creating a transparent, standardised mechanism to justify climate-related allocations and demonstrate consistency with broader public-finance reforms. While still in early stages, the Ministry's engagement in green budgeting represents an important step towards institutionalising climate adaptation within routine health planning and further underscores the need for sustained external support to operationalise climate-resilient health services at scale.

3.3 Digital Transformation of the Health Sector and Climate Change

3.3.1 Digital Ecosystem in Togo

Over the past decade, Togo has experienced one of the fastest digital transformations in West Africa. Building on sustained political commitment and strong donor support, the country has developed an increasingly coherent legal, institutional, and infrastructural ecosystem that positions digitalisation as a driver of inclusive growth, state modernisation, and climate resilience. These reforms provide the foundation for expanding digital health and EWS that underpin climate-resilient public-health services.

3.3.1.1 Institutional and governance mechanisms

Togo's digital transformation is governed through a two-tier system that connects national digital policy and standards with sectoral implementation. This arrangement aims to ensure that the country's rapid digitalisation remains coherent across ministries and consistent with the Togo Digital Strategy 2025.

At the national level, the Ministry of Digital Economy and Transformation (*Ministère de l'Économie Numérique et de la Transformation* - MENTD) leads the design and implementation of digital policies and oversees all cross-sector coordination. Within the MSHPCSUA, digital transformation is managed through DSNISI, a coordinated structure that combines governance, technical oversight, and alignment with the national digital architecture (see *Section 3.2.9.2*). This structure ensures the health sector remains interoperable with wider government systems – particularly the Government Enterprise Architecture of Togo (*Architecture d'Entreprise Gouvernementale du Togo* - AEGT), the Digital Agency of Togo (*Agence Togo Digital* – ATD), and MENTD mandates – while safeguarding sector-specific priorities such as disease surveillance, telemedicine, digital patient management, and the digitalisation of the health supply-chain.

To carry out its mandate, MENTD relies on several key institutions, which provide the policy support and technical infrastructure.

Table 22: Key national digital governance institutions and their roles

Key institutions	Core mandate	Key functions
Government Enterprise Architecture of Togo (*Architecture d'Entreprise Gouvernementale du Togo* - AEGT)	Defines national digital governance standards	Sets reference standards for interoperability, data exchange, sovereign data hosting, and system integration; establishes governance principles and implementation guidelines; provides roadmap for harmonised digital service deployment.
Digital Agency of Togo (*Agence Togo Digital* – ATD)	Operational implementation of national digital strategy	Implements national digital projects; manages public digital platforms and the single government portal (togo.gouv.tg); ensures compliance with AEGT interoperability, cybersecurity, and hosting standards for all new systems.
Digital Infrastructure Company (Société d'Infrastructures Numériques - SIN)	National digital infrastructure provider	Manages the national fibre-optic backbone; operates data-centre infrastructure; ensures broadband connectivity for public institutions including HFs; supports nationwide digital service uptime.
National Cybersecurity Agency (Agence Nationale de Cybersécurité – ANCy) and its operational arm, Cyber Defence Africa (CDA)	Cybersecurity governance, monitoring and incident response	Monitors and secures government information systems; operates the national Security Operations Centre (CERT.tg); coordinates cyber-incident response; enforces cybersecurity policies across sectors.
Personal Data Protection Authority (*Autorité de Protection des Données Personnelles* – APDP)	Data protection and privacy regulation	Ensures compliance with data-protection rules; issues authorisation to data controllers; regulates sensitive data including medical and biometric information; audits and enforces lawful data processing by public and private entities.
Electronic Communications and Postal Regulatory Authority	Regulation of electronic	Oversees market licensing, spectrum allocation, service-quality compliance, and

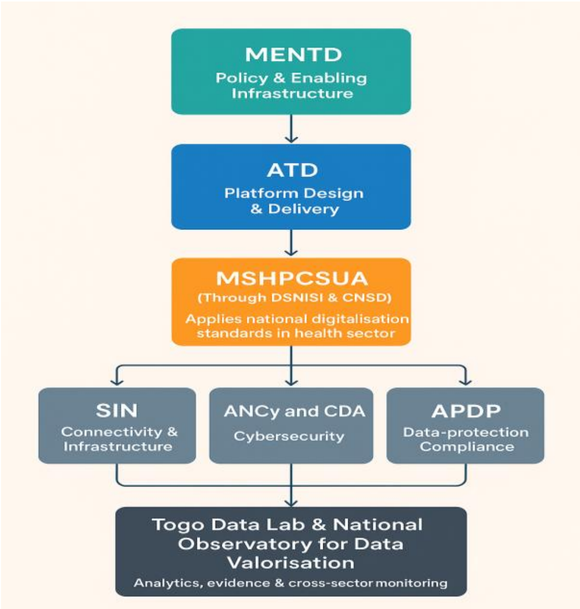
(*Autorité de régulation des communications électroniques et postales* - ARCEP)	communication, postal services and connectivity	consumer protection; ensures fair competition and reliable digital connectivity essential for EWS, health information systems and public-service platforms.
National Identification Agency (*Agence Nationale d'Identification* – ANID)	Management of foundational digital identity systems	Administer the NIU and the RSPM; enables secure record linkage across sectors, including health and social protection; ensures interoperability and data-security alignment with MENTD and ATD.

To bridge the two layers and ensure continuous coordination, sectoral initiatives are embedded within national governance structures that promote cross-sector learning, analytical capacity, and the application of common standards. These include:

- Togo Data Lab (TDL) — A joint initiative of MENTD, the University of Lomé (UoL), and University of California (Berkeley Campus)'s Centre for Effective Global Action (CEGA). It strengthens national data-science capacity, develops analytical tools for policy use, and has already produced spatial analyses of health-infrastructure distribution and access to care.
- National Observatory for Data Valorisation — Being established under MENTD, the Observatory will monitor implementation of Digital 2025, coordinate data-governance frameworks, and track sectoral performance indicators, including health.
- INSEED — The national statistics office responsible for producing official demographic, economic, and health data. INSEED's datasets feed into national systems such as DHIS2 and the RSPM, supporting evidence-based policymaking and data harmonisation.
- Digital Transformation Centre (DTC Togo) — A joint initiative of MENTD and the GIZ. It provides technical support to public institutions (e.g., ATD), fosters partnerships with public- private, and civil-society actors, strengthens digital skills, and supports innovation ecosystems such as the Djanta Tech Hub.
- Djanta Tech Hub — An innovation campus in Lomé led by MENTD and managed by Co-Creation Hub (CcHub Nigeria). It promotes entrepreneurship, incubation, and applied digital research in health-tech, agritech, and edtech, contributing to national digital-talent development.

Figure 49 maps Togo's digital governance ecosystem, demonstrating how national policy translates into coherent, secure digital services across ministries. The ecosystem is driven by the MENTD, which sets the rules and provides the foundational architecture, while the ATD acts as the executive arm, designing and delivering the digital platforms. The MSHPCSUA (through DSNISI and CNSD) is responsible for applying these centralised standards and policies within the health sector. This implementation layer is sustained by specialised support institutions: SIN ensures network infrastructure and secure connectivity; ANCy and CDA safeguard national systems from cyber threats; and the APDP enforces data-protection and privacy compliance. Ultimately, all data generated feeds into the TDL and, eventually, the National Observatory for Data Valorisation, establishing a central hub for analytics, evidence generation, and cross-sector monitoring to ensure sustainable integration and policy coherence.

Figure 49: Governance and coordination structure for digital health and data in Togo



While Togo has established a solid policy foundation for digital transformation, several implementation gaps remain. The SDSN 2025–2030 is not yet formally adopted or costed, and specific regulations for telemedicine, AI-based diagnostics, and cross-sector data interoperability are still under preparation. In addition, the absence of formal data-sharing protocols between health, meteorological, and environmental institutions constrains the practical implementation of the One Health approach and integrated EWS. A comprehensive monitoring and evaluation framework for digital-health performance also remains to be developed. Despite these challenges, the progressive alignment of the Digital 2025 Strategy, PNDS, SDSN, and the soon-to-be CNSD, reflect strong national ownership and a mature policy environment.

3.3.1.2 Legal and regulatory framework

Between 2017 and 2024, Togo adopted and updated a comprehensive set of digital laws that together establish the legal certainty, data-protection safeguards, and trust environment required for electronic transactions and data-driven governance.

Table 23: Legal and regulatory frameworks for digital governance and security

Name	Description
Law No. 2017-007 on Electronic Communications and the Information Society	Adopted in 2017, this law governs the organisation, licensing, and supervision of electronic communications. It regulates network operation, frequency allocation, and quality-of-service obligations for telecom providers, while promoting universal access to digital infrastructure and services. It provides the overarching framework for connectivity expansion, including broadband access to public institutions such as hospitals and schools.

Law No. 2017-010 on Electronic Transactions, revised in 2023	The 2023 revision modernised the original electronic-transactions law to ensure the full legal recognition of electronic documents, contracts, and signatures. It introduced the concept of qualified trust services—including electronic seals, timestamps, and identity verification—and established the national framework for certifying digital-trust providers. A related Decree No. 016/2024 formally recognises foreign electronic certificates, ensuring interoperability in cross-border exchanges such as vaccine certification or digital medical records.
Law No. 2018-026 on Cybersecurity and the Fight Against Cybercrime, amended by Law No. 2022-009	This legislation defines the obligations of public and private entities to protect critical information systems. The 2022 amendment strengthened requirements for cyber-risk management, mandatory security audits, and certification of cybersecurity specialists. It also clarified legal responsibilities for incident reporting and established penalties for cybercrime. These reforms align Togo with the African Union (AU) Convention on Cybersecurity and Personal Data Protection (Malabo Convention) and the ECOWAS Regional Cybersecurity Strategy.
Law No. 2019-014 on Personal Data Protection	Recognised as a key pillar of digital trust, this law classifies medical, biometric, and genetic information as sensitive personal data. Processing such data requires explicit consent, limited use, and strong technical safeguards. Cross-border transfers are authorised only when the destination country provides an adequate level of protection. The law guarantees individual rights to access, rectification, erasure, and objection, and mandates impact assessments for high-risk data processing. Its enforcement is overseen by the APDP which issues compliance authorisations and supervises both public and private data controllers.
Law No. 2020-005 on Biometric Identification, amended 2022–2023	This law established the Unique Identification Number (*Numéro d'Identification Unique* - NIU*)* for every citizen and resident, managed by the ANID. The NIU serves as a universal digital identifier enabling the secure linkage of citizens' records across public services. Within the health sector, it forms the foundation for future patient identification in electronic health records and contributes to the creation of a unified Social Registry of Individuals and Households (*Registre Social des Personnes et Ménages* – RSPM).
Law No. 2023-018 on Digital Trust Services	Adopted in 2023, this law complements the electronic-transactions framework by defining the accreditation, supervision, and legal validity of digital-trust services. It institutionalises the use of qualified electronic certificates and timestamping within public administration and supports verifiable digital credentials for health-related documents, such as vaccination or health-status certificates (*PassCovidTG*).

Despite this robust legal foundation, several critical areas remain under development:

- Artificial Intelligence (AI): As of 2025, no dedicated law governs algorithmic transparency, accountability, or liability for AI systems. The MENTD has initiated public consultations on an AI and Emerging Technologies Bill expected in 2025, which will define ethical and legal frameworks for algorithmic use in public services.
- Digital Health and Telemedicine: These aspects are expected to be defined in the forthcoming National eHealth Strategy 2025–2030 and the Digital Health Master Plan (*Schéma Directeur de*

la Santé Numérique - SDSN), which will include provisions for telemedicine licensing, digital prescribing, and reimbursement mechanisms.

- Green Information and Communication Technology (ICT) and e-waste management: The 2020 National Environmental Policy acknowledges the need for responsible e-waste management, but a specific decree on e-waste from public-sector ICT and medical devices remains pending.
- Cross-sector data sharing: Legal mechanisms for systematic data exchange between the health, environment, and meteorological sectors have yet to be formalised.

Togo's sustained efforts to strengthen its digital-governance framework have been internationally acknowledged. In 2024, the country achieved a score of 88.8 on the International Telecommunication Union (ITU) Global Cybersecurity Index, ranking 67th worldwide and 8th in Africa—the fastest improvement recorded on the continent since 2018.

3.3.1.3 Policies and strategies

Over the past decade, Togo has built a coherent national framework that places digitalisation at the centre of its development agenda. These investments are anchored in the Togo Digital Strategy 2025, which is summarised in *Section 3.2.1.2*. The Strategy is the key reference point, operationalising the digital pillar of the PND 2025–2030 and establishing the foundations, governance principles, and infrastructure standards for transformation across sectors. This vision is reinforced by complementary policies, including the National Financial Inclusion Strategy (2019), which supports digital payments and social-protection delivery, and the National Cybersecurity Strategy led by the ANCy, which aligns national practice with the AU Malabo Convention and strengthens trust in digital systems. Human-capital development is guided by the National Policy for Digital Education and Training (2023) and supported by innovation hubs such as the Djanta Tech Hub and the Digital Transformation Centre (DTC Togo). In the health sector, digitalisation is anchored in the One Health Framework (2023) and the PNDS 2023–2027), which identify digital tools as critical for universal health coverage, surveillance, and resilient service delivery. Building on this strategic base, the forthcoming SDSN defines the digital-health architecture, while the newly established National Digital Health Centre (*Centre National de Santé Digitale* – CNSD) provides the institutional mechanism to coordinate implementation and ensure that policy commitments translate into practice.

The Togo Digital Strategy 2025 is implemented through nine flagship programmes outlined in *Table* 24. Of these, four are directly relevant to the health sector because they provide the infrastructure and governance foundations for digital health:

- Programme 2 – RSPM: creates a unified social registry enabling household-level targeting of health and social protection services. It links to the biometric ID (NIU), which will serve as a future patient identifier.
- Programme 3 – Broadband and equipment access: aims to connect 100 % of schools, hospitals, and public administrations to broadband, providing the backbone for e-health and digital EWS.
- Programme 5 – Access to basic social services: explicitly prioritises the digitalisation of health and education services, including e-health, online appointments, and digital medical records.
- Programme 9 – Data governance and valorisation platform: establishes a national data-governance and analytics observatory to improve data quality, sharing, and evidence-based decision-making.

Within this framework, the health sector aligns its own digitalisation roadmap with national standards on identity management, interoperability, and cybersecurity. Implementation is coordinated by the MENTD through its executive agency, the ATD. The SIN operates the national fibre backbone and Tier III data centre.

Table 24: Togo Digital 2025: Flagship programmes for national digital transformation

Programme	Ambition	2025 Target	Lead Institutions	Partners	Precursor Projects	Budget	Timeline
01 – e-ID (Biometric Identification)	Assign a unique number to every individual as the foundation for economic and social inclusion	100% of eligible citizens & residents have a biometric ID	Presidency, ANID, Ministries of Digital Economy, Security, Territorial Administration	WB	Biometric ID law, creation of ANID	USD 15–20M / USD 30–40M	2021–2025: system setup, population enrolment
02 – Social Registry (RSPM)	Create a social registry to improve targeting of social & economic policies	100% of Togolese registered in the RSPM	Presidency, ANID, Ministries of Social Action (MASPFA), **Health,** Youth, Education, etc.	WB, Innovations for Poverty Action (IPA)	NOVISSI program, social safety nets	USD 1–2M / USD 15–20M	2021–2025: design, implementation, sustainability
03 – Broadband & Equipment Access	Connect all households, schools, hospitals & administrations to broadband and provide equipment	100% connected buildings; 100% households with smartphone; 3 submarine cables	SIN, ATD	WB, international donors, private funding	CIZO project, e-Gov (565 buildings connected)	USD 250–300M / USD 15–25M	2021–2025: broadband extension, project rollout
04 – Digital Public Services	Provide citizens and businesses with accessible digital public services	75% of procedures digitalised; 100% user satisfaction	ATD, Ministries of Digital Economy, Civil Service	Financial, technical partners; training centres	togo.gouv.tg, voyage.gouv.tg, covid19.vaccine platform	USD 15–20M / USD 5–10M	2021–2025: project scoping, POC, civil servants' training
05 – Access to Basic Social Services	Improve inclusion via digitalisation of health & education	80% subsidies digitalised; 60% covered by universal health coverage	ATD, Ministries of **Health**, Education, Higher Education	Financial, technical partners	ENT, maternal & child health innovations, International Fund for Agriculture Development - IFAD, CSU	USD 400–450M / USD 10–15M	2021–2025: project design, rollout in health & education
06 – Dematerialisation of Financial Flows	Digitise financial flows between government, citizens & businesses	80% financial flows dematerialised: 100k digital bank accounts	ATD, Ministries of Digital Economy, Finance, Financial Inclusion, ANID	Financial, technical partners	NOVISSI, e-transaction law, ECO-CCP, YOLIM project	USD 2–5M / USD 1–2M	2021–2025: national payment platform, digital bank
07 – Digitalisation of Key Sectors	Digitise priority sectors: agriculture, logistics, commerce	500k Ha mapped; +8% productivity; +50 positions in World Bank logistics index	ATD, Ministries of Agriculture, Commerce, Urbanism, Transport, etc.	Financial, technical partners	Trade single window, e-wallets for farmers, mobile banking	USD 2–5M / USD 0.5–1M	2021–2025: scoping, project development & rollout

08 – Innovation & Digital Talent Ecosystem	Build a digital innovation hub & develop digital talent	30 startups incubated/year; 3,000 SMEs supported; 800 trained profiles/year	ATD, Ministries of Digital Economy, Higher Education, Youth	Financial, technical partners, training centres	Nunya Lab, Djanta Tech Hub	USD 15–20M / USD 5–7M	2021–2025: incubators, SME support, training programs
09 – Data Governance & Valorisation Platform	Establish national data governance & valorise collected data	1 annual digital sector report; operational national data governance	ATD, Ministries of Planning, Territorial Admin., Digital Economy	Financial, technical partners	Data protection laws, infrastructure census	USD 1–2M / USD 0.2–0.5M	2021–2025: governance framework, implementation, operation

The PNDS 2023–2027 translates the national digital vision into the health domain. It recognises digital transformation as a strategic enabler for achieving UHC, improving service quality, and strengthening surveillance and governance. By embedding these objectives, the PNDS ensures that health digitalisation is pursued not as a standalone project, but as an integral part of service delivery, public health preparedness, and administrative efficiency. The plan calls for:

- Nationwide implementation of DHIS2 and its integration across programmes;
- Harmonisation of digital reporting and data-quality systems;
- Investment in digital literacy and IT skills among health workers; and
- Development of interoperable systems linking health, environmental, and meteorological data.

To operationalise these priorities, the MSHPCSUA launched the SDSN, which serves as the health sector's master plan for digital transformation. The SDSN adapts the principles of Togo Digital 2025 to the specific architecture and functional requirements of the national health system. It establishes a modular, interoperable architecture linking systems of record (DHIS2 as described in *Section 3.3.2.1*, and electronic medical records), systems of intelligence (Climate Health Analytics Platform - CHAP and modelling tools described in *Section 3.3.2.2*), and systems of communication (e.g., SanteComTogo (see *Section 3.3.2.3*), PassCovidTG). The SDSN is aligned with the AEGT and adheres to international interoperability standards (Open Health Information Exchange - OpenHIE/ First Healthcare Interoperability Resources - FHIR) and sovereign data-hosting principles defined by MENTD. Its draft version for 2025–2030 proposes the creation of a National Health Stack, ensuring that all digital health tools operate within a unified framework rather than as isolated pilots. This includes integration with the biometric ID (NIU) for patient identification and the RSPM for social targeting. The SDSN thus bridges national digital policy with sectoral implementation, promoting efficiency, security, and long-term sustainability of digital health systems.

The CNSD, which is under construction in Lomé will contribute to translating these frameworks into practice (see *Section 4.1.1, Table* 30) The CNSD serves as the national hub for digital-health governance, coordinating e-health, telemedicine, and health-data management providing the institutional mechanism to scale digital health solutions and integrate them into national early-warning and disease-surveillance systems. It reports to the General Secretariat of the MSHPCSUA but operates in close partnership with ATD and MENTD to ensure alignment with the AEGT and SDSN standards. Core mandates include:

- Coordination of all e-health and digital-surveillance projects;
- Supervision of SDSN implementation;
- Management of interoperability with national digital systems; and
- Acting as a focal point for technical and development partners (WHO, WB, GIZ, UNDP).

3.3.1.4 Digital access, connectivity and infrastructure

Reliable digital connectivity and energy infrastructure are essential enablers for Togo's digital transformation and for the integration of e-health and climate-data systems. While significant progress has been made in expanding network coverage, broadband access, and data infrastructure over the past five years, substantial disparities persist between urban and rural areas. Particularly in the northern regions of Centrale, Kara, and Savanes, unstable power supply, affordability constraints, and weak network quality continue to limit the deployment of digital health and climate services.

Energy access has expanded rapidly but remains uneven. National electrification increased from 23% in 2010 to roughly 60% by 2022, with urban access near 85–90% but only 20–25% in rural zones (GOGLA, 2024). Despite this progress, power instability continues to constrain digital operations, particularly for HFs outside Lomé. To address this, the government has accelerated solar-energy programmes under the *CIZO* initiative. In 2023 alone, 314 community HFs were equipped with solar-power systems and 122 with solar water-heating units, enhancing operational continuity and the climate resilience of essential services (ESI Africa, 2025). However, a national inventory of electricity reliability and digital readiness across HFs is still lacking, leaving important data gaps for infrastructure planning.

Connectivity expansion has been equally dynamic. By 2023, mobile-broadband coverage reached 99.7 % of the population, with 4G networks available across 98% of inhabited areas and 5G pilot zones planned for 2025 (Kemp, S., 2025). Active mobile subscription connections rose (≈ 78% of the population), and internet-user penetration reached 37%, up from just 3% in 2010 (see *Section 3.2.2.1*). These gains reflect sustained public-private investment:

- TogoCom (49% state-owned) operates the national 4G and fixed-broadband networks;
- SIN manages the national fibre network and government digital infrastructure;
- International Finance Corporation (IFC) provided a € 55 million loan in 2024 to extend fibre and 4G coverage nationwide; and
- WB's "Digital Acceleration Project" *(*P179138, USD 100 million; approved in December 2024) aims to connect 8,000 public institutions, including schools and HFs, to broadband (WBG, 2024a).

Data-hosting capacity has also strengthened. Togo's national fibre network, operated by SIN, links major cities and public institutions through the AEGT. The country is connected to two international cables — the West Africa Cable System (WACS) and Google's Equiano — providing high-capacity international bandwidth. To support secure data storage, a Tier III-certified national data centre was recently completed in Lomé, developed jointly by SIN and private partners. Tier-III certification indicates high reliability (99.98% uptime) and redundant power and cooling systems, making it suitable for hosting government cloud services, digital-health platforms, and climate-data applications (Xalam Analytics, 2025). This architecture forms the technical foundation for secure data exchange, open-data platforms, and interoperable health-information systems such as DHIS2.

Affordability and access remain persistent barriers to digital inclusion. A 1 GB data bundle represents about 8% of monthly GNI per capita, four times the UN's 2% affordability target (ITU, n.d.). Smartphone ownership and internet use are highly unequal, gender gaps remain wide for internet access and device ownership (WBG, n.d.-a). Phone sharing is prevalent: 22% of SIM cards and 7% of SIM slots shared, a practice that is more common among women, youth, and rural residents, indicating limited personal access to devices (Aiken et al., 2021).

Nevertheless, mobile money has proven to be an effective channel for delivering digital public services at scale. The WEZOU program supports safe delivery through mobile-money cash transfers and successfully targets women as the primary beneficiary group. In addition, the NOVISSI cash-transfer scheme, implemented to support Togolese citizens in the informal sector whose daily income had been disrupted by the COVID-19 crisis, registered more than 1.3 million Togolese with more than half being women (IMF, 2025). These experiences demonstrate that, despite constraints in individual device ownership, digital financial infrastructure can be rapidly mobilised for inclusive service delivery when supported by appropriate policy and implementation frameworks.

Overall, the expansion of fibre networks, improved data-hosting capacity, and growing deployment of solar-powered systems provide a strong technical foundation for digitalising Togo's health and climate-information systems. Yet infrastructure alone will not ensure sustainability. Reliable power, affordable connectivity, and digital skills remain critical to fully operationalise these systems, especially in remote HFs where CSHO are concentrated. Extending broadband and energy access to peripheral areas is therefore essential to enabling integrated digital-health surveillance and early-warning and response mechanisms. Only with these foundations can the vision of "connectivity for all" outlined in the Togo Digital Strategy 2025 translate into a more resilient, data-driven health system capable of anticipating and adapting to climate risks.

3.3.1.5 Digital divide and skills

While the expansion of digital infrastructure has progressed rapidly, the benefits of connectivity remain unevenly distributed across the population and institutions. The Togo Digital Strategy 2025 identifies digital skills as a foundational enabler for inclusive growth and service modernisation, yet significant gaps persist in access, competence, and institutional readiness (MENTD, 2022).

Internet use in Togo has grown rapidly, reaching about 37% of the population in 2024, but meaningful use remains concentrated in urban areas, where education and language proficiency are higher (Kemp, S., 2025). According to ITU data, only a small share of adults demonstrate basic or intermediate ICT skills (2023), indicating limited ability to perform tasks such as spreadsheet use or online data analysis (ITU, n.d.). These capacity gaps mirror broader educational and linguistic inequalities. For example, most official e-services and government websites are available only in French, limiting accessibility for non-francophone and low-literacy users. As a result, the digital divide is increasingly defined by skills rather than infrastructure, determining who can benefit from digital health, e-government, and climate information systems.

As of 2025, the government aims to digitalise approximately 75% of public and social services, signalling a strong institutional commitment to embedding digital literacy within administrative functions. Yet digital-competence levels remain uneven across ministries and administrative tiers. To address this, the MENTD launched the E-Gov Academy in 2022 to train civil servants in cybersecurity, data management, and digital-service design. Participation, however, remains limited and concentrated in central administrations, leaving decentralised institutions without the skills needed to operationalise e-government systems. Many regional and communal officials still lack intermediate computer literacy, hampering the rollout of digital public services (AfDB, 2021; WBG, 2019).

The Togo Digital Strategy 2025, notably its Programme 8 on Innovation and Digital Talent Ecosystem, targets the training of 600 ICT specialists and the creation of 20,000 digital jobs by 2025, supported by the WB's Digital Skills Development Project (P176769) and the GIZ Digital Transformation Centre Togo. To extend opportunities beyond Lomé, a network of mobile education and innovation pods is being piloted to deliver targeted training to public servants and health personnel in rural zones. Higher-education institutions are also expanding the talent pipeline: the UoL now offers programmes in AI/Big Data and in Geomatics/GIS, aligned with national priorities, while the State has consolidated engineering training under the Lomé Polytechnic School (*École Polytechnique de Lomé* - EPL). Government-backed hackathons and ecosystem events at Djanta Tech Hub (e.g., the 228 Code Challenge) help cultivate practical digital skills.

In the health sector, the digital-skills gap is particularly acute. The PNDS 2023–2027 identifies digital transformation as a strategic priority but highlights chronic shortages of ICT-trained staff across all levels (MSHP, 2022b). The DSNISI coordinates training on DHIS2 and digital-health reporting, yet foundational digital literacy remains low among front-line staff, and high turnover weakens continuity of skills. Promising early results are emerging at community level: the SanteComTogo platform, rolled out nationally in 2024, onboarded more than 1,000 CHWs within six months to support case management and reporting, demonstrating that digital tools can be adopted even in low-resource settings. However, sustained expansion will require reliable power and connectivity, structured and recurrent training for front-line workers, and stronger interoperability with DHIS2 to ensure consistent use of community-level data for surveillance and decision-making.

Overall, Togo's digital divide is evolving from a challenge of access to one of capabilities and institutional readiness. Bridging these gaps will require coordinated investment in digital-skills development across public administration and the health system, particularly in rural and climate-vulnerable areas where health risks are highest. Strengthening digital literacy, technical capacity, and operational readiness is essential not only for scaling e-government services but also for integrating digital health, early-warning, and climate-information systems, thereby advancing the Togo Digital 2025 vision of an inclusive and climate-resilient digital state.

3.3.2 Digital Health Systems and Services

Togo's digital transformation has enabled the emergence of a growing ecosystem of health-information solutions that together support surveillance, service delivery, population outreach, and predictive modelling. Digital infrastructure across hospitals remains highly uneven. Tertiary hospitals are relatively well equipped with stable internet, diagnostic systems, and IT staff, whereas secondary and primary facilities are increasingly connected to systems such as DHIS2 via computers and tablets, but frequently contend with outdated hardware, irregular maintenance, and frequent power interruptions. National efforts are underway to address these gaps. The MSHPCSUA is in the process of developing a Digital Health Strategy and a budgeted implementation plan, and regional initiatives such as the World Bank-funded West Africa Regional Digital Integration Program (WARDIP) aim to improve broadband access, modernise equipment, and strengthen digital health governance across all levels of care (Health Data Collaborative, 2023).

While many systems were initially introduced through partner-driven pilots, recent national strategies, particularly the SDSN, aim to consolidate these disparate tools into a coherent health-information architecture aligned with the AEGT and OpenHIE standards. The subsections below outline the current landscape and the key systems that will form the backbone of a climate-resilient, data-driven health system.

3.3.2.1 Systems of record

- DHIS2: The DHIS2 is the central platform for routine health data in Togo. It is used nationwide for aggregated reporting across all health programmes and includes integrated modules for immunisation, IDSR, tuberculosis, and HIV. Tracker-based data collection is used selectively — mainly for TB and HIV — but remains limited in primary care settings due to infrastructure and skills constraints. Recent developments demonstrate the potential for enhanced functionality. Togo implemented the DHIS2 Immunisation Package and Data Quality Tool, improving reporting completeness and timeliness within the EPI. DHIS2 is also being extended to support climate-sensitive disease surveillance, including DHIS2-based climate applications piloted in collaboration with the University of Oslo through the DHIS2 Climate App and the CHAP.

- E-LIMS: The e-LIMS is part of Togo's current sector-wide reform of its logistics information system for health products. Since 2016, the MSHPCSUA and its partners have used a "research-action" approach to strengthen the SNAP, which led to a 2019–2022 SNAP strategy and, following its evaluation in 2023, a new SNAP 2023–2026 plan. This evaluation highlighted persistent weaknesses in governance and regulation of the national pharmaceutical supply system, limited visibility on product availability at all levels, loss of traceability beyond district level, and heterogeneous distribution practices that no longer match modern supply-chain standards. In response, the new SNAP strategy identifies as a priority the development and strengthening of a national LMIS and its integration into the SNIS and DHIS2, as well as the establishment of a harmonised, digital e-LMIS.

  To respond to these findings, the Ministry and partners have defined a national roadmap for LMIS reform. With Global Fund GC7 support (Activity 558 VIH) and technical assistance from the Africa Resource Centre (ARC), the DPML is leading a sequence of steps to design and implement a harmonised, interoperable e-LMIS. The roadmap includes: i) benchmarking missions in neighbouring countries that have already implemented an e-LMIS, to inform technology and design choices; ii) development of a single national LMIS manual that standardises processes, roles, indicators and integration requirements with SNIS, DHIS2 and the Central Procurement Agency for Essential Generic Medicines and Medical Supplies[18] (*Centrale d'Achat des Médicaments Essentiels Génériques et des Consommables médicaux* - CAMEG) warehouse system; iii) definition of functional specifications, governance arrangements and a deployment plan for the future e-LMIS; and iv) phased development, piloting and national scale-up, accompanied by Training-of-Trainers (ToT), equipment for HFs and establishment of secure national hosting and maintenance arrangements. The overall implementation is planned over several years (2025–2028, with full operation from 2029), but the GC7 allocation for LMIS has already been reduced and does not cover all development, hosting and rollout costs. Additional technical and financial partners are therefore required to ensure that the national e-LMIS can be fully implemented and sustained (IAS, 2025; MSHPAUS, 2025).

- Electronic Medical Records (EMR): Additionally, some hospitals and clinics have piloted EMR with support from development partners, but adoption remains uneven and fragmented. The SDSN aims to standardise EMR development based on FHIR and national terminology services, with the long-term goal of integrating EMR data into shared national registries such as the biometric ID (NIU) and the RSPM.

- Administrative and financial management: Several hospitals, clinics and HFs have digital solutions for financial and administrative management (billing, accounting, pharmacy and laboratory). There are no standards for these solutions, nor is there any possibility of exchanging and centralising information from these solutions.

[18] CAMEG is Togo's central procurement and distribution body for essential medicines. It coordinates with the MSHPCSUA's departments, including DISEM and DHAB, to ensure adequate equipment and hygienic conditions in HFs.

3.3.2.2 *Systems of intelligence*

- CHAP: A national prototype modelling platform developed as part of the DHIS2 Climate App pilots. It integrates climate variables such as temperature, rainfall, and vegetation indices with routine health data to generate predictive models for malaria and other CSHO. CHAP uses machine learning to forecast incidence and support targeted intervention planning.

- GIS and geospatial systems: Geospatial intelligence is increasingly used across sectors. The GeoPortail platform, managed by ATD, hosts more than 800 sectoral layers including health-facility locations, transportation networks, environmental data, and demographic information. These datasets support microplanning, catchment-area analyses, and risk mapping — critical for malaria, diarrhoeal diseases, extreme heat exposure, and climate-related hazards.

- TDL: It strengthens analytics capacity across government. Its work includes spatial modelling of health-facility distribution, dynamic poverty targeting, and integration of novel data sources such as mobile-phone data and satellite imagery. While not a health-sector institution, its capabilities significantly enhance national capacity for predictive modelling and data-driven policymaking.

- NOVISSI and AI-based targeting: The NOVISSI programme, launched during COVID-19, demonstrated Togo's ability to deploy AI and machine-learning techniques at scale for targeting vulnerable populations. While not a health system, it constitutes a national proof of concept for data fusion, automated eligibility determination, and digital payments — all relevant for climate-responsive social protection and health-service targeting.

3.3.2.3 *Systems of communication*

- SanteComTogo: Launched nationally in 2024, SanteComTogo is the digital platform for CHWs. It supports case management, appointment follow-ups, referral guidance, reporting, and community-based surveillance. Over 1,000 CHWs in six districts have adopted the tool within the first six months. Future interoperability with DHIS2 will allow this community-level data to feed into national surveillance and EWS. Earlier partner-supported tools, such as Medic Mobile deployments, demonstrated the feasibility of CHW digitalisation and laid the groundwork for SanteComTogo. The SDSN envisions a unified CHW platform built on OpenHIE Shared Health Record principles (see *Section 3.3.2.4*).

- PassCovidTG: An operational platform for digital certificates technically aligned with EU and AU standards for cross-border verification. It represents an early building block for participation in the WHO Global Digital Health Certification Network (GDHCN). The system could be extended to other vaccinations or medical certificates under the SDSN.

- Digital communication channels: Togo uses mobile-network-based messaging, social media, and targeted SMS systems during health campaigns, including vaccination and outbreak alerts. These channels are expected to be expanded for climate-related health risk communication.

3.3.2.4 *Data integration and interoperability*

A core objective of the SDSN is to establish a unified digital-health architecture based on OpenHIE principles and aligned with the AEGT. OpenHIE is an international reference framework that helps countries build interoperable, standards-based health-information systems. Instead of relying on a single, centralised software solution, OpenHIE promotes a modular architecture in which different applications and databases communicate through common standards. Its core principles include:

- Modularity: Systems are organised into functional components (e.g., client registry, facility registry, shared health record) that can be scaled or replaced independently;
- Use of foundational registries: Key reference databases, such as patient identity, provider, and facility registries—serve as the backbone for all data exchange;
- Standards-based interoperability: Data exchange follows open standards such as HL7 FHIR, IHE profiles, and open APIs;
- Separation of data and applications: Data storage, processing, and end-user applications remain distinct, preventing vendor lock-in and ensuring flexibility;

- Country ownership: The architecture is designed to be managed by national institutions using open standards and, where possible, open-source components; and
- Security and privacy: Strong authentication, authorisation, and audit mechanisms govern data exchange.

These principles underpin the SDSN's vision for a coherent national digital-health ecosystem in which systems of record, intelligence, and communication interoperate seamlessly. In practice, this includes:

- Adoption of the NIU (ANID) as the unique patient identifier;
- An interoperability layer based on FHIR standards;
- a Shared Health Record (SHR) to integrate longitudinal patient data;
- Harmonised terminology services;
- Integration with social-protection databases such as the RSPM; and
- Linking health data with geospatial and climate information systems, including CHAP, GeoPortail, and the national meteorological services.

Cross-sector interoperability remains limited, especially between health, meteorological, and environmental data systems. Establishing formal data-sharing mechanisms and operationalising the One Health architecture will be essential for strengthening climate-related early-warning systems. The proposed GCF investment directly targets these interoperability gaps to enable a resilient, data-driven health ecosystem.

3.3.3 Digitalisation for Climate-Resilient Health Systems

Digitalisation is becoming a core pillar of climate-resilient health systems. The ability to link epidemiological data with climate information, predict outbreaks, support frontline workers, and optimise resource allocation fundamentally strengthens adaptive capacity. In Togo, digitalisation is progressively being integrated into climate-related surveillance and public-health response, yet major gaps remain in data integration, infrastructure readiness, and facility-level digital capabilities.

3.3.3.1 Digitalisation and climate

Digital transformation contributes to climate resilience in several ways. Digital tools improve the monitoring of CSHO, enable predictive analytics, and support more targeted and efficient interventions. Digital supply chains reduce waste and ensure timely delivery of commodities where climate shocks disrupt transport routes. Mobile platforms expand access to information and services for communities facing climate extremes.

At the same time, digitalisation introduces new environmental considerations. ICT infrastructure requires stable electricity, generates electronic waste, and increases energy demand. As power reliability remains uneven in Togo climate-resilient digitalisation depends on energy-efficient systems, solar-powered HFs, and responsible e-waste management. Therefore, digital health investments should be combined with green ICT principles, including renewable energy supply, efficient data-centre infrastructure, and sustainable procurement of devices.

3.3.3.2 Digitalisation and health

WHO provides several complementary frameworks that guide countries in developing interoperable, scalable, and climate-responsive digital health systems.

- WHO Digital Health "Full Stack" sets out the building blocks of an integrated digital ecosystem, including identity, interoperability, shared health records, facility registries, and decision-support services. Principles already embedded in the SDSN.
- SMART Guidelines translate clinical and public-health guidelines into computable decision-support tools, enabling frontline workers (including CHWs) to follow CSHO management protocols even in low-resource settings.
- Global Digital Health Certification Network (GDHCN) supports secure, verifiable health certificates such as vaccination or screening records. Togo is among the few African countries already technically aligned through PassCovidTG, positioning it well for future cross-border epidemic management.

- GovStack promotes digital “building blocks” (digital ID, messaging, registries, workflows) that can be reused across sectors. For climate resilience, these enable integration between health, civil registration, meteorological, and environmental systems.

Together, these frameworks offer a blueprint for a climate-ready digital health architecture that supports real-time data exchange, automated decision-making, and secure, citizen-centred service delivery.

3.3.3.3 Application for climate-sensitive health outcomes

Digital tools can significantly strengthen Togo’s capacity to detect, prepare for, and respond to CSHO, including malaria, diarrhoeal diseases, and heat-related illnesses.

- Malaria: Modelling platforms such as CHAP and the DHIS2 Climate App combine climate variables with surveillance data to predict malaria outbreaks, allowing targeted deployment of ITNs, IRS, diagnostics, and treatment. GIS tools support microplanning of distribution campaigns, while DHIS2 and forthcoming e-LMIS modules improve stock visibility for RDTs and ACTs. CHW tools like SanteComTogo enhance case detection and referral in remote areas where climate stressors intensify transmission.

- Diarrhoeal diseases: Digital interventions support water-quality monitoring, mapping of sanitation risks, heat and flood alerts, and early detection of outbreaks through community reporting. Real-time stock monitoring of ORS and zinc through e-LMIS will reduce stock-outs following climate shocks, while digital health-promotion channels can reach vulnerable communities with behaviour-change messages.

- Heat-related health risks: Integration of meteorological forecasts with health-facility readiness data allows authorities to issue heat alerts, activate community outreach, and identify high-risk populations through the RSPM. Decision-support tools based on SMART Guidelines can support frontline workers in managing heat exhaustion and dehydration.

Across all three health outcomes, the convergence of surveillance, geospatial intelligence, modelling, and community-level digital tools enables a much more adaptive and responsive health system.

3.3.3.4 Towards an integrated digital health architecture for climate-resilient health facilities

Climate resilience at the facility level requires more than isolated digital tools. It demands an integrated digital-health architecture that links climate information, surveillance systems, community reporting, and clinical services.

The SDSN provides the foundations for such a system, aligning health-sector digitalisation with national AEGT and OpenHIE principles. A climate-resilient architecture would include:

- Digitally enabled HFs with stable power (preferably solar), connectivity, EMRs, and e-LMIS;
- A national interoperability layer connecting DHIS2, SanteComTogo, laboratory systems, and modelling platforms;
- Integration of climate and environmental data into health information systems for risk forecasting and early warning;
- Facility registries and service-readiness data to identify climate vulnerabilities and guide resource allocation;
- Automated decision-support systems for frontline workers using WHO SMART guidelines; and
- Secure patient identification through NIU, enabling tracking of vulnerable populations during climate shocks.

The GCF-financed intervention will accelerate this transition by strengthening data integration, investing in digital readiness of HFs, supporting modelling for CSHO, and improving digital early-warning and response capabilities. This integrated approach will allow Togo to move from reactive disease control to proactive, climate-informed health system management.

3.4 Early Warning System in Togo

The following section, detailing the EWS architecture for addressing CSHO in Togo, is conceptualised to align with the global framework championed by the United Nations Office for Disaster Risk Reduction (UNDRR), notably the Early Warning for All (EW4All) initiative (UNDRR, 2023). The EW4All framework is built on the principle of a people-centred EWS that is multi-hazard, reliable, and accessible to all. The information presented is therefore structured around its four main pillars: i) Disaster Risk Knowledge and Management (Pillar 1), ii) Detection, Observation, Monitoring, Analysis, and Forecasting (Pillar 2), iii) Warning Dissemination and Communication (Pillar 3), and iv) Preparedness and Response Capabilities (Pillar 4).

3.4.1 Cross-Cutting Capability

Cross-cutting capabilities represent the enabling conditions that support the functioning of all four EW4All pillars. They create the institutional, regulatory, organisational, and communicational environment necessary for an integrated, people-centred EWS. In Togo, these foundational elements are partially established but require significant strengthening to ensure the development of a robust MHEWS for CSHO.

Togo's EWS operates within a national DRM architecture composed of strategic coordination bodies, technical forecasting agencies, emergency response institutions, and local dissemination actors. Although formal structures exist, the system remains fragmented, largely manual, and unevenly operational across hazards and regions. The following sub-sections reflect a system with strong institutional foundations but limited integration, standardisation, and reliability, particularly for climate-sensitive threats such as extreme weather conditions and CSHOs.

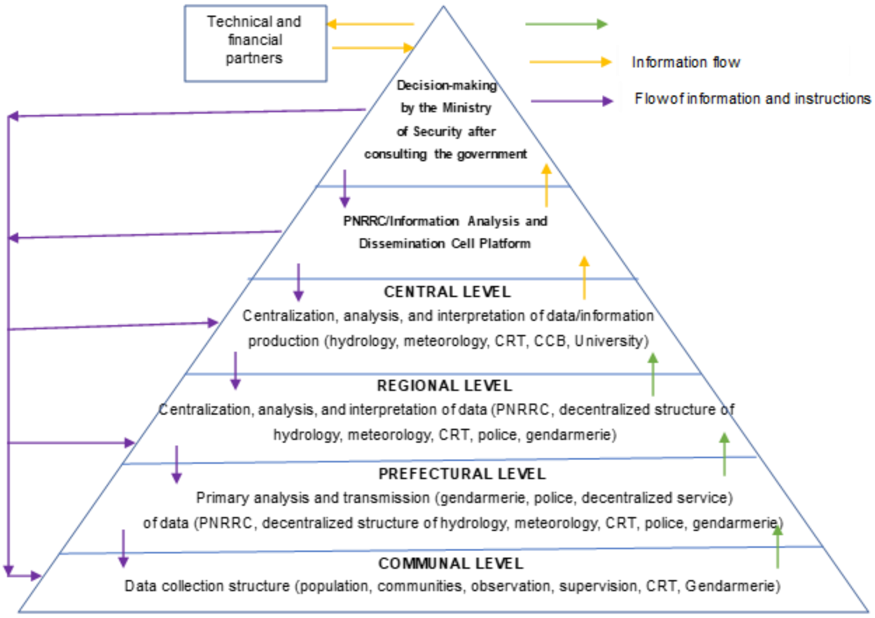
3.4.1.1 Institutional, policy and legislation framework for the development and implementation of EWS

The overarching strategic coordination mechanism for DRR and EWS is the PNRRC, established in 2007 following severe national flooding. The PNRRC brings together ministries, technical institutions, civil society, the Togolese Red Cross (TRC), academia, and private-sector actors. Its mandate is to harmonise policies and promote cross-sectoral collaboration, and align DRM strategies with national development and climate adaptation frameworks, including the PNACC, the PND, and relevant sectoral plans (see *Section* ***Error! Reference source not found.***). The PNRRC provides a national forum for dialogue, coordination and validation of disaster risk information (Badjedke, M et al., 2022).

Despite this strategic mandate, the PNRRC's operational effectiveness remains limited. It does not function as a permanent joint decision-making body for early warnings; multi-agency alert assessments and seasonal preparedness exercises are irregular. Coordination mechanisms are not systematically activated during periods of elevated risk, and formalised SOPs defining data exchange, alert validation, preparedness activation, or confirmation of warning reception are lacking. Health authorities are typically engaged only after emergencies have begun. Consequently, the national EWS remains largely reactive rather than anticipatory.

Strengthening the PNRRC's convening and regulatory role requires formalising inter-agency SOPs, establishing standing joint alert-assessment mechanisms, conducting regular multi-agency simulations, and enhancing operational linkages between ANPC, technical agencies, the health sector, and community-based EWS actors. These steps are critical for transitioning Togo toward a fully integrated, anticipatory, impact-based MHEWS for both hydrometeorological and climate-sensitive health risks.

Figure 50: EWS operating plan flowchart



(Badjedke, M et al., 2022)

3.4.1.1.1 EWS frameworks

In the flood context of Togo, two early warning mechanisms are operational: the Flood Early Warning System (EWS Floods) and the Togolese Red Cross Community Early Warning System (EWS-TRC).

The Togolese government established the EWS Floods in 2015 under the Integrated Disaster and Land Management Project (*Projet Gestion Intégrée des Catastrophes et des Terres, PGICT*) with support from the WB (2017). Anchored institutionally within the PNRRC and is conceptually aligned with the four internationally recognised pillars of an effective EWS: risk knowledge, monitoring and warning service, dissemination and communication, and response capacity.

The EWS Floods operates as a five-stage sequential chain comprising data collection and production, data transmission, data processing and interpretation, dissemination and communication, and alert activation. Two regulatory entities structure operations:

- The Technical Unit - housed within the PNRRC Technical Secretariat, is analyses hydrometeorological information from technical agencies, applies alert thresholds, validates the scientific quality of data, and defines the warning levels.
- The National Coordination - led by the national focal point for the International Strategy for Disaster Reduction, it channels validated information through the EWS server, supervises partner focal points, coordinates the Technical Unit, and prepares periodic reports to the national platform.

At community level, the EWS-TRC complements national mechanisms. Established in 2009 under the Disaster Risk Reduction and Climate Change Adaptation project with the German Red Cross support, it uses locally installed beacons and river-level monitoring by a volunteer network of approximately 64,000 people. The system operates under a standardised operating framework (SOP-SAP++) and plays a critical role in last-mile detection and dissemination, especially in remote flood-prone communities. Despite its operational effectiveness, integration with the national Flood EWS remains partial (Commission Économique des Nations Unies pour l'Afrique, 2015).

System limitations include ad-hoc impact assessments, geographically limited flood-risk mapping, partial integration of meteorological and hydrological forecasts, reactive alert issuance, and irregular joint alert validation. Overall, the Flood EWS demonstrates strong institutional foundations but requires procedural consolidation, full integration with community systems, expanded real-time telemetry, and the transition toward impact-based, anticipatory warning within the national MHEWS.

3.4.1.2 Coordination between relevant agencies and stakeholders

Within this governance architecture, the ANPC serves as the operational authority for disaster preparedness, early warning and emergency response, linking strategic coordination with operational implementation through the PNRRC Technical Secretariat. It manages the Civil Security Response Organisation (*Organisation des Réponses pour la Sécurité Civile* - ORSEC) and the PNCM, which define national procedures for organising rescue operations and safeguarding people and property during major emergencies. ORSEC is implemented operationally by ANPC's Division of Planning, Operations, and Emergencies (*Division de la Planification, des Opérations et des Urgences* – DivPOU), under the authority of the Ministry of Security and Civil Protection (*Ministère de la Sécurité et de la Protection Civile* - MSPC). It is organised around nine operational clusters - Health, WASH, Security, Logistics, and the EWS, among others - each led by a designated ministry. Within this framework, the MSHPCSUA is responsible for patient triage, clinical care, sanitary transport, and epidemic control during emergencies.

The technical structure of the EWS is provided by ANAMET mandated to produce the core meteorological and climatological information (*see Section 3.4.3.1.3*), while the Directorate of Water Resources (*Direction des Ressources en Eau* - DRE) is responsible for hydrological monitoring and river-level forecasts. Complementary technical inputs are supplied by other institutions, including ANGE, for environmental risks, the Benin Electric Community (CEB) for flood alerts downstream of the Nangbeto damn, the Directorate for Agricultural Statistics, Information and Documentation (*Direction des Statistiques Agricoles, de l'Information et de la Documentation* – DSID) for food security monitoring and agricultural impact assessments, and transboundary basin authorities for cross-border hydrological surveillance (Badjedke, M et al., 2022; MSHPAUS, 2025). Within the health sector, the COUSP serves as the national coordination body for health emergencies, linking epidemiological surveillance to disaster response (see *Section 3.2.9.1*) (MSHPAUS, 2023).

At the national level, the EWS Technical Cell (*Cellule Technique du Système d'Alerte Précoce*), coordinated by ANPC, constitutes the central multi-sectoral operational mechanism of the EWS. It goes beyond the simple integration of risk information by ensuring the coordination, analysis, validation, and dissemination of early warning information at the national scale. The Cell brings together the principal technical institutions involved in risk monitoring, including ANAMET, DRE, DSID, CEB, ANGE, INSEED, the TRC and the UoL. Through its quarterly coordination meetings, it centralises forecasts and sectoral data, jointly analyses emerging risks using expert judgement, validates alerts messages, and produces quarterly bulletins on information, prevention and early warning that are disseminated to decision-makers, technical services, partners and the public. The EWS Technical Cell also contributes to the evaluation and continuous improvement of the EWS, by identifying gaps and performance constraints in the alert chain.

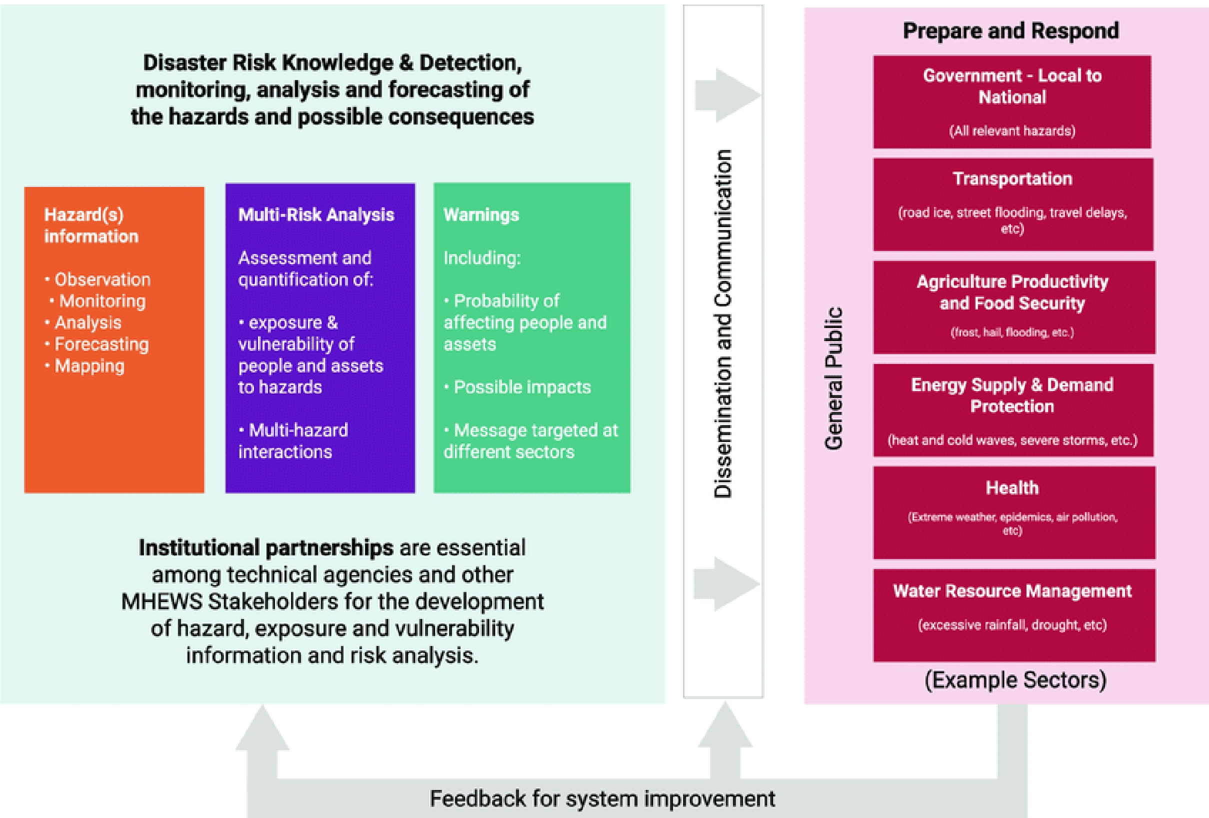
The *Centre national des opérations d'urgence* (CNOU) is a national emergency operations centre under the authority of Togo's ANPC, designed to strengthen the country's preparedness, coordination, and response to major emergencies and disasters. Currently under construction in Lomé, the CNOU is intended to serve as the central command and coordination hub for managing crises such as floods, epidemics, industrial accidents, fires, and other natural or man-made hazards. Construction work is in its final stages and it's operationality is foreseen for 2026.

The CNOU will bring together, in a single secure facility, all key actors involved in emergency management, including civil protection services, sectoral ministries, security forces, technical agencies, and humanitarian partners. Its core function is to enable real-time collection, analysis, and sharing of information, allowing national authorities to make rapid, evidence-based decisions and to coordinate response actions efficiently across sectors and territories. The centre will also support early warning, situation monitoring, and operational planning, ensuring coherence between national and local response mechanisms.

Beyond crisis response, the CNOU is conceived as a capacity-building and preparedness platform, hosting simulations, training, and coordination exercises. Developed with international cooperation support from the United States the CNOU represents a key step in strengthening Togo's disaster risk management system and overall national resilience.

Stakeholders thus contribute to the national MHEWS according to the four internationally recognised components: i) risk knowledge, ii) observation, monitoring, and forecasting, iii) alert dissemination and communication, and iv) preparedness and response. However, the absence of formal coordination protocols, centralised data systems and standing joint-assessment mechanisms continues to constrain the effectiveness, timeliness and accountability of the EWS.

Figure 51: MHEWS flowchart



(Smith, A., 2019)

Despite this, functional integration remains limited as SOPs for joint alert validation and preparedness activation are incomplete, data systems are fragmented, and health surveillance platforms are not interoperable with meteorological and hydrological information. Early warning functions are institutionally split between the national EWS Floods and the EWS-TRC, lacking a unified framework.

3.4.1.3 Targeted communication, outreach and advocacy to promote the benefits of EWS at the national and local levels

The assessment of targeted communication, outreach, and advocacy for EWS in Togo indicates a system that is fragmented, largely top-down, and dependent on ad-hoc channels. Currently, the ANPC serves as the official conduit for alerts, disseminating information through a mix of radio and television broadcasts, local administrative offices, and the volunteer network of the EWS-TRC. Alert management is further supported by mailing lists, social networks such as Facebook and WhatsApp, community radios, and professional networks of journalists, alongside direct communication through police, fire brigades, and local mayors. The ANAMET complements these channels by broadcasting alerts via national and local television stations and social media platforms, while also engaging directly with vulnerable populations through face-to-face meetings to ensure comprehension.

Despite these channels, several critical gaps limit the effectiveness of EWS communication. The absence of standardised alert formats reduces clarity, undermines public trust, and diminishes the effectiveness of responses. In the health sector, digital reporting tools such as *Argus* — a system piloted in two regions and strengthened during the COVID-19 pandemic—remain primarily inward-facing, collecting data from HFs rather than delivering actionable warnings to the public (Guerra et al., 2020). Consequently, communities rarely receive timely warnings about climate-sensitive health risks such as malaria or heatwaves. Communication is also hindered by language and cultural barriers; government bulletins are irregular, predominantly in French, and often inaccessible to non-French speakers. In northern regions, local languages frequently lack established terminology for climate-health phenomena, forcing reliance on French terms that can reduce message relevance and credibility. Community advocacy is limited, with many localities lacking structured awareness-raising campaigns, pre-defined communication scripts, or the involvement of trusted multipliers such as teachers, religious leaders, and health workers. Furthermore, there are no formal feedback mechanisms to verify whether warnings are received and understood, constraining the effectiveness of alerts.

Infrastructure and access limitations exacerbate these challenges. Unequal access to mobile phones and radios, combined with weak network coverage in rural areas, restricts the reach of alerts. Although risk maps and sectoral impact data exist, they are not integrated into digital dashboards accessible to decision-makers or communities, limiting their utility for preparedness and planning. Overall, while tools and channels are in place, the current approach to EWS communication in Togo is fragmented, largely inaccessible, and insufficiently actionable, leaving vulnerable populations underprepared for climate-related health risks.

To address these gaps, the implementation of a MHEWS should prioritise the development of standardised, multi-channel alert templates to ensure consistent messaging, alongside two-way feedback mechanisms to verify receipt and understanding. Risk messages should be locally tailored and include health advisories to enhance relevance and actionability. Integrating the National Mapping Directorate (*Direction de la Cartographie Nationale* – DCN) maps and sectoral impact data into user-friendly digital interfaces for decision-makers and communities will improve preparedness and uptake. Finally, a sustained advocacy programme targeting ministries, media, and communities will be essential to demonstrate the benefits of EWS, build trust, and encourage proactive engagement and preparedness.

3.4.2 Disaster Risk Knowledge

3.4.2.1 Key hazards and related threats

Disaster risk knowledge for the national EWS in Togo is structured around the intersection of recurrent hydrometeorological extremes and their cascading impacts on infrastructure, livelihoods, and public health. The principal hazards identified include rural, urban and coastal flooding; coastal erosion, temperature peaks (heatwaves); and extreme precipitation. These hazards generate direct physical damage and indirect health, food security, and socio-economic impacts, with short lead times ranging from hours to days or occurring on a seasonal to continuous basis.

Flooding constitutes one of the most significant threats nationwide. Rural and urban flooding currently threaten the inundation of residences, villages, towns, agricultural fields, and critical infrastructure, while coastal flooding poses a high risk of permanent land loss and damage to buildings and infrastructure in coastal zones (see *Section* ***Error! Reference source not found.***). Riverine flooding is classified as a high-risk hazard, with a strong likelihood of life-threatening events in the coming decade, driven by the projected 43% increase in the frequency of heavy rainfall events (WBG, 2021a). These floods act as primary drivers for waterborne diseases by contaminating water sources with faecal matter and overwhelming sanitation systems, directly linking this hazard to diarrhoeal diseases (see *Section* ***Error! Reference source not found.***).

Coastal erosion represents a high-vulnerability, seasonal hazard that primarily threatens market gardening crops and fish-selling activities, with direct implications for food security and household incomes. This process is intensified by sea-level rise and is particularly acute in the Maritime region. In addition to these losses, coastal erosion has already affected health infrastructure, with approximately 0.15% of HFs damaged, threatening the continuity and accessibility of care in coastal areas (GIZ, 2021c) (see *Section* ***Error! Reference source not found.***).

Temperature peaks (heatwaves) are classified as high-vulnerability hazards with continuous or event-based occurrence, threatening crops, infrastructure, and population health. Historical climate records show an increase of 1.1°C in national average temperatures since 1960 and a 15.5% rise in the number of hot days (WBG, 2021a) (Section ***Error! Reference source not found.***). These conditions pose direct physiological risks, particularly to pregnant women and newborns through increased risks of preterm birth and stillbirth, and indirect risks by expanding the geographical range and seasonal transmission window of malaria vectors (Douaguibe et al., 20230 (see *Section* ***Error! Reference source not found.***).

Extreme precipitation is identified as a high-vulnerability hazard affecting crops and livestock and destabilising rural livelihoods. Although overall annual rainfall trends remain variable, the intensity of rainfall events is increasing (*Section* ***Error! Reference source not found.***). High-intensity rainfall damages sanitation infrastructure, including the collapse of latrines, and creates stagnant water conditions that favour *Anopheles* mosquito breeding, thereby increasing malaria transmission risk (Thomas et al., 2021) (see *Section* ***Error! Reference source not found.***).

Collectively, these hazards operate through tightly coupled physical, environmental, and health impact pathways, driving compound risks that affect food security, infrastructure integrity, and disease transmission patterns across multiple regions of Togo.

3.4.2.1.1 Exposure, vulnerabilities, capacities and risks

The following table presents a summary of the main hydrometeorological hazards in Togo, including their temporal window – that is, the typical time scale over which each hazard develops and during which detection, alert dissemination, and response actions must occur – together with the associated risks, levels of population vulnerability, and the state institutions responsible for monitoring, alerts, and interventions.

Table 25: Summary of risk, vulnerability alerts and responses by hazards

Hazard	Temporal window	Responsible institution	Risk	Population vulnerability	Alert / Intervention
Rural Flooding	Hour/day	DRE	Flooding of fields and villages	Low	ANPC Fire Brigade (*Corps des Sapeurs-Pompiers* – CSP) TRC
Rural Flooding	Hour/day	DRE ANAMET	Flooding of residences and infrastructure	Moderate	DRE ANPC
Urban Flooding	Hour	Maritime Prefecture Maritime ANAMET ANGE	Flooding of towns, villages, fields, and infrastructure	Moderate	ANPC Maritime Prefecture
Coastal Flooding	Event/Continuous	Maritime Prefecture ANGE	Loss of land, buildings, and infrastructure	High	ANPC
Coastal Erosion	Season	ANAMET	Damage to crops and livestock	High	ANPC
Temperature Peak	Event/Continuous	ANAMET	Damage to crops and infrastructure	High	ANPC
Drought	Season	ANAMET DRE DSID	Damage to crops and food security	High	Ministry of Agriculture ANPC
Extreme Precipitation	Hour/Day	DRE ANAMET	Damage to crops and livestock	High	ANPC Ministry of Agriculture

(Badjedke, M et al., 2022)

3.4.2.2 Roles and responsibilities of stakeholders

Disaster risk knowledge in Togo is generated and maintained across multiple institutions, each with defined mandates, yet the current system is characterised by fragmented information management, ad hoc assessments, and the absence of a unified national repository The ANPC remains the primary institution with a legal mandate for coordinating disaster risk knowledge and conducting impact assessments identification, primarily for flooding events, and collects data on flood-prone areas and observed damages. However, these assessments are largely programmatic rather than continuous, and the ANPC does not yet operate a structured or centralised national database for consolidating risk and impact information (Badjedke, M et al., 2022).

The TRC holds accredited operational responsibilities in disaster risk knowledge and functions as a key partner for community-level data collection. It collaborates with the ANPC to capture local-level hazard impacts and supports community risk profiling and preparedness planning. The DCN manages official cartographic data and documentation on national risk mapping, notably for flood risk maps.

Hazard-specific technical agencies provide specialised knowledge on particular threats. The ANAMET is responsible for risk knowledge related to coastal erosion, temperature peaks (heatwaves), and extreme precipitation, providing monitoring, forecasting, and early warning information. The DRE manages risk knowledge concerning rural flooding through hydrological monitoring and river basin analysis. For urban and coastal flooding, the Maritime Prefecture, in collaboration with the ANGE, is responsible for monitoring, analysing, and reporting associated risks, ensuring coordination with the ANPC for preparedness and alert dissemination

The health sector, though underrepresented in the original summary of risk knowledge, is a critical contributor. The MSHPCSUA, through operational units such as the COUSP and the DSNISI, collects epidemiological data and conducts annual disaster risk assessments. This includes information on disease incidence, outbreak patterns, and CSHO, such as malaria, diarrhoea, and heat-related illnesses (see *Sections* ***Error! Reference source not found.***; ***Error! Reference source not found.***). These health data systems, however, remain largely siloed and are not systematically integrated with hydrometeorological risk data, limiting the ability to generate combined climate-health risk analyses. Academic and research institutions, including the UoL and regional initiatives like WASCAL, contribute to risk knowledge through hazard modelling, vulnerability assessments, and scientific studies, although these contributions are currently project-specific and not fully integrated into national EWS processes.

Despite these mandates and roles, significant gaps persist within the disaster risk knowledge pillar. Risk and impact data remain fragmented across ANPC, sectoral ministries, technical agencies, and health institutions, with no centralised or interoperable system (see *Sections* ***Error! Reference source not found.***; *3.4.2.3*). There are no standardised tools for consolidating multi-hazard early warning data, and many disaster impact assessments remain project-based rather than institutionalised as routine national functions (see *Table 29*). Integration of climate-health data with hydrometeorological monitoring is limited, constraining the development of predictive models for climate-sensitive health risks. Addressing these gaps will require the establishment of a centralised, interoperable risk knowledge platform, standardised data collection protocols, and the integration of health surveillance with meteorological and hydrological data to support multi-hazard, impact-based early warning and preparedness planning.

3.4.2.3 Risk information consolidation

Risk information consolidation within the Disaster Risk Knowledge pillar in Togo remains limited and largely fragmented. Although several institutions collect data on hazards, exposure, vulnerabilities, and disaster impacts, these datasets are not systematically integrated into a single national repository to support comprehensive multi-risk analysis. Information on past events, damages, and affected areas is dispersed across multiple institutions and sectors, with no centralised mechanism for compiling, validating, and updating national risk profiles.

The ANPC compiles disaster impact information, particularly for flood events, drawing on post-disaster assessments and reports from decentralised services. However, this information remains archived in disparate formats and is not managed through a structured, queryable national database. As a result, historical loss and damage data are not consistently consolidated, analysed, or used to inform national risk modelling and planning.

Risk mapping and spatial risk information are managed by the DCN, which holds official flood risk maps for selected regions, notably Savanes and Maritime regions. These maps are available upon request but are not yet integrated into an operational digital geospatial platform to support systematic national-scale risk analysis or regular updating. Additionally, no routine national process exists for developing and consolidating multi-hazard risk maps that cover the entire territory, including comprehensive vulnerability mapping for heat stress or vector-borne diseases at the community level. (Badjedke, M et al., 2022).

Sectoral institutions and technical agencies also retain hazard- and impact-related datasets relevant to disaster risk knowledge, including information on water resources, coastal processes, urban flooding, agriculture, and health. However, these datasets remain sector-specific and are not consolidated through interoperable standards or shared databases.

Consequently, vulnerability information, exposure data, and sectoral impact records are not systematically cross-analysed to produce integrated national risk profiles.

Overall, disaster risk knowledge consolidation in Togo is constrained by institutional silos, the absence of standardised data management protocols, limited digitalisation of historical records, and the lack of a centralised risk information system. These structural gaps significantly limit the capacity to generate comprehensive, evidence-based national risk assessments to underpin MHEWS and DRR planning.

3.4.2.4 Risk information incorporation into the early warning system

The incorporation of disaster risk knowledge into the EWS is currently achieved through institutional coordination mechanisms and selected basin-level forecasting tools rather than through an automated, centralised national platform. The process is largely based on the exchange of information between technical agencies and the empirical interpretation of forecasts and observations by national experts, with a strong reliance on manual procedures.

At the national level, the main institutional mechanism for incorporating risk knowledge into the EWS is the quarterly coordination meeting of the EWS Technical cell, under the leadership of ANPC. The outputs of this process are consolidated into periodic information and early warning bulletins for decision-makers and operational services (see *Section 3.4.4.2*). For rapid-onset hazards, short-term alerts are issued by ANPC on the basis of technical inputs received directly from ANAMET for meteorological threats and from DRE for hydrological conditions.

Despite these mechanisms, the incorporation of disaster risk knowledge into the EWS remains constrained by structural limitations. Information flows between institutions are weakly automated, impact data are not systematically fed back into the warning cycle, and health surveillance outputs are not yet operationally linked with climate and hydrological risk information. As a result, early warning remains predominantly hazard-driven rather than impact-based, and the generation of multi-risk or climate-informed health alerts is still limited.

3.4.2.5 Access to risk information nationally and at the local level

Access to disaster risk information in Togo remains uneven across institutional levels and geographic areas, with significant disparities between national technical services and local communities. While key institutions generate and store hazard, impact and vulnerability data, access to this information is constrained by institutional silos, manual data management, cost-recovery policies and limited digital infrastructure.

At national level, access to disaster risk information is primarily restricted to the producing institutions themselves and a limited circle of authorised users. Technical agencies such as ANAMET, DRE and ANPC retain their own datasets within internal systems that are not interconnected and are only partially digitised. As a result, cross-sectoral access to comprehensive multi-hazard risk information remains limited. Requests for data typically require formal administrative procedures, which introduces delays and reduces the operational usability of the information for early warning and planning purposes.

Financial barriers further restrict access, particularly to hydrometeorological data. Cost-recovery policies applied by ANAMET mean that access to raw or high-resolution meteorological data is subject to user fees, which vary according to institutional status and purpose of use. This has contributed to low reported user satisfaction with data provision and has constrained effective data sharing with other public institutions, research bodies and humanitarian actors. In the absence of open-access data portals or application programming interfaces, information exchange remains largely manual and transactional rather than systematic.

Access to geospatial risk information is also limited. Flood risk maps produced by DCN for selected regions exist largely as static documents and are not embedded within an operational national geographic information system that would allow dynamic querying or overlay with exposure and vulnerability data. Consequently, planners and emergency managers outside DCN and ANPC have restricted access to spatial risk layers for decision support.

Within the health sector, access to epidemiological surveillance data is comparatively well structured internally through the DHIS2 platform (see *Section 3.3.2.1*). However, this system is not interoperable with climate, hydrological or disaster loss databases. As a result, climate-sensitive health risk information is not routinely accessible to civil protection or meteorological institutions, and conversely, health authorities do not have automated access to hazard forecasts that could inform anticipatory public health actions.

At the local level, access to disaster risk information is largely mediated through intermediaries rather than through direct access to national data systems. Communities depend heavily on local authorities, non-governmental organisations, Red Cross volunteers, CHWs and traditional leaders to receive, interpret and relay warning and risk information. Direct access to technical forecasts, risk maps or institutional databases is extremely limited due to the digital divide, low internet penetration and limited availability of smartphones in rural areas (see *Sections 3.3.1.5* and *3.3.2.3*).

Barriers to effective access are not only technical but also sociolinguistic. Risk information is predominantly produced in French, which limits comprehension in many rural communities where local languages dominate. There is currently no standardised system for translating hazard and climate-health terminology into locally understood concepts. In addition, low literacy levels restrict the effectiveness of written bulletins and text-based mobile alerts, reinforcing reliance on oral communication channels.

Local access to disaster risk information is therefore predominantly reactive rather than anticipatory. Communities typically receive information at the time of imminent hazard or during emergency response, rather than having routine access to forward-looking risk information that could inform land-use planning, housing decisions or livelihood strategies.

3.4.2.6 Technologies employed for the collection, production, analysis, dissemination and use of risk information

The technologies currently employed for disaster risk knowledge in Togo reflect a hybrid system in which digital tools coexist with manual and legacy processes. For impact and vulnerability data collection, mobile-based applications such as KoboCollect are used by the ANPC and humanitarian partners to conduct rapid field assessments following hazard events (Badjedke, M et al., 2022). These tools allow geo-referenced collection of damage and loss information; however, the resulting datasets are stored in dispersed digital and paper-based formats without integration into a central national risk database. At community level, local actors, including Red Cross volunteers, rely on simplified digital reporting tools and basic mobile communication to transmit impact observations to national institutions.

The practical use of disaster risk information for planning and preparedness remains constrained by the absence of integrated digital decision-support tools. Risk information is mainly applied through expert judgment during coordination meetings and contingency planning exercises rather than through real-time, system-driven risk analysis. The lack of application programming interfaces, automated data pipelines and shared analytical platforms limits the operationalisation of risk knowledge across sectors.

3.4.2.7 Environmental dimensions incorporation

The environmental dimension is incorporated into disaster risk knowledge in Togo primarily through institutional coordination, ecosystem monitoring, and the integration of environmental determinants into sectoral risk analyses. The ANGE is the mandated technical service, operating under the MERFPCCC, that manages the national environmental information system and contributes environmental data to the national early warning coordination mechanisms. Through its participation in inter-institutional technical platforms, environmental information is used to support the assessment of hazard impacts and underlying vulnerability factors linked to ecosystem degradation (Badjedke, M et al., 2022).

Environmental degradation is explicitly recognised within national risk knowledge as a key driver that exacerbates the intensity and impacts of hydrometeorological hazards. The degradation of soils and vegetation cover is understood to increase surface runoff and flood intensity, while disturbances in ecological equilibrium heighten exposure to extreme events. Along the coast and in lagoon systems, risk knowledge integrates changes in coastal morphology, biodiversity loss, habitat destruction and the deterioration of physico-chemical water quality as factors that amplify coastal flooding, erosion and associated livelihood and health risks (Badjedke, M et al., 2022; MERF, 2021). Within national climate policy, the agriculture, forestry and land-use sector are identified as the most exposed to climate stress, with indicators such as forest health degradation, woody plant mortality and drought impacts integrated into climate risk assessments (MERF, 2021).

The environmental dimension is also incorporated into health-related disaster risk knowledge through the monitoring of environmental determinants of CSHOs. National health adaptation frameworks recognise water quality, sanitation conditions, waste management and vector breeding environments as critical drivers of climate-sensitive diseases such as malaria and diarrhoeal illnesses (MSHP, 2020b). A One Health approach has been formally adopted at the strategic level to promote integration between human, animal and environmental health information, although its operationalisation remains limited by data fragmentation and institutional coordination challenges (MSHPAUS, 2025) (see *Section 3.2.3*).

Anthropogenic environmental pressures, including industrial and chemical pollution, are acknowledged within disaster risk knowledge as aggravating factors that can trigger or compound emergencies. While these risks are recognised as difficult to integrate into routine early warning surveillance due to their point-source nature, targeted environmental surveillance is recommended for high-risk sectors to support civil protection preparedness (Badjedke, M et al., 2022). More recently, air-quality monitoring has begun to receive increased attention, with the deployment of sensors to track pollutants such as fine particulate matter and nitrogen dioxide, reflecting the growing recognition of air pollution as a disaster-relevant environmental determinant of public health risk (MSHPAUS, 2025).

3.4.3 Hazard Forecasting and Early Warning

3.4.3.1 Legal and institutional coordination

The legal and institutional coordination for hazard forecasting and early warning in Togo is embedded within the broader national disaster risk management and civil protection framework and operates through a network of sectoral institutions whose mandates are defined in sector-specific legal instruments. Rather than being governed by a single unified early warning law, forecasting and warning functions are distributed across multiple regulatory texts that jointly structure the production of hazard information, its technical validation, and its official transmission for civil protection purposes.

At the strategic level, intersectoral coordination for disaster risk reduction, including early warning, is anchored within the PNRRC. This platform provides the formal multi-stakeholder policy space for aligning forecasting, preparedness, and response priorities across sectors, but does not function as an operational forecasting authority. As a result, legal coordination for hazard forecasting remains sector-based and is activated primarily through administrative rather than permanent joint decision-making mechanisms.

Operational legal authority for the triggering of public alerts is centralised within the national civil protection system. While multiple technical institutions are legally mandated to observe, analyse, and forecast hazards within their respective domains, only the civil protection authority is legally empowered to validate warnings for public dissemination and to activate national emergency procedures. This creates a hierarchical coordination structure in which forecasting remains decentralised, while alert validation and emergency activation are centralised.

Climate-related hazard forecasting is institutionally aligned with the Global Framework for Climate Services (GFCS) through its national application under the NFCS (WMO, 2018). The NFCS provides the formal governance architecture for coordinating the production, quality control, and sectoral tailoring of climate information (see *Section* ***Error! Reference source not found.***). Within the early warning context, the NFCS serves as the upstream coordination mechanism that ensures climate information is generated according to internationally recognised standards and made usable for disaster risk management, without itself constituting an alert-issuing authority.

Hydrological forecasting and water-related hazard monitoring are governed by sectoral water management regulations, while food security early warning is anchored in agricultural policy and food security coordination mechanisms. Dam safety and flood releases are regulated under transboundary and utility governance frameworks. These parallel legal regimes contribute hazard-specific inputs to the national early warning system but are not legally integrated under a single unified early warning statute.

Overall, legal coordination for hazard forecasting and early warning in Togo is characterised by a functional separation between sectoral forecasting mandates and centralised alert authority, with coordination relying primarily on administrative arrangements rather than legally binding inter-agency protocols. The absence of a dedicated national legal instrument specifically governing multi-hazard early warning limits the formalisation of data-sharing obligations, joint validation procedures, and institutional accountability across the full warning chain.

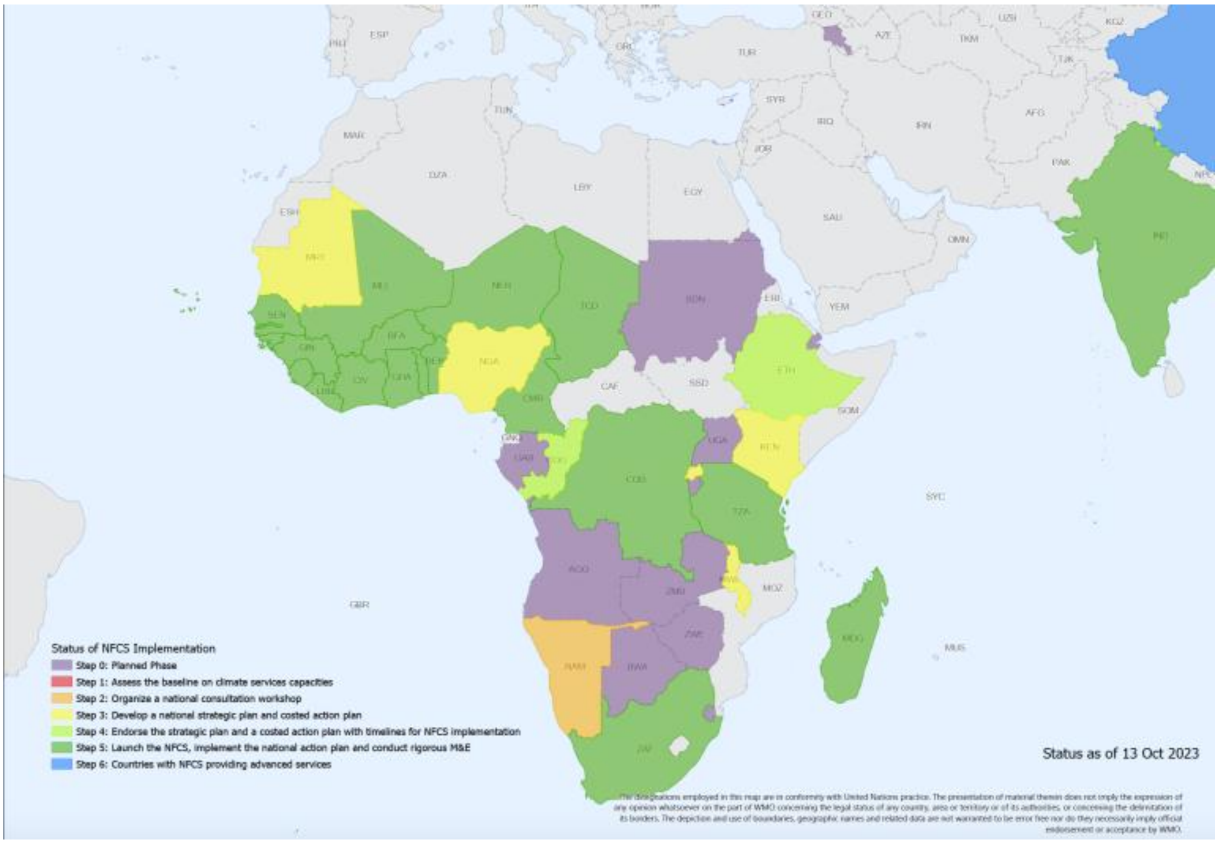
3.4.3.1.1 NFCS implementation within the national EWS architecture

Togo has made substantial progress in strengthening its climate services ecosystem, notably through the operationalisation of the NFCS. The NFCS was formally established in 2019 by ministerial order, which created a dedicated inter-ministerial steering committee serving as a permanent management unit, initially hosted by the General Directorate of National Meteorology (*Direction Générale de la Météorologie Nationale* – DGMN), the institutional predecessor of ANAMET. The same order also established a multidisciplinary working group (*Groupe de travail pluridisciplinaire* – GTP) to ensure structured cross-sectoral collaboration (DGMN, 2019).

While the NFCS is not, in itself, an EWS, it constitutes the core architecture through which climate information is generated, quality-controlled, interpreted and delivered to support the national MHEWS. It provides the institutional coordination mechanisms, service delivery pathways and technical standards that ensure meteorological and hydrological data are sufficiently reliable, timely, and sector-relevant to underpin early warning dissemination. Togo currently scores 5 out of 6 on the NFCS implementation scale, reflecting its official launch, functional operation, and the establishment of a monitoring and evaluation (M&E) system (see *Figure 52*) (GFCS, 2025). In recent years, ANAMET has led several institutional, technical, and governance reforms under the NFCS that strengthen national climate services and, by extension, the performance and credibility of the EWS.

The National Action Plan for the Implementation of the NFCS (2018) places strong emphasis on the delivery of climate services tailored to sector-specific decision-making needs, including health. For DRM, the plan identifies river water level data monitoring and forecasting as a critical user requirement for flood prediction and response. In the health sector, priority information needs relate to air quality, pollution, and climate extremes, particularly heat and flooding, which are closely linked to the seasonality of diseases such as malaria, diarrhoea and meningitis. These sectoral requirements clearly demonstrate the concrete role of the NFCS in enabling a climate-sensitive MHEWS, notably by facilitating the systematic linkage between meteorological and hydrological information and epidemiological surveillance systems for anticipatory risk management.

Figure 52: Current status of NFCS implementation in Africa



(GFCS, 2025)

Overall, the NFCS operationalises the interface between climate science and sectoral decision-making in Togo by ensuring that climate information is not produced as a generic public good, but it is tailored to the concrete operational needs of priority sectors, notably health and DRM. For the health sector, it enables the routine production and use of climate information relating to air quality, pollution and extreme events to support the prevention and management of climate-sensitive diseases such as malaria, diarrhoea and meningitis. For DRM, it ensures the systematic availability of hydrological information, particularly river water level data, to support flood forecasting and emergency preparedness. By structuring the co-production, validation and dissemination of these sector-specific climate services, the NFCS directly strengthens the effectiveness, credibility and usability of the national MHEWS, thereby enhancing anticipatory risk management and climate resilience across institutions and communities.

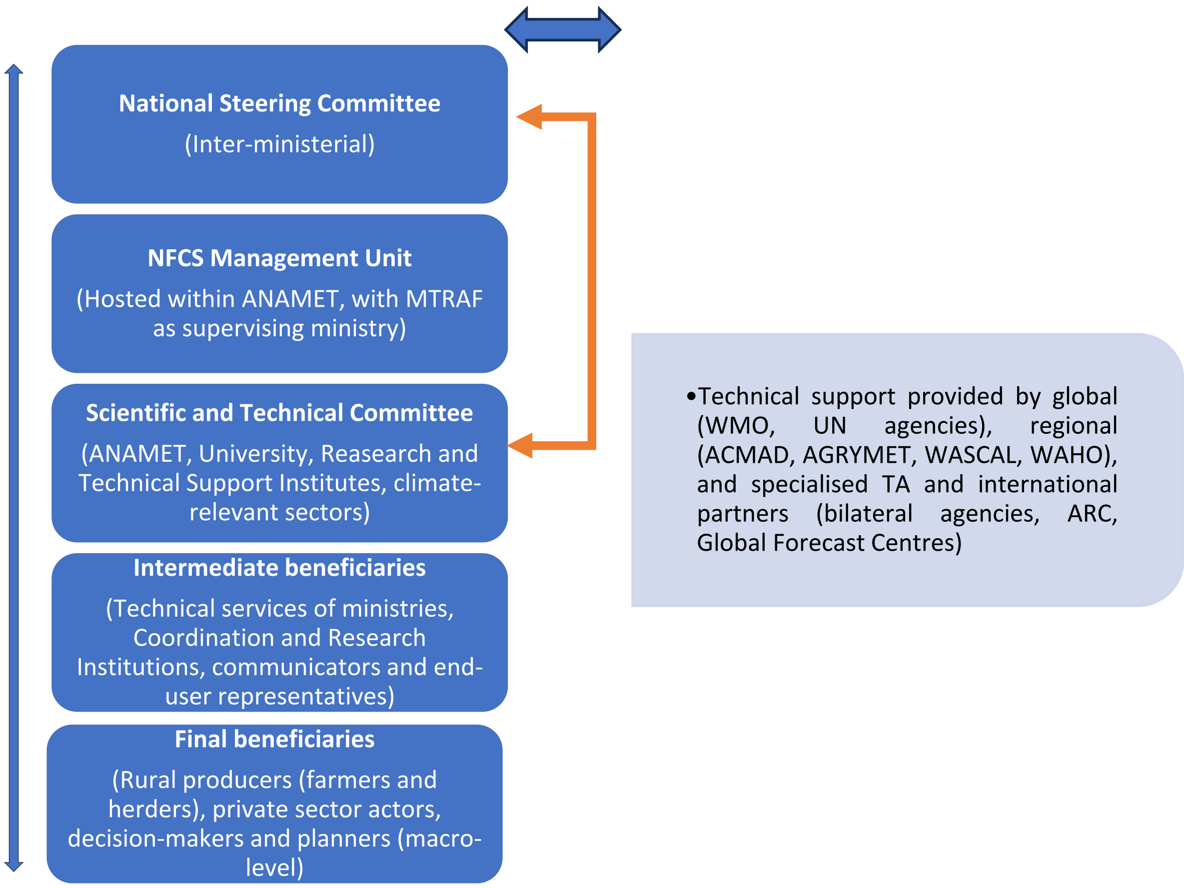
3.4.3.1.2 NFCS coordination mechanisms

Togo's NFCS is anchored in an institutional architecture designed to ensure both political oversight and technical coordination, as well as the effective delivery of climate services across priority sectors (ANAMET, 2022). At the apex of its structure sits the Inter-ministerial Steering Committee, chaired by ANAMET, which serves as the central decision-making and strategic guidance body for the framework. By convening ministries responsible for climate-sensitive sectors, the committee ensures alignment between national development policies, sectoral planning frameworks and climate services priorities.

The steering committee is supported by the NFCS Management Unit, which is institutionally anchored within ANAMET and operates under the supervisory authority of the Ministry of Road, Air and Rail Transport (*Ministère des Transports Routiers, Aériens et Ferroviaires* — MTRAF). The Management Unit is responsible for the day-to-day coordination and operational management of the NFCS, including planning, facilitation of sectoral engagement, support to service co-production processes, and monitoring and reporting on implementation. Through its hosting role, ANAMET provides the technical backbone for the operationalisation of the framework, particularly in relation to climate data production and dissemination (ANAMET, 2022; GIZ, 2020).

A multisectoral Technical Committee complements these governance and management structures. Comprising researchers and practitioners from the five NFCS priority sectors – agriculture and food security, water, health, DRR, and energy – the committee ensures that scientific analysis, sectoral expertise and user-needs jointly inform the generation, tailoring, and application of climate services. Together, the Inter-ministerial Steering Committee, Management Unit and Technical Committee form a structured coordination ecosystem through which climate information flows from production and validation to sector-specific application, including its integration into national operational systems such as the MHEWS.

Figure 53: Organisational chart for the NFCS in Togo



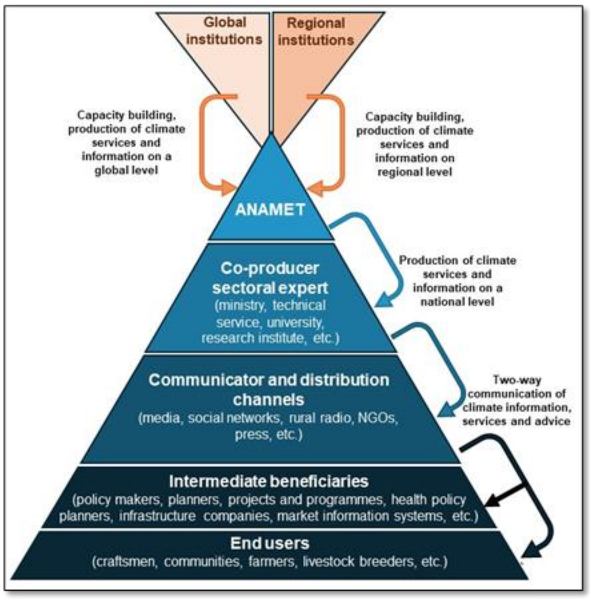
(Badjana, M.H, 2021; Badjedke, M et al., 2022)

Beyond these formal governance and coordination mechanisms, the effectiveness of the NFCS ultimately depends on the extent to which climate information responds to concrete operational decision-making needs across climate-sensitive sectors. Climate-service users in Togo fall into three broad groups: i) decision-makers in climate-sensitive sectors such as agriculture, health, energy, water, disaster risk reduction, transport and infrastructure, who rely on climate information for policy formulation, planning and operations; ii) information intermediaries, including public and private media, associations and NGOs, which translate and disseminate climate information; and iii) end-users, including farmers, pastoralists, fishers, foresters, artisans and other rural actors whose livelihoods and wellbeing are directly affected by climate variability (MIT, 2018).

Sectoral demand for climate services is strongest in agriculture, where agro-meteorological and seasonal forecasts underpin adaptation planning and food security. In the water sector, climate information supports resource management, infrastructure planning and preparedness for droughts and floods. The energy sector, particularly solar and hydropower development, depends on reliable climate projections and monitoring. The health sector's sensitivity to heatwaves, rainfall anomalies, flooding and associated vector-, water- and food-borne diseases makes climate information essential for surveillance and early warning. Transport, especially aviation and maritime operations, relies on weather services for safety and planning, while DRR and land management institutions increasingly depend on climate information for preparedness, risk reduction and resilience-building. CSOs further strengthen the climate services value chain by disseminating information and mobilising communities.

Figure 54 summarises the main stakeholders in the production chain of climatological services in Togo.

Figure 54: Main stakeholders in the production chain of climatological services in Togo



(MIT, 2018)

Collectively, ANAMET's technical functions, the NFCS coordination structures and the network of sectoral institutions, intermediaries and end-users form an integrated national climate services ecosystem. This ecosystem enables climate information to move from observation and modelling through translation and sectoral tailoring to operational use, including within the national MHEWS. Its coherence and functionality are fundamental to enabling climate services to contribute effectively to DRR, sectoral planning, resilience-building and sustainable development across Togo.

3.4.3.1.3 Role of ANAMET

Established initially as the DGMN by decree in 1971 and renamed under a 2005 decree, ANAMET was subsequently elevated to national agency status in 2022 and its highest governance body, the Board of Directors, has been nominated in December 2025. The agency constitutes the technical pillar of the NFCS, in alignment with WMO guidelines (DGMN, 2019). This institutional transformation marked a major milestone, providing greater administrative and financial autonomy, a clearer legal framework, and a modernised mandate for climate service delivery. It also consolidated the operational foundations required for the effective implementation and long-term sustainability of the NFCS.

ANAMET's mission is to implement government policy on meteorology and climatology across Togo. The agency is responsible for observing, analysing, studying, and forecasting weather, climate, and atmospheric constituents to safeguard people and property. Its mandate encompasses the operation of the national observation network, weather and climate forecasting, data management, product development, and the communication of meteorological and climatological information to all socio-economic, environmental, and public sectors. Supported by international institutions such as the WMO and regional organisations including the Agency for Aerial Navigation Safety in Africa and Madagascar (*Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar* - ASECNA), the Regional Training and Application Centre for Agrometeorology, Hydrology and Meteorology (*Centre Régional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle* – AGRHYMET) and the African Centre of Meteorological Applications for Development (ACMAD), these institutions provide seasonal forecasts, short-term climate outlooks, specialised modelling products and capacity-building programmes, and convene regional climate forums to support Member States in climate risk management. This contributes to ANAMET's provision of appropriate and timely climate services for the country.

Since its elevation to agency status, ANAMET has strengthened its operational capacities by improving communication and dissemination through the NFCS communication strategy (2022), updating climate databases, expanding the observation network, and rehabilitating technical facilities (ANAMET, 2022). Human resource capacity has been reinforced with the deployment of 65 volunteers, complementing the 35 civil servants on staff. Partnerships under initiatives such as the Food Systems Resilience Program (FSRP) (MAEDR, 2021) and the CREWS project (WBG, 2020) have contributed to upgrading server infrastructure, diagnosing multi-hazard alert systems, and enhancing the production and dissemination of meteorological and climate information. These improvements have strengthened the upstream information chain critical for early warning and climate risk management.

The production, provision, and use of climate services involve actors at three interconnected levels. At the global level, climate data are generated and managed within the Global Observing System by the scientific community and technical and financial partners. At the regional level, multi-country institutions such as AGRHYMET and ACMAD support national services through forecasting products and technical assistance. At the national level, ANAMET leads the production and dissemination of climate information to a wide range of users, including line ministries, public agencies, the private sector, civil society organisations and vulnerable communities.

3.4.3.2 Observational infrastructure

The foundational infrastructure for climate and hydrometeorological hazard forecasting in Togo is severely constrained by degraded assets, reliance on manual observation, and limited real-time data transmission capacity. This physical foundation for the national EWS is managed primarily by the ANAMET and the DRE.

ANAMET collects *in situ* climate data daily, primarily focusing on maximum and minimum temperatures, wind speed, maximum and minimum relative humidity, potential evaporation, evapotranspiration, sunshine duration, as well as sensory observations, including dust, cloud cover, vapour pressure, and atmospheric pressure. These data are collected by 65 volunteer weather observers through a hydrometeorological network comprising different types of stations, both automatic and manual, ensuring spatial coverage of the climate system observation across the entire territory (DGMN, 2019).

The ANAMET meteorological network nominally includes 28 Surface Synoptic Observation (SYNOP) stations and 200 rain gauges. A significant portion of this network remains dependent on manual observation (four SYNOP stations and 64 rain gauges are manual). The effective operational coverage is compromised by severe degradation: technical assessments indicate that only 32% of automated rain gauges were fully operational in 2023, with SYNOP stations exhibiting faulty sensors or transmitting less than 30% of expected observations (ANAMET, 2023). While 24 stations are connected to the WMO Information System (WIS), most data from conventional stations are not digitised, constraining their utility for real-time forecasting.

Hydrological observation, monitoring, and forecasting are managed primarily by the DRE. The DRE network currently comprises a total of 53 water level measurement stations distributed across the Oti, Mono, and Lake Togo basins. Only 15 of these stations are equipped with GSM telemetry for automatic data transmission. The remaining stations rely on 52 volunteer observers who manually record water levels every six hours. The DRE uses limnometric scales and radars as measuring instruments. Recorded historical data are highly available, with approximately 90% being digitised, stored in a database, and provided free of charge in digital form upon request. However, the DRE's hydrological monitoring is not continuous or standardised, as the lack of real-time data transmission from most stations limits the tracking of watercourse evolution, particularly during the rainy season (Badjedke, M et al., 2022).

Beyond formal government agencies, the TRC network of local volunteers contribute to grassroots observation and early warning. These volunteers visually monitor colour-coded beacons installed in riverbeds to physically monitor flood risks and trigger community alerts. This system acts as a complementary, low-tech observational safety net for riverine communities.

3.4.3.2.1 *Data quality check*

The quality check of collected data is a crucial step to identify aberrant and missing data, and ensure data consistency to guarantee the reliability and accuracy of meteorological data before their utilisation in analyses or models:

- Aberrant data: are detected using tools such as R-Instat+ or statistical methods such as normality tests or scatter plots. Values that exceed a defined threshold or significantly deviate from the general trend can be identified as aberrant and require further verification.

- Missing data: may occur due to equipment failures, transmission problems, or other factors. For handling missing data, techniques such as spatial or temporal interpolation are employed by technicians, where missing values are estimated based on available data and mathematical models.

- Consistency verification is done for internal consistency to ensure they adhere to physical laws and known relationships between meteorological variables. For example, temperature should not be higher than the dew point, or the sum of precipitation over a given period should not be negative.

Data entry for the collected data is done using a Climate Database software (CLIDATA) and Excel, and the data quality check is carried out in two ways. The first method involves using software tools like RStudio and Climate Data Tool (CDT), which, in addition to their diverse functions, include data quality control for each parameter. The second approach is manual and occurs at two levels. After data entry, the first level takes place either in the Excel database or the CLIDATA database by voluntary data entry operators. They verify the information entered in the monthly climatological tables (MCT) against what they have inserted. The second level of verification is performed by the database manager, who checks MCT, station by station. However, this process can be cumbersome and time-consuming, with the drawback of abrupt interruptions during power outages.

Data processing and quality control are not standardised or automated; these essential tasks are performed manually, requiring reliance on the experience of ANAMET personnel (Badjedke, M et al., 2022).

3.4.3.2.2 *Data transmission*

The transmission of collected climatic data occurs through two channels. The first involves transmitting data from the national to the international level. Data gathered by automatic stations are sent in real-time globally via the WMO Global Telecommunication System (GTS). Meteorological reports are also transmitted in the Meteorological Aerodrome Report (METAR) and SYNOP formats every hour, both at primary synoptic times (00:00, 06:00, 12:00, and 18:00) and secondary synoptic times (03:00, 09:00, 15:00, and 21:00) to the ASECNA service.

The second channel focuses on transmitting data from the decentralised to the central level. For decentralised manual/classic stations, MCT are transported to the central level by couriers. In urgent situations, some data may be transmitted via telephone while awaiting the arrival of the MCTs.

However, it should be noted that not all the weather observation stations across the territory are interconnected by a network system or the internet to facilitate the transmission of collected data. Additionally, there is a lack of resources for the transportation of monthly meteorological documents (notebooks, monthly climatological tables, helios bands, recording diagrams). This explains the observed delay in data processing and quality control, as well as the underutilisation of certain data by users.

3.4.3.3 Hazard monitoring

The core monitoring process remains highly vulnerable to human error, equipment malfunction, and significant reporting delays due to the continued reliance on non-automated data collection and transmission. These constraints directly contribute to the under-utilisation of in-situ observational data by end-users, with some programmes (e.g., CHAP) relying instead on satellite-derived information.

Flood monitoring is supported by three distinct flood monitoring and forecasting systems that run in parallel, and by specific institutional protocols. The DRE conducts national seasonal forecasts derived from regional products, focusing mainly on river floods using the American CPT model. Three main operational forecasting tools currently support flood early warning:

- Flood Early Warning System (FEWS): This system is operational in the Oti basin, providing water-level forecasts with a five-day lead time. It relies on hydrological and hydraulic models using input data from tele-transmitted stations and basin discharge. The DRE utilises the FEWS for twice-daily forecasting, and the resulting information is provided to the ANPC for field operations.

- Functional Estimation System (FUNES): This system, developed by the Red Cross Climate Centre, is specifically used on the Mono River to manage flood risks downstream of the Nangbéto dam. It uses operational data, including rainfall from 29 tele-transmitted stations. This model is operated by the dam managers and utilised by the ANPC and the TRC.

- Reinforced Cooperation to Provide Operational Flood Forecasting and Alerts in West Africa (FANFAR): This regional system provides daily hydrological forecasts and flood risk information, occasionally used by the DRE and the ANPC to track river course trends. Input data includes rainfall, temperature, river flow, and soil moisture, delivered via various channels, though operational use is constrained by national integration and ICT reliability.

These three systems operate in parallel rather than as components of a unified national flood forecasting platform. A major gap in the national early warning architecture is the DRE's critically constrained human resource capacity, with the agency having practically no permanent staff. This severely limits the DRE's capability to support the health sector with the necessary water quality and quantity warnings crucial for managing diarrhoeal disease risks (Badjedke, M et al., 2022).

A specific observational node is managed by the CEB at the Nangbéto Hydroelectric Dam on the Mono River. The CEB maintains real-time monitoring of reservoir water levels and downstream river flows to manage dam operations. This provides essential boundary conditions for flow observation along the Mono River. When reservoir levels approach the limit (144m) and inflows are high (> than 600m^3/s), the CEB issues alerts regarding imminent water releases to prevent dam failure, which can cause downstream flooding. Historically, the CEB utilised the FUNES model for real-time flood risk assessment downstream, though its operation has been intermittent due to funding limitations for server hosting.

Monitoring addresses the health-environment nexus by tracking physical, environmental, and epidemiological risks, though these systems remain largely fragmented. While institutions like the ANGE and the UoL monitor coastal and marine risks and the DSID tracks food insecurity, the health sector independently utilises the IDSR framework via the DHIS2 platform to track 47 diseases, many of which – such as malaria and diarrhoea – are climate-sensitive. This formal monitoring is complemented at the grassroot level by the TRC network, which deploys volunteers to visually monitor flood risks, serving as a critical link between the environmental hazards and community alerts (Badjedke, M et al., 2022).

3.4.3.4 Remote sensing data

Remote sensing constitutes a core upstream data source for hazard monitoring and forecasting in Togo, complementing the national *in situ* observational infrastructure described in *Section 3.4.3.2*. Because of the limited density and real-time transmission of ground stations, satellite-derived products play a decisive role in providing spatially continuous information on rainfall, cloud dynamics, temperature, vegetation conditions and large-scale atmospheric systems.

ANAMET currently does not operate weather radars or national Earth-observation processing platforms. Instead, it relies on satellite-based products accessed primarily through its Preparation for the Use of Meteosat Second Generation in Africa (PUMA) 2015 receiving station. This system provides continuous access to meteorological satellite imagery and graphical forecast products generated by major international centres, notably the UK Met Office, the European Centre for Medium-Range Weather Forecasts (ECMWF), and Météo-France through the Small-Scale Large-Scale Research Action (*Action de Recherche Petite Echelle Grande Echelle*, ARPEGE) model. These satellite-derived products are used operationally for the real-time tracking of convective systems, storm development, rainfall distribution and large-scale circulation patterns affecting Togo.

Additional remote-sensing products and ensemble-based visualisations are accessed via the Specialised Meteorological Regional Centre (*Centre Météorologique Régional Spécialisé* – CMRS) in Dakar, facilitated by more reliable international connectivity. These include satellite-informed products and Ensemble Prediction System grams (EPSgrams) for multiple urban centres in Togo, including Lomé, Kara, Sokodé, Atakpamé, Mango, Dapaong, Niamtougou and Bassar. These products support nowcasting, short-term extreme-weather tracking and the interpretation of evolving regional weather systems.

Remote sensing data are also used indirectly by the DRE within regional hydrological forecasting platforms such as FANFAR, where satellite precipitation estimates, soil moisture proxies and temperature fields are assimilated into hydrological models to support flood outlooks. However, systematic national-level integration of satellite products with *in situ* meteorological and hydrological data remains limited by ICT constraints and the absence of automated data assimilation systems.

Overall, remote sensing compensates for critical spatial and temporal gaps in the national observation network, but its operational effectiveness remains constrained by limited national processing capacity, weak real-time data integration with surface observations, and dependence on external regional and global platforms.

3.4.3.5 Numerical Weather Prediction Model for forecasting and tool application

This subsection focuses specifically on the numerical modelling systems used to transform meteorological and remote-sensing observations (*Sections 3.4.3.2* and *3.4.3.4*) into predictive weather and climate forecasts.

ANAMET currently does not operate national numerical weather prediction (NWP) models, climate models or weather radars. Instead, it relies entirely on externally produced NWP that provide very short-term, short-term and medium-term forecasts that are operationally used by ANAMET to issue national daily, three-day and five-day weather bulletins.

For climate data analysis and seasonal forecasting, ANAMET relies primarily on statistical tools rather than on dynamic numerical models. R-Instat+ is used to analyse historical rainfall and temperature series, derive agro-climatic indicators (such as onset of rains, dry spell probabilities and growing season length), and support the interpretation of seasonal climate outlooks. The CPT is used to generate seasonal rainfall and temperature forecasts through Canonical Correlation Analysis (CCA) based on regional and global climate predictors. Outputs from these tools are visualised using Surfer for mapping and spatial interpretation. These tools depend entirely on the quality and completeness of observational data.

Regional numerical products are further accessed through the Specialised Meteorological Regional Centre (CMRS) in Dakar, including EPSgrams and ensemble-based probabilistic forecasts for multiple Togolese cities. These regional products underpin short-term extreme-weather anticipation, particularly for intense rainfall, heat episodes and wind events, but remain fully dependent on external modelling infrastructure.

Hydrological monitoring systems applied in Togo (FEWS, FUNES and FANFAR, see *Section 3.4.3.3*) represent applied extensions of meteorological NWP outputs into river-flow and flood forecasting. These systems ingest rainfall and temperature forecasts derived from international NWP models to drive hydrological and hydraulic simulations. However, limitations in real-time rainfall observation, manual river-level measurements and partial network automation continue to constrain model calibration, spatial reliability and forecast lead time.

Overall, Togo's numerical weather prediction capacity is characterised by a strong dependence on international modelling centres and regional forecasting hubs, in the absence of national modelling infrastructure. While access to high-quality global NWP products through PUMA 2015 and CMRS Dakar provides a functional operational baseline, the lack of domestic data assimilation systems, weather radar and dense real-time observation networks limits fine-scale forecasting precision and the full development of an integrated multi-hazard early warning system.

3.4.3.5.1 *Climate change projection and long-term modelling tools*

Long-term climate change analysis in Togo is not based on national numerical climate models but relies on downscaled global and regional climate projection frameworks developed at international level. These tools are used primarily for strategic planning, vulnerability assessment and adaptation policy, rather than for operational weather forecasting or early warning.

The backbone of climate projection work is the CMIP, which provides ensembles of GCM outputs describing future climate evolution under different greenhouse gas emission scenarios. These global projections are spatially coarse but form the primary boundary conditions for regional downscaling.

To address the scale limitations of global models, Togo uses outputs from the CORDEX, which delivers higher-resolution regional climate projections (typically 12–50 km) over West Africa. CORDEX products are used to assess future changes in temperature, rainfall patterns, seasonal variability and extreme events relevant for water resources, agriculture, health and disaster risk reduction.

For sectoral impact analysis, the ISIMIP is used to translate climate projections into potential impacts on hydrology, food systems, ecosystems and health-relevant variables. These outputs support national vulnerability assessments and adaptation planning.

At the applied level, ANAMET and partner institutions use SimCLIM v4.11 as an integrated modelling platform that combines CMIP, CORDEX and ISIMIP datasets to generate location-specific climate change scenarios for selected zones in Togo. This tool supports long-term risk assessment, infrastructure planning and climate-informed sectoral strategies but is not used for real-time forecasting.

The application of these climate projection tools remains constrained by limited national computing infrastructure, uneven access to high-resolution datasets, and a shortage of specialised climate modellers. As a result, most long-term climate analysis continues to be undertaken through externally supported projects and regional research programmes rather than through a fully institutionalised national modelling system.

Table 26: Major climate models used by ANAMET for prediction

Climate model category	Model	Description	Use	Gaps/limitations
Global climate models	**Coupled Model Intercomparison Project (CMIP)**	CMIP produces GCMs that simulate large-scale climate evolution of the atmosphere and oceans under different emission scenarios.	Serves as the global baseline input for SimCLIM and CORDEX. Used to generate long-term climate change scenarios for national climate risk assessment and adaptation planning.	Very coarse spatial resolution (100–200 km); high uncertainty in West African rainfall simulations; not suitable for local decision-making or operational early warning as gaps remain in its downscaling capacity.
Regional climate models	**Coordinated Regional Downscaling Experiment (CORDEX - Africa)**	CORDEX downscales GCM outputs to regional scale with finer spatial resolution (12 to 50 km), improving representation of local climate processes using statistical and dynamical methods.	Provides regional-scale climate projections for Togo that are fed into SimCLIM to improve the spatial accuracy of temperature and precipitation scenarios for vulnerability mapping and long-term planning.	Inherits biases from parent CMIP models; accuracy depends on the availability and quality of national station observations for calibration; still too coarse for community-level early warning.

Sectoral climate (impact) models	**Inter-Sectoral Impact Model Intercomparison Project (ISIMIP)**	ISIMIP is a community initiative that translates physical climate variables into sectoral impact indicators such as crop yields, water availability, and health risks through coordinated impact-model simulations.	Provides sectoral impact datasets that are integrated into SimCLIM to assess cross-sectoral climate risks, particularly for agriculture, water resources and health. Used for impact-based vulnerability analysis rather than operational real-time warning.	Limited availability of locally calibrated climate–health impact models for Togo; weak representation of disease transmission dynamics; highly dependent on the quality of underlying climate and epidemiological data; not suitable for real-time outbreak prediction.

3.4.3.6 Impact-based forecasting capacity

Impact-based forecasting in Togo remains at an early and largely pilot stage. While the country has access to hazard forecasts derived from observational networks, numerical weather prediction products and regional hydrological models, these are still rarely translated into systematic assessments of likely impacts on populations, infrastructure, health or livelihoods.

At present, impact interpretation is mainly undertaken on an ad hoc basis by sectoral actors and humanitarian partners, rather than through an institutionalised national impact-based forecasting framework. For floods, the DRE, ANPC, the TRC and the Nangbéto dam operators occasionally combine river-level forecasts with local exposure knowledge to anticipate downstream impacts, but this process is not standardised and relies heavily on expert judgement rather than on calibrated impact models.

In the health sector, early efforts to link climate variables with disease risk forecasting are emerging through pilot platforms integrating meteorological data with DHIS2 surveillance records. These initiatives aim to support anticipatory action for climate-sensitive diseases such as malaria and diarrhoeal illnesses but are not yet fully operational at national scale.

Several structural constraints limit the operationalisation of impact-based, including the absence of national exposure and vulnerability databases at sufficient spatial resolution, limited digitisation of infrastructure and asset inventories, weak interoperability between climate, hydrological and sectoral information systems, and shortages of specialised staff trained in impact modelling. As a result, most warnings disseminated through the national EWS remain primarily hazard-based rather than impact-based.

Strengthening this type of forecasting in Togo will therefore require systematic integration of exposure and vulnerability data with forecast products, development of standard impact thresholds for priority hazards (notably floods, heat and epidemics), and the institutionalisation of cross-sectoral analysis workflows linking ANAMET, the DRE, civil protection, health services and humanitarian actors.

3.4.3.7 Financial and technological enablers

The effectiveness and sustainability of climate services and EWS in Togo are strongly conditioned by the availability of financial resources and enabling technologies that support data production, processing, dissemination and maintenance of infrastructure.

From a financial perspective, the national climate and hydrometeorological system is characterised by a high dependence on external project-based financing. Core operational budgets allocated to ANAMET and the DRE remain insufficient to cover routine maintenance of observation networks, replacement of sensors, communication costs, software licensing, and continuous staff training. As a result, many essential components of the EWS—particularly automated stations and telemetered hydrological gauges—have deteriorated after donor-funded installation phases ended. Human resource financing constraints further limit system sustainability, as a significant share of observation and data transmission tasks relies on unpaid or poorly remunerated volunteers.

Technological enablers are equally critical. The performance of forecasting and warning services depends on reliable electricity supply, internet connectivity, data servers, and secure digital platforms for storage, processing and dissemination. Frequent power outages and limited broadband coverage outside Lomé, and weak redundancy systems constrain real-time data transmission from field stations, access to international NWP and satellite products, and the hosting of modelling platforms. The absence of national high-performance computing infrastructure prevents ANAMET from running its own numerical models, reinforcing dependence on externally produced forecasts.

Software availability and system interoperability also constitute key enabling factors. While sectoral tools exist for meteorology, hydrology and health, these systems are weakly integrated, and data-sharing protocols remain largely informal. Limited access to licensed analytical software, combined with the absence of automated quality-control and impact-modelling platforms, further slows down forecasting workflows and the transition toward impact-based early warning.

Finally, communication technologies play a decisive role in last-mile warning dissemination. The reach of climate and hazard alerts depends on mobile phone coverage, community radio networks and digital platforms operated by public institutions and civil society organisations. In rural and border areas, uneven network coverage and limited digital literacy continue to constrain the timely reception and uptake of early warnings by vulnerable populations.

Overall, financial and technological enablers constitute a central bottleneck in the operationalisation and long-term sustainability of climate services and EWS in Togo. Without predictable domestic financing, resilient ICT infrastructure, and integrated digital systems, improvements in observation, modelling and forecasting cannot translate into reliable, continuous and user-centred early warning services.

3.4.4 Dissemination and Communication Capability

The effectiveness of EWS ultimately depends not only on the production of reliable forecasts, but also on the capacity to disseminate timely, clear and actionable information to decision-makers and at-risk populations. This section examines the operational, organisational and decision-making processes that govern climate and hazard information dissemination in Togo. It further assesses the communication systems, equipment and institutional arrangements that underpin climate output dissemination and impact-based early warning communication.

3.4.4.1 Operational, organisational and decision-making processes

Decisions to issue alerts follow a hierarchical process. Technical services analyse meteorological, hydrological, and operational data, using forecasting models to simulate risks. The SAP Technical Unit reviews these analyses and produces bulletins. Alerts are initiated by ANPC for general events, while major risks require formal declaration by the MSCP. During emergencies, the COUSP is also activated and operates through clusters responsible for communication, early warning, and information transmission. For dam operations, critical water levels trigger direct communication to authorities alongside digital notifications.

Dissemination occurs through both official and community channels. National alerts are broadcast via radio and television and communicated through the administrative chain to Prefects and Mayors, who relay information locally. Digital platforms, such as WhatsApp groups and mailing lists, are used to share hydrological data, forecasts, and operational updates in near real-time. At the community level, volunteers monitor rivers using colour-coded beacons and trigger local alerts through megaphones, whistles, and door-to-door communication. Community multipliers (e.g., town criers) and religious leaders further ensure reach in remote areas.

The user network comprises decision-makers and technical actors, information relays including journalists, NGOs, and organised community groups, and end-users such as rural producers, infrastructure users, and the general public.

3.4.4.2 Operational communication systems and equipment: climate output dissemination

Seasonal forecast bulletins are developed for Togo's climatological zones and issued at key times of the year: for the major rainy season in the bimodal zone, for the monomodal zone cropping season, and for the minor rainy season in the bimodal zone. These bulletins target decision-makers, farmers and their partners, investors, and the public. They are prepared in collaboration with regional institutions such as AGRHYMET and ACMAD and adapted to national conditions by ANAMET experts. Meteorological alert bulletins provide short-term warnings, typically two hours ahead of damaging rain events, while specific forecasts and confirmation attestations are issued on request for private or institutional users.

Observational data are collected from automated weather stations using GPRS telemetry, although maintenance issues affect network reliability. Alerts and forecasts are coordinated through institutional communication networks, including mailing lists and dedicated WhatsApp groups, which allow near real-time sharing of hydrological data, dam operations, and meteorological updates among authorities and stakeholders. ANPC also uses the TogoAlert+ monitoring tool, and the adoption of the Common Alerting Protocol (CAP) has begun to standardise warning formats.

TogoAlert+ is a digital monitoring and alert dissemination tool developed by the ANPC to strengthen national early warning, crisis monitoring and coordination. It's currently a pilot system. TogoAlert+ aims to centralise and visualise risk information, support real-time situational awareness, and facilitate the rapid dissemination of alerts to authorities and operational actors. The platform is linked to geospatial information systems and national disaster databases, allowing hazards, vulnerable zones and reported impacts to be monitored in near real time. TogoAlert+ complements existing institutional early warning mechanisms and supports decision-making during emergencies, particularly for floods and other climate-related hazards, while remaining under gradual development and operational consolidation.

Dissemination to the public relies on multiple channels. National television has broadcast meteorological information since 2007, with local television (*La Chaine du Futur*) providing additional coverage since 2012. Rural and community radios, including the *Radio Rurale Internationale* network, extend reach to local populations in their own languages. Social media platforms such as WhatsApp and Facebook, as well as mobile phone messaging, are increasingly used for rapid updates. Meetings organised by ANAMET directly engage vulnerable users to ensure comprehension and uptake of warnings. NGOs and state organisations, including DSID, the Institute for Technical Advice and Support (*Institut de Conseil et d'Appui Technique - ICAT)*, and Togolese Institute for Agronomic Research (*Institut Togolais de Recherche Agronomique* — ITRA), contribute to dissemination, enhancing outreach and improving access to meteorological information.

For last-mile dissemination, particularly in rural areas with limited connectivity, community-based methods are employed. The Togolese Red Cross operates colour-coded river beacons to indicate water levels, while volunteers use whistles, megaphones, and door-to-door communication to alert residents. Town criers and local committees provide additional support. A toll-free number is also available for emergency information.

Despite these systems, dissemination remains fragmented and predominantly top-down. Standard operating procedures for verifying alert receipt are lacking, and many automated observational instruments are non-operational, limiting the timeliness and accuracy of warnings. Overall, Togo's climate EWS relies on a combination of technological, media, and community-based systems, with seasonal forecast bulletins and alert bulletins serving as key outputs for preparedness and planning.

3.4.4.3 Impact-based early warnings communication capacity

The capacity for impact-based early warning communication in Togo is structurally limited because the system operates under the WMO's Paradigm 1 (Hazard-Based), focused on "what the weather will be," rather than the advanced Paradigm 2 or 3, which predict human consequences. This fundamental limitation means that the current system for developing and disseminating warnings is characterised by fragmentation and a lack of quantitative linkage between hazard forecasts and potential societal impacts. Alerts are often "univocal" (one-way) and lack the specific, localised instructions necessary to trigger appropriate preparedness actions among different population groups. A key deficiency is the absence of defined impact thresholds—such as specific rainfall amounts correlating to infrastructure damage or health impacts—that are formally agreed upon by the various actors in the alert chain, meaning the system lacks the quantitative capacity to predict specific, actionable consequences at the national level (UNDRR, 2023).

The communication architecture relies on a mix of institutional and community channels, though coordination remains a challenge. The ANPC acts as the central coordinator, issuing official communiqués via national radio/TV and direct communication to local authorities. ANAMET disseminates meteorological alerts via email, social media, and national television, utilising a network of journalists to reach rural populations. A functional, distinct channel is operated by the CEB for the Nangbéto Dam, which uses official letters and a dedicated WhatsApp group to share reports and videos with downstream stakeholders to manage flood risks. At the community level, the TRC operates a crucial community-based system where local volunteers monitor colour-coded riverbed beacons and use acoustic signals (whistles, megaphones) to trigger immediate local evacuation. Dissemination also relies on mass media and traditional channels like town criers and religious leaders in remote areas.

Table 27: Summary of key institutions contributing to hydrometeorological alerts

Components of EWS	Risk	Risk Surveillance and forecasting networks		Alert and communication Preparation and response		Preparation and response	
	Knowledge and identification	**Meteorology**	**Hydrology**	**Alert**	**Communication and dissemination**	**Preparation and response**	**Response**
Institution with legal mandate or accredited operational functions in this field	ANPC TRC DCN	ANAMET	DRE	Meteorological Alert (ANAMET) Flood and others alerts (ANPC)	ANPC	ANPC, TRC	
Other involved institutions			Nangbeto Hydroelectric Power Plant		Radio, TV	CSP, other stakeholders of the PNRCC	
Comments on the current situation regarding the Institutions' responsibilities	Impact assessments, primarily for floods, are conducted on an ad-hoc basis as part of programs. There is no structured database for information collection. Flood risk maps are available in the Savanes and Maritime regions. There are no national processes for developing other maps on major hydrometeorological risks.	Meteorological forecasts are used as a reference for hydrological forecasts and decision-making for alerts, but they are not integrated into systems.	Hydrological forecasts are mainly seasonal, with only daily forecasts available for the Oti basin.	Alerts are based on forecasts and field information. Due to the lack of suitable forecasts in several basins, a large portion of alerts are provided during the ongoing event. Institutions do not convene for joint alert assessment and decision-making.	Communication of warnings and alerts is done via telephone, email, radio, TV, and social media during the event occurrence.	No protocol for regular preparedness involving key institutions in the alert chain has been identified. Similarly, no preparation protocol has been identified at the institutional level.	Responses or interventions are coordinated by the ANPC, which collaborates with various actors. Many interventions are conducted in emergency situations.

(Badjedke, M et al., 2022)

Despite these channels, significant structural weaknesses prevent effective communication. Within the health sector, communication is primarily reactive to outbreaks (e.g., meningitis or cholera) rather than anticipatory based on climate triggers, demonstrating an absence of a national system with harmonised procedures for disseminating warnings for climate-sensitive health risks. Furthermore, there is a lack of SOPs for the dissemination of alerts or for verifying that populations have actually received and understood them. Official bulletins are often in French, and the lack of established local terminology for climate-health phenomena in northern regions undermines message relevance and public trust. Overall, the communication is fragmented and top-down, with trusted community multipliers not systematically integrated, and the absence of a formal feedback loop means there is no mechanism to verify that warnings have been received, understood, or acted upon by the population. Togo's capability, therefore, is defined by its ability to deliver widespread hazard information (Paradigm 1) but its limited institutional capacity to translate that hazard into predictable, actionable societal impacts.

3.4.5 Preparedness and Response Capability

Preparedness and response capacity in Togo is structured around national contingency planning and coordinated emergency operations led by the ANPC. The system applies to the same operational frameworks to both rapid-onset hazards (floods, storms, epidemics) and slow-onset or seasonal risks (drought, food insecurity), without formal differentiation in preparedness protocols. While a legal and institutional framework for response is well established, operational preparedness remains largely reactive, with limited systematic use of forecast to trigger anticipatory action and weak feedback mechanisms to support continuous improvement.

Preparedness and response actions are implemented jointly or individually by ANPC, the CSP, TRC, COUSP, DSID, and ICAT when agro systems are affected. ANPC intervenes primarily where communities are concerned, while the MERFPCCC intervenes when natural resources are affected. Depending on the nature of the emergency, the social action component of the Ministry of Social Action, Women's Promotion, and Literacy (*Ministère de l'Action Sociale, de la Promotion de la Femme et de l'Alphabétisation* - MASPFA, National Food Security Agency (*Agence Nationale de la Sécurité Alimentaire du Togo* – ANSAT), the Defence and Security Forces, CSOs, and UN agencies intervene under the coordination of ANPC.

3.4.5.1 Crisis/disaster risk management and climate adaptation review processes

Preparation for emergency situations is carried out according to national and community-level plans and protocols, applied uniformly regardless of whether the risk is linked to rapidly evolving events or seasonal hazards. These preparations combine actions at the central level and in the field.

Preparedness actions include the pre-positioning of food and non-food items, the assessment of reception sites for displaced persons, and the organisation of simulation exercises at classroom, field and community levels, particularly in flood-prone areas. Simulation exercises are coordinated mainly by ANPC and the TRC, with additional internal emergency simulations conducted by the CSP and COUSP for rescue operations and epidemic response.

Response operations are activated through ANPC and implemented by the CSP for evacuation and lifesaving, while COUSP coordinates epidemic response. Reconstruction and social assistance are overseen by ANPC in collaboration with Social Action. Damage and Immediate Needs Assessments are conducted after events using both paper forms and digital tools (KoboCollect), covering physical damage, social impacts and urgent humanitarian needs.

Climate adaptation considerations remain weakly institutionalised within preparedness and response review processes. Although climate risks are acknowledged in national planning, there is no structured operational mechanism for systematically reviewing how climate information is used during preparedness or how response performance should be adjusted in light of evolving climate risks. Post-event review is largely limited to administrative reporting and archiving rather than analytical learning.

The following table summarises the preparedness plans and response actions taken.

Table 28: Togo's preparedness and response action to disasters

Preparedness and response	Constituents	Content
Preparedness	Plans and protocols	National and Regional Contingency Plans: o Regularly updated between March and April each year; o Assess the main hazards likely to occur during the year; o Define response procedures in the event of a disaster.
		ORSEC Plan: o Determine the roles of different actors for interventions; o Support the mobilisation of resources to cope with disasters.
		National Drought Plan: o Define the entire process and alert to cope with risks and the occurrence of drought.
		Community Preparedness and Contingency Plans: o Plans currently developed solely by the TRC; o Define detailed preparation and response procedures at the community level.
	Actions	SAP Technical Meetings: o Quarterly frequency; o Analyse various risk forecasts from responsible institutions; o Produce information, prevention, and risk and disaster alert bulletins; o Involved stakeholders: ANPC, ANAMET, DRE, CEB, DSID, TRC, UL, ANGE, INSEED.
		Simulation Exercises: o Simulation in the classroom, in the field, and at the community level with populations from the most flood-prone areas (ANPC and TRC coordinate the exercise); o Simulation exercises also conducted internally by the CSP and COUSP for emergency interventions and epidemic management.
		Assessment of displaced persons' reception sites. This involves evaluating: o Accessibility and availability of sites, and capacity for accommodation; o Availability and condition of infrastructure, including sanitation facilities, etc.; o Identify urgent measures to be undertaken.
		Pre-positioning of food and non-food items: o Stakeholders: ANPC; TRC, and the MASPFA.
	Equipment	Provision of rescue equipment: o Equipment: life jackets, motorised canoes; o Coordination actors: ANPC and TRC.
		Community training: o Community training with a participatory approach focusing on raising awareness and knowledge of risks, how to organise and react in case of disasters o Main actor: TRC
Response	Response and intervention actions	o Rapid-evacuation and lifesaving interventions ensured by the CSP; o Reconstruction overseen by ANPC and MASPFA (Social Action).
		Damage and Immediate Needs Assessment, which includes: o In-depth assessment of social factors, infrastructure, and cross-cutting aspects (gender, environment, governance, risk reduction, and livelihoods); o Rapid assessment of damage, losses, immediate needs of the affected population.
	Means and tools for recording alert and response data	Alert recording system involves: o Archiving in paper and electronic forms within ANPC warehouses as well as in email inboxes; o Damage assessment conducted through paper forms or electronically via Kobocollect.

(Badjedke, M et al., 2022)

3.4.5.2 Local preparedness capacities

At the local level, preparedness capacity is driven mainly by the decentralised services of ANPC and the TRC, with support from local authorities and community volunteers. Community contingency plans currently exist only in areas covered by TRC programmes, resulting in uneven preparedness coverage across the national territory.

Local preparedness focuses on community awareness-raising, evacuation preparedness and basic response training, delivered through a participatory approach by the TRC. Limited rescue equipment, including life jackets and motorised canoes, is available in selected high-risk areas, but overall equipment levels remain insufficient relative to exposure and vulnerability. Reception sites for displaced persons are identified in some localities, but their preparedness levels vary considerably in terms of water access, sanitation, shelter capacity and security.

Local response remains predominantly emergency-driven. Preparedness actions are generally not activated by predefined forecast thresholds, but rather in reaction to the occurrence of events or field observations. There are no standardised local protocols for preparedness activation based on warning levels, and feedback from community response is not systematically documented nor integrated into national-level review processes. As a result, local preparedness capacity remains uneven, project-dependent and weakly linked to national anticipatory planning systems.

The following table delineates the critical gaps requiring attention in the implementation process of Togo’s multi-hazard EWS, specifically focusing on its four foundational components.

Table 29: Gaps to address in implementing the 4 components of Togo's multi-hazard EWS

Components	Challenges	Actions
Knowledge of risk	The gaps in the system identified include: **Spatial:** • Lack of comprehensive risk mapping covering the entire territory for better anticipation and planning; • Inadequate utilisation of available satellite information to analyse vulnerable and at-risk areas. **Temporal:** • Absence of real-time meteorological and hydrological observations to evaluate situations and issue timely warnings and alerts; • Insufficient communication between services and affected populations, particularly during events. **Infrastructure and operations:** • Need to strengthen and establish interconnected systems for collecting and managing information, including risk maps and documentation of impacted areas; • Lack of coordinated processes among different institutions and actors contributing to information gathering and risk analysis; • Inadequate operationalisation of multidisciplinary working groups for agro-hydroclimatic monitoring; • Absence of standardised tools for multirisk EWS	• Enhance tools, information, and capacities for combating hydroclimatic events in high-risk zones, crucial for territorial planning, local community development, agriculture, and sanitation; • Establish comprehensive maps, databases, and documents delineating vulnerable areas to urgent threats (e.g., extreme rainfall, flash floods) and long-term hazards (e.g., droughts, slow environmental degradation like coastal erosion) to facilitate swift action and develop vulnerability reduction strategies. • Implement a risk information management system to collect, process, and analyse data on the impact of hydroclimatic hazards, fostering better preparedness and planning; • Develop an integrated system of platforms and databases among institutions to standardise and build a robust risk management repository, effectively meeting the needs of risk prevention efforts.
Observations, climate forecasting, meteorological, and hydrological forecasting	**Infrastructure:** • Limited capacity for database operation and information management; • Lack of standardised computer solutions for data sharing among hydrological surveillance and forecasting systems; • Absence of hydrological data analysis and processing systems, affecting forecast quality; • Inadequate real-time data connection from automatic weather stations and digital forecast products for flood modelling and analysis; • Insufficient involvement of hydrological stations in forecasting systems. **Practices and hydrological forecasting systems:** • Lack of institutional support for developing and maintaining forecasting systems; • Limited coverage and flexibility of existing hydrological forecasting systems; • Underutilisation of information from other forecasting support systems; • Lack of online accessibility for existing forecasting systems;	• Enhance hydrological monitoring and forecasting practices through a strategic plan focused on hydrological service development; • Utilise existing system information to assess their potential and relevance for flood forecasting, emphasising the need for a comprehensive hydrological forecasting framework; • Address limitations in seasonal forecasts by implementing a simple modelling and analysis framework, initially supporting the DRE and later considering more advanced ensemble forecasting approaches; • Recognise the importance of establishing a local flood forecasting system for Lake Togo, requiring continuous support from various programs to enhance understanding and modelling of its complex dynamics; • Establish a unified access system for specific forecast products, integrating meteorological and climatological data to enhance situational evaluation and flood alert decision-making;

	• Need for inventory construction of flood situations and episodes; • Absence of a national flood forecasting structure. **Forecasting products, communication, and exchange:** • Need for development of national-level hydrological condition products and flood occurrence possibilities; • Improvement in communication process and access to forecasting products between institutions. **Human resources:** • Significant shortage of technicians and engineers for flood forecasting processes; • Lack of dedicated training plan to enhance technician capabilities.	• Implement a standardised hydrometeorological data exchange system to ensure accurate representation of Togolese conditions, leveraging platforms like World Hydrological Observing System (WHOS) supported by the WMO; • Involve national teams in the development process to ensure knowledge transfer and provide practical analysis solutions to support the understaffed DRE; • Foster collaboration between meteorological and hydrological agencies to consolidate flood forecasting capabilities, aiming to enhance information generation and communication tailored to user needs. • Enhance hydrometeorological alert assessment and decision-making processes by investing in improved forecasting methods and tailored tools to address existing weaknesses and ensure representativeness of information;
Alerts, communication and dissemination	• Need to reassess the institutional structure and roles/ responsibilities within the alert chain to clarify contributions regarding climate, meteorological, and hydrological information; • Insufficient financial and human resources, equipment, and training for institutions directly involved in the alert system; • Limited contribution from institutions like ANAMET and DRE in the alert process, requiring quantitative, impact, and flood prediction improvements nationally; • Lack of common indicators, alert thresholds, and associated actions among different actors in the alert chain; • Absence of protocols and technological means for data and information exchange between alert chain institutions; • PNRRC lacks standardised operational procedures for sending and disseminating alerts and verifying their reception by local populations, as well as mechanisms for cross-border data and multirisk alert message exchange; • Inadequate public awareness of alert messages and the need for more frequent simulation exercises to evaluate the overall functioning of the alert chain: • Limited partnership development with the private sector to enhance communication and dissemination of alerts and warnings.	•Develop a comprehensive plan to harmonise responsibilities in information production and dissemination for flood alerts, emphasising collaboration among stakeholders and outlining clear operational guidelines; • Define stakeholder roles and integration of communication systems, followed by the creation of SOPs manuals to guide alert system operations and institutional roles; • Improve information exchange and communication between key alert chain institutions, transitioning from email to more efficient technological platforms, interconnected systems, and centralised databases to facilitate risk analysis, timely alert definition, and rapid intervention actions; • Standardise flood and other hydroclimatic alerts thresholds through joint efforts between hydroclimatic information producers and disaster management institutions, complemented by workshops for capacity-building and knowledge exchange; •Enhance flood awareness campaigns supported by educational and research institutions to strengthen community ties and disaster management efforts.
Preparedness and response	• Lack of an operational plan guiding preparation towards timely provision of forecasts and products for alerts; • Obsolescence of certain preparedness and response plans; • Weak technical capacities for analysing and managing data and information collected during response actions, hindering the rapid assessment of assistance	• Revise and update existing preparedness plans while developing regional plans with tailored actions; • Structure preparedness mechanisms for forecasting floods associated with extreme and rapidly evolving events;

	needs while considering the characteristics of the affected population (presence of children, pregnant women, disabled individuals, injured persons, etc.).	• Map vulnerable areas to various climatological, meteorological, hydrological, and other major natural risks; • Engage communities in disaster-related situation assessment; • Conduct awareness campaigns for vulnerable communities on evacuation measures; • Provide training to rescue and assistance personnel based on their areas of expertise; • Review, update, and develop response and intervention plans as needed; • Enhance practices for damage assessment due to floods and other natural events; • Establish tools and databases for collecting damage and loss data resulting from hydroclimatic situations.

(Badjedke, M et al., 2022)

4. Project Baseline and Barriers

4.1 Baseline Projects and Programmes

4.1.1 Health Projects and Programmes

The table below lists the most relevant projects related to health funded in Togo.

Table 30: Health projects and programmes in Togo

Name	Funder, budget, duration	Description
Creation of the National Digital Health Centre (MSHPAUS, 2024a)	Funder: UNDP Budget: USD 2 million Duration: 2024 – under implementation	The CNSD in Togo is a collaborative initiative launched in 2021, in partnership with the MSHPCSUA to strengthen healthcare through digital technologies. It will serve as the national hub for eHealth governance, providing a structured framework for digital health initiatives. Key activities include expanding teledermatology services to connect remote patients with specialists, introducing tele-ultrasound programs to improve maternal, infant and child health, and developing a comprehensive national eHealth strategy. The CNSD will enhance access to quality healthcare in rural areas, supports high-risk pregnancy monitoring, and fosters digital health innovation. Future plans involve assessing program impacts and creating scalable models to replicate successful digital health interventions across Africa, contributing to Togo's goal of achieving Universal Health Coverage by 2030.
Health emergencies preparedness and response strengthening in Togo	Funder: The Pandemic Fund Budget: USD 18.9 million Duration: 2023 – under implementation	The Pandemic Fund's project in Togo focuses on strengthening Togo's capacity for pandemic prevention, preparedness, and response using a One Health approach, which integrates human, animal, and environmental health. The goal is to address the country's high risk for epidemics and epizootics. Key achievements as of mid-2024 include: • Establishing Infection Prevention and Control Committees in regional hospitals. • Completing a National Action Plan for integrated disease surveillance and for AMR. • Training and equipping community volunteers for emergency response. Objectives also include developing a national genomic surveillance strategy to support sustainable infection prevention and control in HF. The implementing entities for the project are the WHO, UNICEF, and FAO. While a specific end date is not provided, the project's progress is being monitored, with over USD 2.1 million spent on implementation activities as of June 2024.
Health system strengthening - sexual and reproductive health and rights (KfW-SRDR)	Funder: KfW Budget: Phase I-IV EUR 59 million Duration: 2017-2032	The project objective is to increase of quality and use of basic healthcare services in Togo. More specifically, the project aims to contribute to the MSHPCSUA goals of reducing maternal and neonatal mortality as well as increasing the contraceptive prevalence rate. The project's activities affect all levels of the health pyramid, from the MSHPCSUA's national directorates to 110 USPs in the Kara (80) and Central (30) regions, as well as their respective regional and prefectural directorates. More concretely, Phases I and II concentrate on the Kara region and prioritise investments in Emergency Obstetric and Neonatal Care (EMONC) facilities, including rehabilitation and equipment of health infrastructure, establishment of regional maintenance mechanisms, and investment-accompanying measures to improve quality of care and service utilisation. In addition, the project includes support to a regional isolation and treatment centre,

		strengthening emergency preparedness and clinical response capacity. Phase III extends the EMONC-focused approach to the Centrale and Savanes regions, maintaining the same integrated package of infrastructure investments, capacity building, and communication measures. Given the higher levels of fragility in northern Togo, Phase III also incorporates adaptations to the security context and addresses elevated needs for emergency and maternal health services, including for pregnant women, as identified through feasibility assessments. Phase IV extends proven EMONC, quality, and demand-creation approaches to the Maritime Region and Greater Lomé.
Development and execution of a health emergency response plan (MSHP, 2020a)	Funder: World Bank Budget: USD 8.1 million Duration: 2020-2022	Guarantee health coverage and access to basic services for all by strengthening access and improving the quality of the health system. 2025 target: • Number of HFs implementing health emergency management procedures: 600 • Epidemics (at high risk of occurrence in Togo) covered by the health emergency system. Main project activities • Define the mechanisms and processes for responding to and managing health crises; • Put in place mechanisms for managing the supply of strategic drugs throughout the entire supply chain; • Reinforce emergency equipment and infrastructure; • Put in place an emergency reorganisation plan.
Implementation of Universal Health Coverage (WBG, 2021b)	Funder: World Bank Budget: USD 70 million Duration: 2021-2026	Improve access to primary and basic care Strengthening access and improving the quality of the health system. • Densification of the care offer (construction of centres and recruitment of staff); • Reinforcement and modernisation of equipment; • Implementation of Universal Health Coverage (for young people under 18, identified vulnerable populations, pregnant women, and the elderly). The intervention area covers the six (6) health regions of Togo, but some interventions will specifically concern for the disadvantaged regions of Plateaux, Centrale, Kara and Savanes.
Disease Surveillance Systems Strengthening Project-REDISSE (ECOWAS region) (WBG, 2018a)	Funder: World Bank Budget: USD 114 million Duration: 2017-2019	**Overall vision:** End extreme poverty and promote more shared prosperity. "Health component" goal: Help Togo provide vital health and nutrition services to more than 1.3 million people, 60% of whom are women and girls under the age of five. The REDISSE project aims to strengthen national cross-sectoral capacities for collaborative disease surveillance, preparedness and response to epidemics in West Africa. It includes 5 components, namely: • surveillance and health information; • laboratory capacity-building; • emergency preparedness and response; • human resource management for effective disease surveillance; • and institutional capacity-building, project management, coordination, and advocacy. Fields: Medical products, vaccines, and medical technologies/Health human resources.
Sahel Women's Empowerment and Demographic Dividend (SWEDD+)	Funder: World Bank Budget: USD 66,3 million Duration: 2023–2028	The SWEDD+ initiative aims to accelerate women's and girls' empowerment and contribute to the demographic dividend by addressing structural gender inequalities. The programme focuses on improving access to sexual and reproductive health services, strengthening girls' education

		and life skills, expanding economic opportunities for young women, and promoting positive social and behavioural norms to prevent early pregnancy, early marriage, and gender-based violence. SWEDD+ also strengthens institutional capacity for gender-responsive planning and coordination across sectors. In Togo, the initiative has contributed to improved utilisation of reproductive and maternal health services, increased participation of adolescent girls and young women in education and economic empowerment activities, enhanced community awareness on gender equality and girls' rights, and strengthened national and local systems to integrate gender and demographic considerations into development planning.
Child Survival – Education–Child Protection–Social Policy	Funder: UNICEF Budget: USD 510,000 Duration: 2024–2026	The project aims to ensure that every girl and boy in Togo lives in a more resilient, protective, equitable, and inclusive society, where children's rights are respected and their voices matter.
UNFPA Health Programme	Funder: UNFPA Budget: USD 18.6 million Duration: 2024–2026	This is a set of projects/components focusing on family planning, maternal health, sexual rights, prevention of gender-based violence and harmful practices, as well as the empowerment of women and girls and the protection of their rights
GAVI Alliance-Expand Vaccination Program	Funder: GAVI Funds Budget: USD 250 million (Global) Duration: 2017-2021	Overall objective: Support Togo's EPI to increase equitable coverage of life-saving vaccines and reduce morbidity and mortality from vaccine preventable diseases. GAVI support focuses on: - Funding the expansion of routine vaccine coverage in all health regions, including COVID-19 vaccination and catch-up activities for under-immunised children; - Strengthen immunisation information systems and data quality (in particular the use of DHIS2 for recording, reporting and analysis of vaccination data); - Reinforcing the vaccine supply chain and cold chain at central, regional and facility level (logistics, equipment and maintenance) to reduce stock-outs and losses; and - Supporting supervision, training and community outreach to reach hard-to-reach and vulnerable populations. Overall the programme aims to improve vaccine coverage and equity while consolidating data systems and the vaccination supply chain (MSHP, 2020a). (Gavi 2020, Joint Appraisal Togo)
Global Sanitation Fund support for the Togo SANDAL Initiative (Joint SDG Fund, 2020)	Funder: GSF Budget: USD 7.8 million Duration: 2014-2019	The SANDAL Initiative, supported by the GSF, aimed to increase equitable access to improved sanitation and hygiene services in Togo through sustainable, community-led approaches. The programme focused on eliminating open defecation, promoting lasting behaviour change in sanitation and hygiene practices, and strengthening national and local institutional capacities for sanitation service delivery, in line with SDG 6. The initiative contributed to improved sanitation coverage in targeted areas, strengthened community-led total sanitation (CLTS) approaches, and enhanced the capacity of local authorities and community structures to plan, implement, and sustain sanitation interventions. It also helped establish national frameworks and operational experience that informed subsequent sanitation and hygiene programmes, including later support under the Joint SDG Fund.
GIZ - Health System Strengthening – Sexual and Reproductive Health	Funder : BMZ Budget : ProSanté II EUR 15.6 million	Objective: To improve the quality of the health services, the project has developed a national quality management system in collaboration with its Togolese partners. More than 100 HFs in Kara and Central regions are now

and Rights (ProSanté III)	EUR, ProSanté III EUR 16.3 million Duration : ProSanté II 2021-2023, ProSanté III 2024-2026	implementing this approach. It focuses on capacity-building, communication, management capacities and response capacities to emergencies. Further information is provided below.
Programme Régional d'Appui à la Prévention des Pandémies dans la Région de la CEDEAO (GIZ - RPPP)	Funder: BMZ Budget: EUR 13.9 million Duration: 2021- 2024	Objective: strengthen the pandemic prevention and control based on the One Health approach. The strategy focuses on: • Establishing the Centre for Research in Science and Medicine (CRSCM), • Strengthening EWS, • Operationalising the regional coordination coordination mechanism for the One Health approach, as well as strengthening core capacities in line with the International Health Regulations (IHR).
GIZ-BACKUP Health – Global Programme Health Systems Strengthening	Funder: BMZ Budget: 85.3 million Duration: 2020-2026	BACKUP Health is a multi-country technical cooperation programme that works with global health initiatives such as the Global Fund and the Providing for Health (P4H) Network to ensure that their resources not only fight specific diseases but also strengthen resilient health systems. It supports partner countries throughout the funding cycle by improving alignment and coordination of global and national health financing, advising on policy and system development (including regional vaccine production), and strengthening the capacities of key actors. The programme emphasises gender equality, human rights and civil society participation, and distils lessons learned that can be scaled up in future GHI-funded measures. Togo is one of the flexible support countries benefiting from this assistance.
GIZ-Sector Initiative Global Health	Funder: BMZ Budget: 15,6 million Duration: 2023-2026	Sectoral initiative providing assistance in the following: • Advice on funds; • Expansion of Universal Health Coverage; • Digitalisation of health and health data; • Knowledge management. Particularly in its advisory role to funds, GIZ and its partner BMZ participates in the management bodies of Gavi, the GFATM, and the Global Polio Eradication Initiative (GPEI). The project provides advice on COVID-19 and access to vaccines, tests and treatments, as well as advising on vaccine and pharmaceutical production in Africa.
Project Against Malaria Foundation (Against Malaria Foundation, 2023)	Funder: Against Malaria Foundation Budget: N/A Duration: 2023 - 2025	Distribution of 3.9 million nets to five regions protecting 7 million people.
Malaria Operational Plan Financial Year 2023 and 2024 (PMI, 2024)	Funder: US President's Malaria Initiative (PMI)/USAID Budget: NA Duration: 2024 -2025	The plan aims to significantly reduce malaria mortality and morbidity through key interventions including comprehensive prevention, vector control, and strengthened case management. Aligning with national strategies, PMI's support is crucial for improving data quality, surveillance, and commodity distribution to combat this persistent disease effectively. Since 2016, the PMI aims to eliminate malaria in 24 African countries, including Togo. Unfortunately, PMI fundings in Togo are being significantly reduced since USAID withdrew. Even ongoing processes at the time of this withdrawal have undergone significant disruptions. For instance, as part of the upcoming mass mosquito net distribution campaign in Togo, in April 2026, PMI had committed to providing 900,000 mosquito nets. However, they will ultimately only provide 330,000, creating a gap of 570,000 units, or approximately EUR 2 million.
Support to Malaria, HIV and Tuberculosis	Funder: Global Fund Budget: EUR 113 million – HIV: EUR 45 million	Objectives: • End HIV, tuberculosis, and malaria by 2030; • Build resilient and sustainable systems for health and strengthen pandemic preparedness;

	– TB: EUR 4 million – Malaria: EUR 64 million Duration: 2024 -2026	• Foster a healthier and more equitable world. The GF aims to put people and communities at the centre of their work and to address structural barriers (incl. human rights and gender-related barriers), to achieve a lasting impact. The process of developing concept notes for the next funding cycle will take place in 2026, with implementation from January 2027 to December 2029.
C19RM (Covid-19 Response Mechanism)	Funder: Global Fund Budget: USD 45,5 million Duration: 2021 -2025	The Covid-19 Response Mechanism (C19RM) was designed to support countries in 3 broad categories: • COVID-19 control and containment interventions; • activities to mitigate the effects of the pandemic on HIV, TB and malaria programs; • and expanded reinforcement of key aspects of health community systems. Since 2022, epidemiologic trends in case notification, morbidity and mortality have prompted a transition towards strengthening systems for health and pandemic preparedness.
SURGE Regional initiative - Strengthening and Utilising Response Groups for Emergencies (MSHPAUS, 2022)	Initiator: WHO Budget: N/A Duration: 2022 - 2026	The SURGE initiative in Togo aims to reinforce national preparedness and rapid response to public health emergencies by establishing a multidisciplinary team that can be mobilised within 24 hours of an alert. As one of the pilot countries, Togo has trained 50 experts from key sectors such as health, security, civil protection, agriculture and environment through a four-week intensive programme covering incident management, surveillance, logistics and risk communication (OMS, 2022b). To operationalise these capacities, the programme has provided vehicles (including an ambulance), emergency kits and access to an online training platform, which complement the existing public health emergency operations centre and rapid response mechanisms. Although detailed country-level budget figures for Togo are not publicly disclosed, SURGE is part of a substantial multi-year regional investment led by WHO and partners, designed to help countries like Togo better absorb, manage and recover from increasingly frequent health emergencies (OMS, 2022a).
Strengthening the Health System and Primary Healthcare	Funder: Inter-American Development Bank (IDB) Budget: EUR 58,61 million Duration: 2023 - 2026	Objectives: • Improve the use of health services coupled with the fight against the main communicable diseases (HIV/AIDS, tuberculosis and malaria); • Strengthen health sector governance. It will be executed through 6 components: i) Improved service offering; ii) Improving service quality; iii) Improved governance of the health sector; iv) Support for project implementation; v) Financial audit; vi) Unforeseen for emergency interventions.
Integrate Health (*Santé Intégrée* – SI)	Funder: SI Budget: N/A Duration: mid-2010 – under implementation	SI aims to strengthen community health systems by improving access to quality primary healthcare through well-functioning Community Health Workers (ASC), aligned with the national Community-Based Interventions (IBC) policy. Its interventions focus on integrated service delivery, strengthened supervision, improved data use, and enhanced referral for maternal, neonatal, and child health. The approach has contributed to more structured CHW recruitment and management, improved utilisation of community-level health services, strengthened routine data collection and use for decision-making, and the generation of operational models that inform national policy dialogue on community health system strengthening.

Plan International Togo (PIT)	Funder: Divers Budget: N/A Duration: Since 2010 – under implementation	PIT aims to improve the wellbeing of children, adolescents, and women by strengthening access to quality health, WASH, and SRHR services, with a strong focus on girls' empowerment and social norms change. Its interventions promote adolescent sexual and reproductive health, menstrual hygiene management, school and community WASH, and inclusive behaviour change, increasingly integrating climate and resilience considerations. Plan International's activities have contributed to improved hygiene practices, increased girls' school attendance and retention, enhanced use of SRHR services by adolescents, strengthened community awareness on gender equality, and more resilient, gender-responsive WASH and health practices at community and school levels.

4.1.1.1 GIZ ProSanté Project

ProSanté Phase III (2024-2026), titled "Strengthening the health system – sexual and reproductive health and rights (SRHR). is currently being implemented by GIZ, the Accredited Entity (AE) of this proposed project. Commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and co-financed by KfW Development Bank, this phase has an overall budget of nearly EUR 16.3 million. It directly builds on ProSanté Phase I (2017-2020), and Phase II (2020-2023), which focused on improving the quality of health services in 135 HFs in the Kara and Central regions (GIZ, 2022b).

ProSanté III aims to enhance the health of the population, particularly women, young people, and children, through three main components: enhancing the quality of health services, particularly SRHR services; increase the competences of community actors to empower girl, women and men to use SRGR and nutrition; supporting health system strengthening and resilience. The project continues to operate in the Kara and Central regions, while expanding its activities to the Savanes region, targeting 135 HFs.

The prior to effectiveness activities describe measures implemented under ProSanté III in the 12 months before the start of the proposed GCF project. Due to their strong thematic alignment and direct contribution to the proposed intervention logic, these contribute to the objectives of project proposition. The overall contribution is EUR 2,900,000. The attributable resources are distributed across the GCF project components as follows:

- Component 1 – Strengthening the surveillance system for climate-sensitive diseases accounts for approximately EUR 50,000. Activities include, inter alia, capacity strengthening of the national meteorological service (ANAMET) and the development of climate–health bulletins to support early warning and data-informed decision-making.
- Component 2 – Building an enabling environment to increase health sector resilience amounts to approximately EUR 360,000. Key activities include the update of the Health Sector Adaptation Plan, the development of a climate–health curriculum for Master's-level students, and technical and coordination capacity strengthening for ministries, civil society organisations, and the academic sector. This component also includes an assessment of e-learning potentials to support scalable and sustainable capacity development.
- Component 3 – Climate-resilient and low-carbon infrastructures, technologies, and supply chains represents approximately EUR 1,400,000. Activities include construction costs for the Tindjassi health centre, as well as measures to strengthen maintenance capacities of health facilities, and the procurement of medical equipment and operational supplies.
- Component 4 – Enhancing community adaptation and engagement amounts to approximately EUR 480,000. Activities focus on training and technical support to local governments and communities, including the promotion of gender-transformative approaches, integration of

health considerations into decentralisation processes, and support for local resource mobilisation.

- Overarching: The remaining EUR 610,000 correspond to personnel-related expenditures and associated overheads required for effective project implementation and management.

A significant synergy exists between ProSanté III and the proposed GCF project. This is evident through their shared focus on integrating climate and environmental components, their common target regions (Kara and Central, with Savanes being an expansion for ProSanté III), and their shared focus on key vulnerable populations. Although ProSanté III primarily addresses reproductive and sexual health, the proposed CSHO (malaria, diarrhoea, and the effects of heat) largely concern the same groups: mothers, infants, and children. The proposed project can directly benefit from the institutional knowledge, established relations, and built capacities leveraged by GIZ through the multi-phase ProSanté initiative.

The table below details the synergies between ProSanté III and the proposed GCF project.

Table 31: Synergies between ProSanté and this GCF project

Synergies	ProSanté III	Proposed GCF project
Capacity building	Medical staff are systematically trained in subjects such as quality management, family planning, ante- and postnatal care and prevention and control of infections. The project supports basic training at schools for midwives and birth attendants.	The GCF project will build the capacities of the health system to react to climate-sensitive health problems. This will include the development of health training programs in higher education institutions and in professional settings. It will also build capacity in prevention and management of CSHO.
Communication	Implementation of an extensive communication strategy based on change agents, mothers and fathers' clubs or community leaders, as well as on mass communications. Development of a specific communication strategy for climate change and health and its implementation.	The GCF project will strengthen community-level capacity and awareness on the links between climate change and health. It will also encourage behavioural change, particularly around the prevention of diarrhoea and malaria, as well as mitigation of extreme heat events on maternal and infant health. The conceptual bases of communication materials during ProSanté III will be built upon.
Steering capacities	The MSHPCUAS was supported in establishing a Climate and Health Task Force, which is being strengthened through continuous coaching, technical training, and participation in international events. In addition, the Task Force is receiving support to update the PNAS, which is expected to be completed by early 2026.	The GCF project will strengthen intersectoral collaboration, accountability and leadership mechanisms specifically on the nexus between climate change and health issues through the creation of a central and regional CCUs.
Infrastructure	One maternity ward will be newly built, and additional renovations will be carried out during ProSanté III.	The GCF project will strengthen the infrastructure of HFs, primary schools and kindergartens with regards to heat reduction and improvement of WASH infrastructure while also addressing

		broader aspects like cold chain and digital infrastructure for a more resilient health system in Togo.
Quality management	A key activity of ProSanté I-III is the improvement of the quality of services of the HFs, which is achieved through training, coordination, equipment and supervision.	The GCF project will strengthen the integration of climate relevant norms into the quality approach with regards to environmental health, medical waste and awareness of the climate impacts on health outcomes.
Strengthening of laboratories	ProSanté II has supported the construction of a regional antenna of the National Hygiene Institute (INH) to allow the provision of keys diagnostic services for the northern region. During ProSanté III, the project supports the accreditation of the INH Kara laboratory for water and food microbiology.	In the GCF project, laboratory capacities — particularly for malaria diagnostics — will be strengthened, and the water testing capabilities will be further enhanced and fully utilised.
Research	WASCAL received support to strengthen its capacities in climate-risk and vulnerability assessments, qualitative data collection, and contributions to the communication concept. Its collaborations with renowned research institutions were also strengthened. WASCAL was also supported in developing a research proposal to the Wellcome Trust's Climate Impact Awards. In addition, WASCAL is supported in developing a curriculum on climate change and health.	The GCF project will continue to strengthen WASCAL's capacities by supporting the implementation of a training programme and its participation on research concerning the nexus topic.
Response (ProSanté II)	To contain the spread of COVID-19, the project has increased the health system's response capacity. To this end, it has built a new reference laboratory, improved the diagnostic skills, supported communication campaigns and supported vaccination coverage through extreme cold chain strengthening.	The GCF project aims for a comprehensive approach to last-mile delivery, all while working in synergy with ongoing health initiatives to ensure effective and sustainable access to essential medication and vaccinations for vulnerable communities.

4.1.2 Climate Change Projects and Programmes

The following tables summarise the relevant adaptation, cross-cutting and mitigation projects relating to climate change in Togo.

Table 32: Relevant climate adaptation projects in Togo

Information	Description
Title: FP205 Infrastructure Climate Resilient Fund (ICRF) **Budget:** USD 765.075 million **Duration:** 10 years (2024 – 2034) **Funder:** GCF **Agency:** Africa Finance Corporation (AFC)	The multi-country ICRF promotes large-scale investment in climate-resilient infrastructure across 19 African countries, including Togo. It targets four asset classes – transport, energy, economic zones, and digital infrastructure – using a blended finance model where GCF equity de-risks private capital. The Fund supports technical assistance, climate risk assessment, and parametric insurance to enhance long-term resilience. Togo's inclusion aligns with national climate priorities, and the ICRF complements the proposed GIZ-GCF project by strengthening the enabling infrastructure (energy, ICT, and data systems) essential for climate-resilient health service delivery.

Title: SAP48 Strengthening the resilience of vulnerable communities within high climatic and disaster risk areas in Togo **Budget:** USD 27 million **Duration:** 5 years (GCF approved – 2025) **Funder:** GCF **Agency:** West African Development Bank (BOAD)	The project aims to improve the preparedness capacities of national institutions and strengthen the resilience of local communities to climate change and disaster risks by reinforcing the existing early warning system and training vulnerable populations in Togo (see *Section 4.1.2.1*). The proposed actions fall into the following four components: • improving knowledge and understanding of disaster risks; • strengthening governance to better manage disaster risks; • investing in disaster risk reduction for resilience; • strengthening disaster preparedness, response and recovery capacities.
Title: Integrated Disaster and Land Management Project (WBG, 2018b) **Budget:** USD 16.9 million **Duration:** 5 years (2011-2016) **Donor:** WBG **Agency:** Togolese Ministry of Environment and Forest Resources	The overall objectives are to i) strengthen the institutional capacity of targeted institutions to manage flood and land degradation risks in targeted rural and urban areas, and ii) to expand sustainable land management in targeted landscapes and climate-vulnerable areas of Togo. More specifically, the project aims to strengthen the capacities of disaster risk reduction and sustainable land management organisations/institutions and set up early warning and knowledge monitoring systems on climate risks.
Title: Support the strengthening of national capacity to deliver climate, hydrometeorological and early warning services in selected sectors and communities **Budget:** USD 2.4 million **Duration:** 5 years (2020-2025) **Funder:** WGB **Agency:** WBG, GFDRR	The project aims to improve Togo's early warning services for drought, floods and other severe climate events by building the capacity of national services in charge of i) meteorology and climate; ii) hydrology; iii) civil protection. Resources support scientific/technical expertise and capacity development for national services and local communities. The CREWS project provides substantial, multi-faceted support to ANAMET, focusing on elevating its technical capabilities from observation to national warning dissemination. The support is channelled across three key areas: • Forecasting and data modernisation: providing access and training on advanced forecasting tools, enabling ANAMET to develop new processes for both sub-seasonal forecasting and crop monitoring. • Specialised meteorological training: investing in institutional strengthening from meteorological training and international knowledge exchanges to refine flood warning procedures. • Warning dissemination and standardisation: enhancing the operational delivery of warnings by supporting the adoption of international standards.
Title: Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin **Budget:** USD 7,920,000 **Duration:** 4 years (2023-2027) **Donor:** Adaptation Fund **Agency:** WMO	This project, covering Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Togo aims to develop capacity and frameworks at the local, national and regional levels to ensure risk-informed decision-making. Moreover, its objective is to foster practical, environmentally friendly adaptation measures using an integrated approach.

4.1.2.1 *"Strengthening the resilience of vulnerable communities within high climatic and disaster risk areas in Togo (BOAD)" project and this GCF project*

The BOAD SAP48 Funding Proposal (FP) "Strengthening the resilience of vulnerable communities within high climatic and disaster risk areas in Togo" has been approved by the GCF in March 2025. As the first single-country project for Togo in the GCF portfolio, this initiative is designed to enhance the preparedness capacities of national institutions and build the resilience of local communities against climate change and disaster risks. This will be achieved by strengthening the existing early warning system and providing targeted training to vulnerable populations.

The project focuses on strengthening the capacity of national and subnational entities to monitor climate change, generating reliable hydrometeorological information (including forecasts) and being able to combine this information with other environmental and socio-economic data to improve evidence-based decision-making for early warning and adaptation responses and planning. In addition, improved national systems will be prioritised to address the needs and wants of the most vulnerable communities. The BOAD project will have the largest implications for Component 1 of this project, "Strengthening the surveillance system for climate-sensitive infectious diseases", and Component 4, "Enhancing community adaptation and engagement through climate-informed health communication".

Table 33: Synergies with the BOAD SAP FP "Strengthening the resilience of vulnerable communities within high climatic and disaster risk areas in Togo"

HEWS Project	Health Project
Component 1&2: Strengthen governance to better manage disaster risks management and warning dissemination. **Activities include establishing national frameworks for climate services and DRM, strengthening ANAMET/ANPC/DRE, modernising monitoring equipment and creating a multi-hazard data centre to support the early warning system.**	Under Component 1, an integrated climate and health information system is operationalised, which includes capacity-building at national and regional level. This system builds on the climate services and data generated by the BOAD project (automatic stations, ANAMET data, risk analyses) to develop models of CSHO, risk maps and a H-EWS. Under Component 4, output 4.2 aims to enhance climate-informed health communication and strengthen community awareness. The climate–health messages and tools developed by the GIZ project are disseminated through the same multi-channel communication means and community alert networks established by the BOAD project (radio, SMS, community focal points, etc.), thereby creating a single communication mechanism covering both disaster risks and health risks.
Component 3: Investing in disaster risk reduction for resilience. Investing in disaster risk reduction for resilience. The BOAD project establishes forecast-based action protocols and a national Emergency Fund to finance anticipatory measures and risk reduction investments across several sectors.	The GIZ project applies these principles in the health sector by financing climate-resilient health infrastructure, the cold chain and supply chains in the northern regions, complementing community-level interventions under Component 4 and thereby illustrating a concrete sectoral application of the BOAD mechanism rather than double funding.

Table 34: Relevant climate cross-cutting and mitigation projects in Togo

Information	Description
Cross-cutting	
Title: FP223 Project GAIA **Budget:** USD 1.5 billion **Duration:** 30 years (2023-2054) **Donor:** GCF **Agency:** MUFG Bank, Ltd.	Project GAIA is a multi-country blended finance platform designed to mobilise private capital for climate mitigation and adaptation investments in 18 emerging markets, including Togo. The program de-risks private investors and directs at least 70% of its portfolio toward adaptation – particularly in health, water security, and resilient infrastructure. GAIA aligns closely with the proposed GIZ–GCF project in Togo through shared priorities in climate-resilient health systems, infrastructure, and institutional capacity-building, complementing public sector efforts with scalable private finance mechanisms for adaptation.
Title: FP219: Staple Crops Processing Zone, Promoting Sustainable Agricultural Value Chains **Budget:** USD 271.7 million (USD 40.7 million to Togo specifically) **Duration:** 5 years (2025-2030) **Donor:** GCF **Agency:** AfDB	FP 219's objective is to strengthen climate resilience and reduce GHG emissions within agricultural value chains across Togo, Senegal, and Guinea, to stimulate productivity and income generation. The program focuses investment on drip irrigation powered by solar pumps and renewable energy technology (biogas, solar PV) for crop processing.
Title: FP211 Hardest-to-Reach **Budget:** USD 250 million **Duration:** 12 years (2024 - 2036 **Donor:** GCF **Agency:** Acumen Fund Inc.	The Hardest-to-Reach (H2R) initiative aims to expand access to off-grid solar (OGS) energy for vulnerable populations across 16 sub-Saharan countries, including Togo, to close the energy access gap and strengthen climate resilience. The initiative supports OGS companies through two facilities: the Market Support Facility for early-stage ventures and the Market Expansion Facility for scaling operations. FP211 targets both mitigation and adaptation outcomes through improved energy access, reduced indoor pollution, enhanced health, and greater adaptive capacity to climate change.
Title: FP095 Transforming Financial Systems for Climate **Budget:** USD 700 million **Duration:** 7 years (2019-2026) **Donor: GCF** **Agency:** Agence Française de Développement (AFD)	FP095 is a large-scale global programme that includes Togo among 17 participating countries. Its objective is to scale up private climate finance by engaging local financial institutions to fund low-carbon and climate-resilient investments. Through a Credit Facility and Technical Assistance component, it builds the capacity of banks, project developers, and policymakers to originate, finance, and manage green projects. FP095 promotes systemic change by integrating climate criteria into national financial systems – supporting Togo's resilience goals, private sector adaptation financing, and green infrastructure development.
Mitigation	

Title: FP198 CATALI.5°T Initiative: Concerted Action to Accelerate Local I.5°Technologies **Budget:** EUR 36.5 million **Duration:** 6 years (2022-2028) **Donor:** GCF **Agency:** GIZ	CATALI.5°T is a multi-country initiative that supports early-stage climate technology ventures in West Africa and Latin America, including Togo, to accelerate innovation aligned with the 1.5°C goal. The program builds regional technical assistance and investment platforms to identify, mentor, and finance up to 180 start-ups, fostering low-carbon solutions in energy, transport, industry, and land use. By strengthening entrepreneurial ecosystems and promoting digital, clean energy, and infrastructure innovations, FP198 indirectly supports Togo's climate-resilient development through enhanced local capacity, innovation, and green business opportunities.
Title: FP151 Global Subnational Climate Fund (SnCF Global) – Technical Assistance (TA) Facility **Budget:** USD 28 million **Duration:** 7 years (2021 – 2028) **Donor:** GCF **Agency:** IUCN	The TA Facility supports the development of bankable, high-integrity climate projects for investment through the SnCF Global Fund. It assists subnational actors in designing low-carbon, resilient infrastructure across sectors such as water, sanitation, waste, energy, and urban development. In Togo, FP151 promotes climate-resilient WASH and energy systems, capacity-building for public authorities, and adoption of a robust Monitoring, Reporting and Verification (MRV) and Nature-based Solutions (NbS) standards, contributing to healthier, climate-adapted communities and sustainable green infrastructure.
Title: FP152 SnCF Global - Equity **Budget:** USD 750 million **Duration:** 20 years (2021-2040) **Donor:** GCF **Agency:** Pegasus Capital Advisors	The FP152 is a multi-country private sector investment fund that targets low-carbon, climate-resilient infrastructure in 48 countries, including Togo, focusing on water, sanitation, waste, energy, and agriculture. It aims to reduce GHG emissions, create employment opportunities, and improve services for millions of people. In Togo, it finances resilient WASH and renewable energy systems, enhancing infrastructure for public health, and promoting climate-smart investments that strengthen national health resilience and sustainable development at the subnational level.
Title: FP105 BOAD Climate Finance Facility to Scale Up Solar Energy Investments in Francophone West Africa LDCs **Budget:** USD 141 million **Duration:** 7 years (2020 – 2027) **Donor:** GCF **Agency:** BOAD	The BOAD-led initiative promotes solar energy deployment in sex Francophone LDCs, including Togo, to decarbonise the energy mix and enhance energy access. In Togo, FP105's planned 20 MW (Blitta) and 20MW (Dapaong) solar plants directly improve energy reliability, thereby strengthening the resilience of infrastructure, including the health sector's, to climate impacts.
Title: Support the Shift to Electric Mobility in Togo **Budget:** USD 1.64 million **Duration:** 5 years (2021 – 2025) **Donor:** GEF **Agency:** UNEP	The UNEP/GEF project's primary objective is to accelerate the adoption of electric mobility in Togo to mitigate GHG emissions. The focus is placed on the foundational stages of e-mobility adoption in Togo, specifically targeting the moto-taxi sector in Lomé. The project's main components are: • Political and institutional framework: It aims to establish a coordinated inter-sectorial body and a national strategy for e-mobility, including gender-sensitive business development. • Demonstration and technology viability: It includes a pilot demonstration of up to 25 electric moto-taxis to prove their technical, operational, and financial viability in the local context. • Scale up and replication: It is developing fiscal policies and regulatory schemes to remove barriers and incentivise the wider adoption of electric mobility.

	Long-term sustainability: The project addresses critical long-term issues by developing a framework for battery recycling and disposal and conducting studies on integrating renewable energy for charging.

4.1.3 Problem Statement

The populations in Centrale, Kara, Savanes are increasingly exposed to climate change impacts, particularly higher temperatures and variable precipitation, which are projected to significantly increase CSHO. This includes rising mortality and morbidity rates for malaria, diarrhoeal diseases, and adverse heat-related outcomes in pregnancy, childbirth, and post-partum. Specifically, increased temperatures will have impacts on infant and maternal health due to heat stress (Nakstad et al., 2022b). Moreover, temperature and variable precipitation affect malaria and diarrhoea morbidity due to complex transmission chains and their impact on WASH conditions, as further elaborated in *Section* ***Error! Reference source not found.***.

5. Project Design

5.1 Project Objective

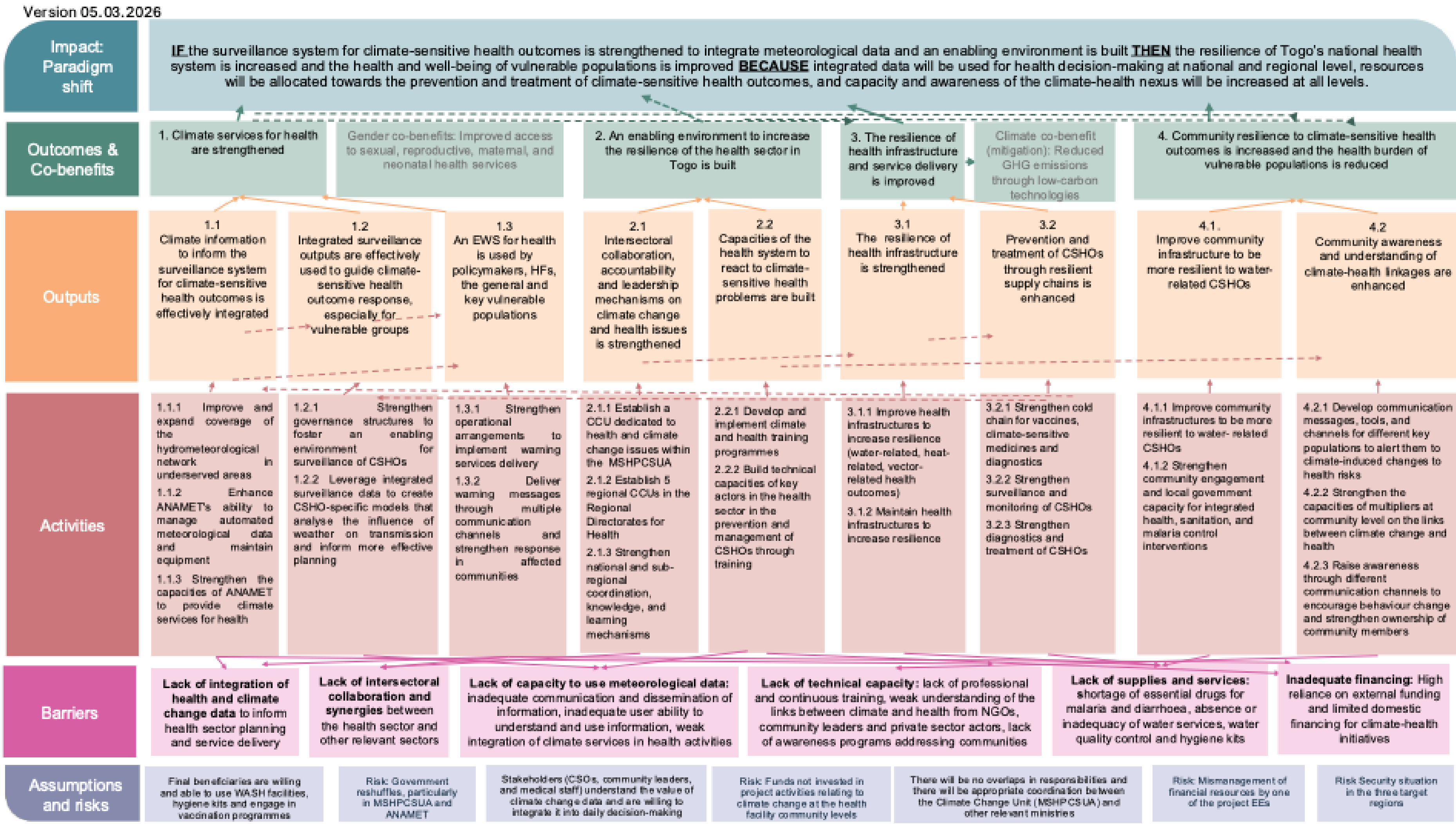
The objective of the project is to strengthen the resilience of Togo's national health system and vulnerable communities to CSHO. The project aims to transform the current situation of high vulnerability of the health system to the risks and impacts of climate change by developing a climate-resilient health system and implementing tangible health adaptation activities at the HFs and community level.

5.2 Theory of Change

The Theory of Change for this initiative in Togo aims to increase the resilience of the national health system and vulnerable communities to CSHO. This is achieved by strengthening the surveillance system to integrate meteorological data and building an enabling environment. This approach directly serves to shift the development pathway towards a climate-resilient direction by systematically addressing vulnerabilities and building adaptive capacities within the health sector and communities.

The Theory of Change is presented below as a results chain, detailing the climate problem, barriers, interventions, outputs, results (outcomes), and impact, along with the causal relationship

Figure 55: Theory of Change



The goal of the project is to strengthen climate services for health; increase the climate resilience of the health sector, the health infrastructure and service delivery; and enhance the resilience of communities to climate related health outcomes, including their capacity to manage associated health burden.

The intended impact of the project is defined as follows: IF the surveillance system for climate-sensitive health outcomes is strengthened to integrate meteorological data and an enabling environment is built **THEN** the resilience of Togo's national health system is increased and the health and well-being of vulnerable populations is improved **BECAUSE** integrated data will be used for health decision-making at national and regional levels, resources will be allocated towards the prevention and treatment of climate-related health outcomes, and capacity and awareness of the climate-health nexus will be increased at all levels.

The series of activities, outputs, and outcomes drive the ToC diagram, goal, and goal statement by addressing the barriers and risks described below.

5.2.1 Barriers to be Addressed

The project adopts a multilevel approach (national, regional, and community) to address key barriers. The table below presents these identified barriers and the corresponding project outputs designed to overcome them, ensuring effective and sustainable interventions.

Table 35: Overview of barriers that this project will address

Barrier	Description	GCF project Outputs
Governance and institutional	**Fragmented intersectoral collaboration and coordination:** • Limited intersectoral collaboration and coordination across sectors and non-operationalisation of the One Health approach, hindering comprehensive climate-sensitive health responses. • Lack of clear mandate and institutionalisation for climate-health initiatives (e.g. the Climate-Health Task Force is informal, temporary, and lacks dedicated staff), hindering long-term action and effective decision-making.	**Output 2.1 –** Institutional mechanism for intersectoral coordination on climate and health established and operationalised (i.e., CCU).
Information and data	**Lack of capacity to use meteorological data:** • Absence of high-performance weather prediction tools. • Data collection system with inadequate geographical coverage and obsolete equipment and management system with outdated processes. **Lack of integration of health and climate change data:** • Lack of integration of climate data in the DHIS2 health sector's information system, hindering analysis, planning, and evidence-based decision making.	• **Output 1.1 –** Climate information system strengthened for integration of meteorological and health data (i.e., DHIS2) to support more effective information management and decision-making. • **Output 1.2 –** Integrated surveillance system upgraded to ensure the data is actively used by developing specific CSHO models and creating maps for targeted interventions, bridging the gap between data collection and data-driven response. • **Output 1.3 –** EWS health installed to provide real-time weather data. • **Output 3.2** – Sentinel sites for more robust case surveillance
Capacity	**Lack of technical capacity of staff:** • Limited national expertise in interpreting and communicating meteorological and climate-health data to end-users. • Reliance on unpaid or undertrained volunteers for technical tasks in ANAMET. • Weak integration of climate services in daily health operations and limited user capacity	• **Output 1.1** – Improve management capacity of ANAMET • **Output 1.2** – Integration and ad operational analysis o climate services • **Output 1.3** – Climate informed • **Output 2.2 –** Capacity of health professionals and institutions to use

	among health professionals and communities. • Absence of climate-health modules in academic and professional curricula. • Underdeveloped health research, characterised by insufficient national coordination, coupled with limited context-specific literature, restrict evidence-based planning and interventions.	meteorological and climate information is strengthened by integrating climate-health knowledge and training programs into the education system. • **Output 4.2 –** Community awareness and understanding of climate-health linkages enhanced.
Technical and resources	**Lack of supplies and services:** • Degraded meteorological observation network with limited geographic coverage and no decentralised maintenance system. • Outdated health infrastructure standards (MSHPCSUA norms from 2013) that fail to integrate heat resilience. • Absence or inadequacy of essential services, including irregular access to quality water and energy for HFs and communities. • Severe shortage of biomedical technicians and absence of structured maintenance pathways for facilities and cold chains. • Frequent shortage of essential medication and medical supplies needed to treat CSHO.	• **Output 1.1 –** Improve geographical coverage through the installation of new and maintenance of existing hydrometeorological equipment. • **Output 3.2 –** Strengthened prevention and treatment of CSHO through improved supply chains for essential medicines, enhanced surveillance and monitoring and improved health infrastructure. • **Outputs 3.1 and 4.1 –** Investment in climate-resilient construction of HF and WASH services for communities.
Financial	**Inadequate financing:** • Heavy reliance on external funding due to insufficient state budgetary resources, resulting in weak financial management and limited overall capacity to mobilise finance for climate-health initiatives.	• **Output 1.1 –** ANAMET's financial autonomy improved finance and maintenance capacity to ensure long-term self-sufficiency**,** complementing SAP48 financial revenues securing efforts. • **Output 2.1 –** Permanent CCU within MSHPCSUA established to secure budget allocation and strengthen domestic resource mobilisation. • **Cross-cutting –** Capacity building in financial management and resource mobilisation for MSHPCSUA and ANAMET staff.

5.3 Envisaged Paradigm Shift in the Sector

The project is designed with built-in mechanisms that enable sustained expansion and replication beyond the initial implementation regions. Before project completion, clear scaling-up pathways will be defined for all major interventions This includes the development of a national scale-up roadmap for climate and weather modelling under Activity 1.2.2, which will provide an actionable strategy for expanding climate-informed HEWS to the national level.

By strengthening national capacities in epidemiological modelling, data integration, and the use of climate, weather, environmental, and social determinants of health data within the DHIS2 platform (1.2.2), forecasting tools will become replicable across additional CSHO. The project also institutionalises climate-resilient norms and assets that can be expanded nationwide, including harmonised infrastructure standards for HFs (3.1.1) and operationalised systems for health equipment maintenance (3.1.2). The establishment of a national manufacturing capacity for mosquito screens (4.1.2 will accelerate replication and ensure local availability of climate-resilient vector control materials across the country.

The project embeds a multi-tiered learning strategy spanning academic institutions, operational health actors, and regional/international platforms. At the academic level, Output 2.2 supports the creation of climate-and-health academic programs and the integration of medical maintenance into technical curricula, ensuring long-term sustainability of skills in the national workforce.

Operational knowledge sharing is strengthened through capacity building in epidemiological modelling, delivered in partnership with international institutions with proven expertise. This supports the transfer of cutting-edge modelling approaches to MSHPCSUA personnel and academic partners, enabling sustained replication and continuous system improvement.

Institutional learning is reinforced by establishing a national coordination and knowledge-sharing mechanism on climate and health (Output 2.1.3). This will position Togo as a regional contributor through South–South exchanges, technical workshops, and participation in platforms such as ECOWAS, WAHO, the African Union, and global climate-health dialogues.

At the community level, Output 4.2 merges evidence-based behaviour change strategies with real-time implementation lessons, strengthening local awareness and risk response.

The project directly strengthens Togo’s enabling environment by formalising institutional roles, standardising procedures, and improving inter-institutional coordination. Under Output 1.1, the development of SOPs for hydrometeorological equipment maintenance will address chronic inefficiencies and ensure data availability.

Output 1.2 establishes SOPs for multi-source data integration, enabling a methodologically robust national health EWS. Output 1.3 operationalises the use of these data through structured forecasting, risk communication, anticipatory guidance for HFs, and climate-sensitive planning mechanisms.

Furthermore, Output 4.2 builds community-level enabling conditions by strengthening the capacities of community multipliers, health educators, and local leaders in climate-health communication and behavioural change methodologies.

A transformative shift is achieved by institutionalising climate governance within the health sector, addressing long-standing systemic weaknesses in coordination, workforce stability, and financing. The project creates a formal CCU within the MSHPCSUA (Activities 2.1.1 and 2.1.2), replacing temporary and informal arrangements with a permanent, mandated structure capable of driving sustained climate-health governance and mobilising regular funding.

Through Output 1.2.2, the project supports the revision of the national AMR Plan to incorporate climate-sensitive disease surveillance and updated epidemiological tools, ensuring national policies reflect emerging climate-related risks. By streamlining governance frameworks and strengthening accountability mechanisms, the project establishes policy conditions for long-term climate-resilient health system transformation.

The project advances a comprehensive climate-resilient development pathway for Togo's health sector, addressing structural barriers through strategic planning, data integration, and system-wide capacity development. It strengthens institutional governance, expands workforce capabilities, upgrades health infrastructure, enhances diagnostic capacities, and fosters intersectoral collaboration across meteorology, health, environment, civil protection, and communities.

The integration of hydrometeorological data into the health information system enables anticipatory risk management for heat, vector-borne diseases, waterborne diseases, and other climate-sensitive conditions. By ensuring DHIS2 can host climate and weather data and connecting it with epidemiological and social determinants of health, the project establishes the foundation for adaptive planning, outbreak projection, and real-time resource allocation. The project further builds community resilience through improved awareness, targeted behavioural change interventions, and tailored health risk communication.

In sum, the project delivers a long-term climate-resilient development pathway by embedding climate considerations across policy, infrastructure, service delivery, information systems, and community action, positioning Togo to anticipate, absorb, and adapt to climate-related health shocks.

5.4 Project Structure and Rationale

Component 1: Strengthening the surveillance system for climate-sensitive health outcomes

Output 1.1: Climate information to support the surveillance system for climate-sensitive health outcomes is effectively integrated

Baseline	Togo's meteorological observation network faces severe operational limitations. According to the National Strategic Plan for Meteorology in Togo (*Plan national stratégique de la météorologie du Togo* - PNSM) 2024-2028, ANAMET continues to depend heavily on non-automatic equipment: of 200 rain gauges, 64 remain manual, and among the 28 SYNOP (surface synoptic observations) stations, 4 operate manually and 8 use mixed (manual/automatic) systems (ANAMET, 2023). Personal communication with ANAMET staff indicates that only 32% of automated rain gauges were functional at the time of assessment; 8 SYNOP stations transmitted less than 30% of expected observations; 16 had faulty sensors, and 5 were entirely non-operational. A total of 24 stations is connected to the WMO Information System (WIS). Most data collected from conventional stations are still not digitised, significantly constraining their use for climatological analysis as well as meteorological and hydrological forecasting. Until 2023, ANAMET also operated without a national strategic or operational plan, further contributing to fragmentation of observation, data management, and service delivery systems (WMO, 2024). Financial constraints further compounded these challenges. ANAMET's operational budget in 2024 was only 9.2 million FCFA in 2024 (approx. 138,000 EUR) (ANAMET, 2025), far below what is required to operate, maintain, and upgrade the national observation network. With no sustained funding mechanism for routine maintenance, the institution depended largely on ad hoc donor-funded projects. Technical infrastructure limitations also hindered service delivery. Computing capacity was outdated, and the agency lacked software and hardware for data quality control, visualisation, archiving, and integration of station data into EWS or climate models (ANAMET, 2025). Strengthening this digital foundation is essential to ensure that meteorological data are not only collected, but also stored, analysed, interpreted, and disseminated securely and on time to national stakeholders, decision-makers, and international partners.

	Spatial coverage gaps were particularly acute in climate-vulnerable regions, reducing the reliability of early warnings and the provision of meteorological and climate services. Togo has no meteorological radar network and no operational equipment-calibration protocol (ANAMET, 2023). Community engagement in local station upkeep remains minimal, while station-data sharing is slowed by poor internet connectivity, reliance on paper-based reporting in manual synoptic stations, and the absence of standardised digital transmission protocols.
Activity 1.1.1: Improve and expand coverage of the hydrometeorological network in underserved areas	
Description	This activity aims to improve the availability, reliability, and geographical coverage of real-time meteorological data in Togo by strengthening the national network of automated weather stations (AWS). It provides the essential technical foundation for EWS and climate services through the expansion of infrastructure, the rehabilitation of existing equipment, and the promotion of sustainable mechanisms for operation and maintenance. The activity is implemented through the acquisition and installation of new stations in vulnerable and underserved areas and the repair and rehabilitation of non-functional AWS and rain gauges, including all necessary physical and digital infrastructure. Activity 1.1.1 will be supported by two sub-activities: • Sub-activity 1.1.1.1: Purchase and installation of AWS and rain gauges • Sub-activity 1.1.1.2: Repair and rehabilitation of existing AWS and rain gauges These sub-activities are designed to be complementary as the installation of new stations will expand geographical coverage, while the rehabilitation of existing equipment ensures the sustainability of previous investments. The acquisition of digital tools will enhance the management, analysis, and dissemination of data, thereby ensuring that information is both accessible and usable. The outputs of this activity contribute directly to Activity 1.1.2, which focuses on strengthening AWS maintenance capacities and ensuring long-term sustainability. The improved AWS network will also support Activity 1.2.1 by providing high-quality, and reliable data, essential CSHO forecasts and projections. Lastly, it will reinforce Activity 1.3.1 by delivering continuous and dependable local data streams, which are crucial for the operationalisation of EWS and for safeguarding vulnerable communities.
Sub-activity 1.1.1.1: Purchase and installation of AWS and rain gauges (EE: GIZ)	
Description	This sub-activity aims to strengthen Togo's national meteorological observation capacity through the purchase of SYNOP automated AWS compliant with WMO standards. These stations will serve as key data sources for national forecasting and EWS, and for regional and international data-sharing platforms. The process will begin with a technical assessment of the existing observation network to identify priority locations where AWS and rain gauges are needed most, based on climate risks, data gaps, and vulnerability. ANAMET, in collaboration with technical partners, will develop detailed technical specifications for synoptic AWS and rain gauges. The AWS will include standard meteorological sensors (temperature, humidity, pressure, wind, and rainfall), and real-time data transmission (General Packet Radio Service – GPRS or satellite), compatible with WMO's Observing Systems Capability Analysis and Review Tool (OSCAR)/Surface (WMO, 2024), and GTS/SYNOP or WIS 2.0 systems.

	Once specifications are finalised, an international procurement process will be launched. Selected suppliers will be required to deliver fully equipped AWS kits, carry out equipment testing, and provide installation, operation and maintenance training to ANAMET staff. Equipment will undergo technical validation before deployment to ensure quality and interoperability. Following validation, the installation of AWS units will be carried out in the selected locations and sites. Post-installation, each station will undergo functional testing and be integrated into the national observation network for continuous data transmission and monitoring. All construction will take place according to GIZ processes.
Deliverables	• 1 technical procurement file, including specs, supplier selection report, and delivery certificates developed (Q1/Year 2) • 4 new AWS procured, installed, and delivered (from Q2/Year 2 to Q2/ Year 3) • 50 rain gauges procured, installed, and delivered (from Q2/Year 2 to Q2/ Year 3)
Key institutions involved	<u>ANAMET:</u> Draft technical specifications and ensure alignment with national and WMO standards. <u>ANPC:</u> Contribute to site prioritisation based on climate vulnerability and ensure integration of new infrastructure into national DRR and EWS.
Sub-activity 1.1.1.2: Repair and rehabilitation of existing AWS and rain gauges (EE: GIZ)	
Description	This sub-activity aims to restore the functionality of non-operational AWS and rain gauges that have been damaged or deactivated over the years. It will begin with a technical audit to identify stations in need of rehabilitation and determine the necessary repair components (e.g., sensors, modems, power supplies). Once the list of priorities is established, procurement of the requires spare parts and technical services will be initiated. Repair teams will be dispatched to the field with logistical support of local stakeholders to carry out on-site rehabilitation. Each repaired station will be calibrated and tested to ensure data accuracy and real-time transmission capacity. Technical partners will support the process with diagnostics, training on recalibration procedures, and supervision of quality assurance. This activity contributes to optimising existing infrastructure and enhancing data availability with minimal investment.
Deliverables	• 1 national technical audit report with rehabilitation needs and field logs developed (Q2/Year 2) • 15 AWS and 82 rain gauges repaired and restored to real-time operational status, with maintenance teams having at least 40% female technicians (Q3/Year 2)
Key institutions involved	<u>TA providers:</u> Help with recalibration, quality assurance, and staff training.

Baseline	ANAMET faces significant challenges in its operational infrastructure, particularly concerning personnel and maintenance systems for meteorological stations. As a newly formed agency, it struggles with a critical shortage of qualified staff, relying heavily on 8 national technicians to maintain over 100 automatic and non-automated weather stations and rain gauges nationwide (ANAMET, personal communication, 2025). This shortage means that regional teams are non-existent, exacerbating the strain on maintaining equipment effectively.

<table>
<tr><td></td><td>Compounding these issues is the absence of a structured maintenance system, resulting in reactive interventions that are often delayed due to financial constraints, unavailability of spare parts and/or lengthy procurement processes. Moreover, there is no centralised inventory system for spare parts or materials, further complicating timely repairs and maintenance.

To address these issues ANAMET is currently restructuring their organisation to address decentralisation needs. The decentralisation envisions the development of two units in addition to the Lomé central administration, one in covering the two climatic regions of the country. The units will be based in Kara and Atakpamé and will cover data collection and processing as well as maintenance. The new units will be supported by already existing personnel that will be transferred from Lomé. Nevertheless, the process is still underway and significant gaps still exist in terms of physical and technical infrastructure (buildings and equipment). In Kara, the ANAMET premises - hosting the weather observers - are currently under renovation with funding from the Togolese Government to host the new unit. Additional needs exist for the construction of a maintenance workshop including the necessary equipment, and informatics infrastructure for the collection and analysis of hydrometeorological data.

Furthermore, there is a need to develop preventive maintenance protocols, which are currently non-existent, as this compromises equipment reliability. Maintenance activities are neither documented nor digitally tracked. This oversight not only hinders operational efficiency but also poses risks to the continuity and accuracy of climate data collection.

Overall, these deficiencies directly affect ANAMET’s ability to deliver reliable climate services, underscoring urgent needs for structural improvements in personnel management, maintenance systems, and operational funding.</td></tr>
<tr><th colspan="2">Activity 1.1.2: Enhance ANAMET’s ability to manage automated meteorological data and maintain equipment</th></tr>
<tr><td>Description</td><td>This activity aims to strengthen the technical and operational capacities of ANAMET and key stakeholders to ensure the management of AWS and the sustainable maintenance of equipment. It contributes to the establishment of a robust and decentralised system for rapid interventions to guarantee station availability, which is essential for climate resilience and informed decision-making.

The activity will be implemented through supporting the development of an operational decentralised unit in Kara, the structuring of a preventive and corrective maintenance program, and the development of a digital solution to rationalise the maintenance and operational hydrometeorological equipment monitoring.

Activity 1.1.2 will be supported by two sub-activities:

• Sub-activity 1.1.2.1: Establishment of a decentralised unit in Kara
• Sub-activity 1.1.2.2: Establishment of digital maintenance protocols and monitoring of hydrometeorological infrastructure and equipment
These sub-activities are designed to complement each other. Sub-activity 1.1.2.1 will support the development of an operational decentralised unit in Kara, providing the physical infrastructure, while sub-activity 1.1.2.2 will support the establishment of maintenance protocols.

The expected results of this activity directly contribute to Activity 1.1.1, focused on improving meteorological observation infrastructure, by ensuring the durability of installed equipment. They will also reinforce synergies with Activity 1.2.1, which seeks to enhance the availability and reliability of data. Finally, the activity</td></tr>
</table>

	will support Activity 1.3.1 by providing a continuous flow of reliable meteorological data, necessary for the operationalisation of EWS and the protection of vulnerable communities.
Sub-activity 1.1.2.1: Establishment of a decentralised unit in Kara (EE: ANAMET)	
Description	This sub-activity aims to establish a decentralised unit based in Kara. The unit will function as a decentralised technical hub for the maintenance and repair of meteorological stations, as well as the collection and analysis of data for the Savanes, Kara and Centrale regions. The decentralised unit will include the physical and digital infrastructure, as well as the personnel to address the decentralisation needs. The project will support the development of the unit with the construction of the workshop building and the equipment needed for the maintenance workshop to be operational. ANAMET will ensure that specialised teams of technicians will be transferred to cover the needs for personnel in Kara. The maintenance unit will operate as a fully equipped including diagnostic and repair workshops, secure storage spaces for spare parts, and a logistics to ensure rapid deployment of equipment and teams to malfunctioning stations, including those located in remote or hard-to-reach areas.
Deliverables	• 1 building to host the maintenance workshop, storage areas, and logistics constructed takin into consideration gender needs (Q4/Year 2) • 1 fully operational Decentralised Maintenance Centre with workshops, storage areas, and logistics capacity for rapid interventions equipped (Q4/Year 2)
Key institutions involved	ANPC, DRE, sectoral ministries: Report station needs and priorities. GIZ: Support equipment, logistics, and digital tools. Specialised suppliers: Provide spare parts and critical equipment.
Sub-activity 1.1.2.2: Establishment of digital maintenance protocols and monitoring of hydrometeorological infrastructure and equipment (EE: ANAMET)	
Description	The project will support the development and establishment of digital maintenance protocols and monitoring for the ANAMET hydrometeorological equipment. The protocols will be developed based on a comprehensive stocktaking of the utilised equipment from ANAMET and the proposed guidelines by the manufacturers. All technical manuals will be collected and stored in a digital centralised database. The technical guidelines in terms of manufacturer-recommended maintenance will be used to develop a maintenance requirement protocol that will be integrated in digital system. The protocol will be informed with the actual data of the existing hydrometeorological equipment in terms of dates of purchase, last maintenance performed etc. and will include a complete profile for all equipment (ID, equipment name, model, type, etc.). A digital maintenance action plan will be developed for the equipment detailing which maintenance actions need to be performed, when and by which type of personnel (ANAMET technical, personnel, weather observers, local volunteers). In addition, with the maintenance time plan, specific standard maintenance procedures will be developed for calibration, routine maintenance and corrective action as well as templates for maintenance logging that will be accessible online and offline. The system will provide details on tools and spare parts needed, as well as next planned maintenance enabling fieldwork optimisation.

	In addition to the above the digital monitoring system will integrate available stocks of spare parts with automatic notifications proactive planning and procurement. Technical personnel and selected volunteers will be trained for its use, with differentiated access in functionality.
Deliverables	• 1 fully operational digital solution for maintenance protocols and monitoring developed (Q2/Year 2) • 30 (ANAMET, ANPC) technical personnel trained for data upkeeping, maintenance protocols, stock availability and proactive planning (Q3/Year 2)
Key institutions involved	Digital solution providers: Build digital solution and provide equipment.

Baseline	Weather and climate forecasts are essential for anticipating and managing climate-sensitive health risks, yet their usefulness depends directly on the quality of NWP systems, the ability of forecasters to correctly interpret these products, and the availability of reliable data that can be integrated into public health decision-making processes. ANAMET is already producing daily bulletins and seasonal forecasts that provide a valuable foundation, but these outputs remain insufficient to fully address the needs of the health sector. The monthly climate and health bulletins still lack the specificity and quality characteristics needed to guide evidence-based decisions. The equipment used for the collection, processing, and dissemination of meteorological data is often obsolete or geographically limited, reducing both the precision and the timeliness of forecasts. Forecasters, while experienced in practice, still have limited skills in the use of numerical prediction tools and in the interpretation of climate data. Effective modelling of climate-sensitive health risks requires high-resolution spatial and temporal data combined with interpretation tailored to the specific needs of the health sector. The absence of standardised quality control and dissemination protocols further undermines the reliability and consistency of the information produced, while existing climatological products are not systematically translated into operational services usable by public health actors. Lastly, tailored advice to health professionals and to seasonal conditions would greatly improve the effectiveness of the bulletins. Other structural barriers also limit ANAMET's capacity to provide integrated climate and health services. The number of specialised human resources remains very limited, with few forecasters and technicians trained, health-related climatology or risk communication. Finally, the visibility and uptake of ANAMET's products remain low, since bulletins and forecasts are not always adapted to the language or operational needs of health decision-makers, which reduces their effective use in planning and response. Beyond these immediate constraints, other institutional capacity gaps hinder the effectiveness of ANAMET, including the application of processes for M&E, Environmental and Social Safeguards (ESS), Gender, Sexual Exploitation, Abuse, and Harassment (SEAH), and Financial Management (FM). While ANAMET has been successful in implementing project activities before, the institutional and personnel capacity needs to be strengthened.

Activity 1.1.3: Strengthen the capacities of ANAMET to provide climate services for health

Description	The main goal of this activity is to ensure that meteorological data are managed effectively and integrated into the health sector's decision-making processes, enabling timely and appropriate actions to enhance resilience to climate-related impacts. Therefore, the activity aims to strengthen ANAMET's capacity to deliver effective and actionable health and climate bulletins and strengthen the overall institutional and personnel capacity on of managerial, organisational, and intersectoral coordination capacities. It will be enhancing ANAMET's technical capacities to deliver reliable and sector-specific climate services, particularly for public health. In addition, the activity will enhance ANAMET's operational capacities by providing it with standardised protocols and quality control measures to ensure better accuracy, reliability, and consistency of meteorological data and forecast products generated. Finally, the activity will reinforce managerial and coordination mechanisms to foster synergies with sectoral users, ensuring climate services are effectively utilised in national health surveillance systems. Activity 1.1.3 will be supported by two sub-activities: • Sub-activity 1.1.3.1: Capacity development and dissemination of climate and health bulletins • Sub-activity 1.1.3.2: Strengthening of managerial, organisational, and intersectoral coordination capacities These sub-activities are closely interlinked and designed to reinforce one another within an integrated approach. The modernisation of infrastructure provides the essential foundation for the effective application of standardised protocols. Building on this, enhanced technical skills will enable the full use of these tools to generate and interpret meteorological and climate data that directly inform public health. In parallel, strengthened managerial capacities will foster sound governance and stronger intersectoral collaboration, ensuring that the benefits achieved are sustained over time. The outcomes achieved through infrastructure modernisation and the implementation of standardised protocols (1.1.3) will support the planned geographic expansion under Activity 1.1.1 through the deployment of new automated stations. They will also contribute to Activities 1.2.1 and 1.2.2 by facilitating the integration of meteorological data into health surveillance systems and enabling the development of robust climate–disease models. Additionally, the generated data will underpin Activity 1.2.3 by informing the creation of vulnerability maps and the identification of high-risk areas, while incorporating equity and gender considerations. Finally, Activity 1.3.1 will directly benefit from these advances, as the availability of reliable and standardised data is essential for establishing effective EWS in public health.
Sub-activity 1.1.3.1: Capacity development and dissemination of climate and health bulletins (EE: ANAMET)	
Description	The sub-activity will equip ANAMET staff with the specialised knowledge and practical skills required to integrate climate science with public health outcomes into actionable bulletins. The sub-activity will be based on a needs assessment that will identify what are the requirements of the different sector, taking under consideration the needs of health professionals and CHW. ANAMET and WHO members will be supported by foundational training on the Togo-specific climate and health nexus. This module will specifically cover the

	health impacts of climate-induced hazards, including heatwaves and floods, and the dynamics of climate-sensitive diseases, focusing on malaria and diarrhoeal illnesses. A dedicated section on risk communication will be provided, ensuring that all ANAMET and WHO personnel involved can translate complex scientific data into clear, actionable messages that resonate with public health officials and the general population. Training will also address the successful production and dissemination of the bulletins. This involves supporting the development of rigorous guidelines and templates specifically for the Health and Climate Bulletins, ensuring consistency and adherence to international best practices. Eligible trainees will be ANAMET and WHO staff. ANAMET staff will include Directorate of Meteorological Uses personnel, including the climatological and agrometeorological divisions. WHO personnel will be eligible under the recommendation by the country office, focusing on staff working on the climate and health nexus and especially CSHO. Following the training, ANAMET will receive dedicated support for the initial production of these new bulletins for 15 monthly bulletins.
Deliverables	• 3 sets training material on climate and health nexus science, risk communication, health and climate bulletins developed (Q4/Year1) • 15 participants of ANAMET personnel trained (Q1/Year2) • 15 monthly bulletins delivered (Q3/Year 5) • At least five (≥ 5) staff members only from ANAMET's technical divisions (Agrometeorological, Synoptic, Climatological, Forecasting, and Instrumentation) will be trained on climate and health nexus science, risk communication, and the development of health and climate bulletins. •
Key institutions involved	<u>GIZ:</u> Support training and coaching.
Sub-activity 1.1.3.2: Strengthening of managerial, organisational, and intersectoral coordination capacities (EE: ANAMET)	
Description	This sub-activity will strengthen the operational processes within ANAMET in M&E and Risk Management, Environmental and Social Safeguards (ESS), Sexual Exploitation and Harassment (SEAH), and financial management. The sub-activity includes process operationalisation and hands-on training to ensure high-quality and standardised results. The sub-activity will support ANAMET personnel in the hands-on operationalisation of the institutional policies. This will include stocktaking of essential documentation for all relevant processes. Through this operationalisation, the sub-activity will define clear roles and responsibilities, identifying specific Key Personnel (such as the ESS Officer, Gender/SEAH Lead, and M&E Focal Point) who will own and execute the processes. The training of ten key ANAMET personnel will allow the operational application of M&E and Risk Management requirements; ESS processes, including screening tools and impact assessment procedures, to integrate safeguards into the project lifecycle; Gender and SEAH guidelines, a code of conduct, and a Grievance Redress Mechanism (GRM); and Financial Management, including

	budgeting, procurement, and internal controls, ensuring compliance with all regulatory requirements. Lastly, on-going ad-hoc support will be provided to key personnel of the Directorate of Administration and Finance to ensure that any additional issues that may arise will be addressed in a timely manner, lifting any bottlenecks. Eligible trainees will have to be ANAMET permanent personnel, staffing positions in the Directorate of Administration and Finance, including the Finance Division, the Procurement Division, and the Administration Division.
Deliverables	• 1 log of ad-hoc support provided (Q4/Year 1) • 1 set training material on M&E and Risk Management, ESS, SEAH, and FM developed (Q3/Year 2) • 10 ANAMET personnel trained for 5 days (Q4/Year 2)
Key institutions involved	GIZ: Support training and coaching.

Output 1.2: Integrated surveillance outputs are effectively used to guide climate-sensitive health outcome response, especially for vulnerable groups

Baseline	Togo has made notable progress in establishing the foundations for climate-sensitive health outcome surveillance. This work is primarily centred on two key pillars: the health information system and the meteorological infrastructure. Within the MSHPCSUA, the DSNISI has served as the responsible entity, overseeing the national HMIS. Anchored by the DHIS2 (for DHIS2-Togo), this system supports both indicator-based and event-based surveillance, including IDSR. Within this framework, the DSNISI works closely with the ministerial PNLP, particularly on innovations that integrate climate and health data. Pilot tools, such as the DHIS2 and the CHAP, are testing ways to link climate and health indicators to enhance surveillance, preparedness, and response capacities. These tools have already demonstrated practical value in malaria control by combining rainfall and health data to stratify malaria risks and better align interventions with seasonal transmission patterns (DHIS2, 2025). However, their integration remains partial: neither the tool is yet fully embedded within the national DHIS2 server, and their scope is currently limited to malaria, without systematic application to other CSHO. In parallel, the One Health Platform (2023, integrated, inter- and multi-sectoral coordination and monitoring structure) seeks to integrate human, animal, and environmental health data to improve detection and the coordinated management of shared health threats. At the national level, the MSHPCSUA, through its Climate-Health Task Force, plays a central yet emerging role in coordinating and shaping the country's response to CSHO. Although the ANAMET collects essential meteorological data the information is not yet integrated into the country's health information system platform. This gap constrains Togo's ability to anticipate and respond proactively to climate-sensitive infectious diseases (e.g. vector-borne, water- and food-borne, air- and dust-related infectious and zoonotic diseases). Despite these advances, the operational use of climate and health information for decision-making remains limited. This is primarily because the climate-health data ecosystem is fragmented, lacking a consolidated centralised climate-health variable inventory, systematic and routine quality assessments, and harmonised data formats across institutions, particularly between the health and meteorological sectors. This is compounded by a minimal level of coordination, with lack of fully documented data sharing protocols or agreed-upon thresholds operationalising the

	use of weather variables that can be used as a trigger in sending out health warnings. Technical and institutional capacities are also insufficient to operationalise climate-health surveillance, as the Climate-Health Task Force, for instance, remains informal and under-resourced, limiting its ability to embed modelling results into national planning. This hinders the translation of predictions to actionable strategies and constrains integration of cross-cutting issues such as AMR into national climate-health priorities.
Activity 1.2.1: Strengthen governance structures to foster an enabling environment for surveillance of climate-sensitive health outcomes	
Description	This activity aims to strengthen the institutional and technical foundations required to integrate meteorological and health data into a coherent system, while preparing the platform to incorporate additional data sources in the future. A comprehensive data landscape analysis will first be carried out to identify all available datasets and their quality and highlight gaps and overlaps. Accompanied by institutional mapping to map relevant actors, assess governance structures, map. Building on these findings, on the institutional dimension the institutional framework will be reinforced through clarified mandates, updated reference documents, formal agreements, and defined partnerships. Coordination mechanisms will be established and strengthened to align ministries, agencies, academia, and development partners in a common climate–health agenda. In this context, SOPs refer to documented technical or operational procedures, while collaboration protocols describe institutional agreements and coordination practices. In addition, this activity will address the technical and operational layer of interoperability (technical dimension) by creating the “digital bridges” that allow systems to exchange data smoothly, securely, and in line with national standards and regulations. This will include common data and metadata standards, shared procedures for data exchange, and two pilot integrations linking meteorological and health systems. The result will be a robust governance and interoperability fabric that enables climate and health information to be used effectively for modelling, risk mapping, and early warning. To ensure that these institutional and technical foundations can be operationalised effectively in downstream activities, Activity 1.2.1 will also consolidate several implementation-readiness elements. This includes clarifying user needs and decision pathways for how climate and health information will be applied in modelling (1.2.2) and early warning processes (1.3.1); describing current and future data flows between ANAMET, DSNISI, HFs and other actors; reviewing data quality across systems; and identifying concrete measures to close critical data and workflow gaps. These additions ensure that the outputs of Activity 1.2.1 form a coherent and usable basis for the predictive and operational functions developed under subsequent activities. Activity 1.2.1 will be supported by four sub-activities: • Sub-activity 1.2.1.1: Conduct a data landscape analysis and institutional mapping • Sub-activity 1.2.1.2: Strengthening the institutional set up • Sub-activity 1.2.1.3: Strengthening collaboration mechanisms • Sub-activity 1.2.1.4: Establishing the technical interoperability architecture and assurance Sub-activity 1.2.1.1 provides a comprehensive stocktaking of the specific needs in improving the institutional set up (1.2.1.2), coordination mechanisms (1.2.1.3), and interoperability solutions (1.2.1.4). Together, these sub-activities create the enabling environment required for subsequent activities on modelling (1.2.2), risk maps (1.2.3), and EWS (1.3.1). All institutional, coordination, and interoperability

	mechanisms will be developed in close alignment with 2.1.1 (creation of climate change unit) and 2.2.1 (strengthening of academia).
Sub-activity 1.2.1.1: Conduct a data landscape analysis and institutional mapping (EE: GIZ)	
Description	This sub-activity will carry out a comprehensive data landscape analysis and institutional mapping to lay the foundations for an integrated climate-health information system in Togo. Landscape analysis will consolidate datasets from health, meteorology, and other relevant sectors (e.g. Agriculture, Environment) to develop a centralised climate-health data inventory, while also considering other potential sources such as satellite imagery (collaboration with TDL using and developed approaches of University of Berkley), drones' imagery (if available) and mobile phone metadata. Data quality will be systematically assessed based on their accuracy, completeness, timeliness, consistency, accessibility, quality, and suitability for modelling and decision-making, as well as to identify gaps and redundancies. The activity will also assess the potential to integrate cross-cutting issues such as AMR and food security into climate–health information systems. Building on this, the sub-activity will also clarify how these datasets are expected to flow through the climate–health system. A concise As-is and To-be data flow description will be developed, specifying how information moves between ANAMET, DSNISI, HFs, and analytical platforms, and identifying any weak links. In parallel, user needs and decision pathways will be documented to understand how data should support surveillance, modelling (1.2.2), and early warning (1.3.1). A light data-quality review (completeness, timeliness, consistency) will be carried out to assess suitability for downstream use. These insights will inform a targeted strategy to close the most critical data and workflow gaps. Institutional mapping will clarify governance structures, mandates, and information flows across ministries and agencies, including MSHPCSUA (via DSNISI), ANAMET, ANPC, the Ministry of Agriculture, the Ministry of Environment, Ministry of Water and Sanitation as well as data providers like community health units, HFs, and meteorological stations. Collaboration with the TDL and the use of the Togolese geoportal (*Géoportail*) is recommended. It will further define the roles of development partners such as GIZ, the World Bank, the Global Fund, NGOs like Integrate Health, and the TRC. This initiative will also enable the identification of institutional and technical requirements necessary for data integration, including the need for data-sharing agreements, harmonised methodologies, and interoperable systems. To ensure sustainability, health and meteorological data managers will be trained to develop the analysis protocol, and stakeholder mapping will be co-developed with national representatives trained to repeat the process in the future. Together, these steps ensure that the outputs of Sub-activity 1.2.1.1 directly support the modelling requirements of 1.2.2 and the operational needs of 1.3.1.
Deliverables	• 4 data managers trained (2 health DSNISI, 2 meteorological ANAMET) and 2 stakeholders (ANPC, GIZ) staff on data landscape analyses and institutional mapping (Q4/Year 1) • 1 report on prioritised technical and institutional requirements for the operational integration of data for modelling (Q2/Year 2) • 1 consolidated implementation-readiness note developed (Q2/Year 2)
Key institutions involved	MSHPCSUA – DSNISI: Provide 2 data managers to be trained in and conduct data landscape analysis and institutional mapping. It will also be the primary beneficiary of the reports.

	ANAMET: Provide 2 data managers to be trained to conduct data landscape analysis and institutional mapping. ANAMET will be a key beneficiary of the reports. ANPC: Provide one stakeholder to be trained to conduct data landscape analysis and institutional mapping. ATD: Provide national guidance on digital governance, interoperability frameworks and hosting considerations, ensure that data flows and system design align with national e-government and digital health architecture. TDL: Contribute its expertise, support data harmonisation, quality assessments, metadata standards and analytical readiness, contribute to the development of as-is/to-be data flows and gap closure strategies.
Sub-activity 1.2.1.2: Strengthening the institutional set up (EE: GIZ)	
Description	This sub-activity aims to reinforce the institutional foundations required for effective integration of meteorological, health, and socioeconomic data in the Togo health (information) system, while preparing the system to incorporate additional datasets in the future. Building on the data landscape analysis and institutional mapping, it will clarify mandates and responsibilities across key institutions, update policy and reference documents, and formalise agreements such as MoUs between MSHPCSUA, ANAMET, UoL, UoL/WASCAL, TDL and development partners. The activity will also ensure alignment with the CNSD, which is being established as the long-term governance anchor for digital health in Togo, so that climate–health data integration becomes an institutionalised part of national digital health strategies. SOPs will be developed to improve data collection ensuring clear workflows and consistent. These efforts will institutionalise best practices, improve accountability, and provide the technical and policy framework needed for long-term sustainability. To ensure that the institutional framework fully supports downstream modelling (1.2.2) and early warning operations (1.3.1), this sub-activity will also define governance processes specific to climate–health analytics. These include roles and responsibilities for data-quality assurance, model updating and calibration, validation of thresholds and trigger logic, and cross-institutional workflows from data ingestion to alert decision-making. A technical and organisational operating model will be developed to clarify how DSNISI, ANAMET, ATD, TDL and other partners collaborate along the surveillance–modelling–warning chain, ensuring predictable decision pathways and seamless handovers across institutions. Further workstreams in the activities 1.3.1 and 1.2.3 will be based on this sub-activity.
Deliverables	• 3 MoUs between MSHPCSUA and stakeholders signed (Q4/Year 1) • 1 set of SOPs for data collection developed (Q2/Year 2) • 10 data managers and technical staff trained in SOP processes and institutional mandates (Q3/Year 2) • 1 cooperation agreement between MSHPCSUA, WASCAL-UoL, and a university with a strong track record on climate-sensitive disease modelling signed (Q4/Year4)
Key institutions involved	MSHPCSUA - DSNISI: Coordinate the health sector contribution, provide epidemiological data, sign MoUs, and ensure technical validation of health-related data integration. Also, it will act as a TA recipient for strengthening mandates, SOPs, and governance. ANAMET: Provide meteorological and climate data, sign MoUs, designate staff to be trained, and co-lead the development of SOPs for linking weather and health data. ANPC: Share disaster management data, designate a focal point for institutional mapping and coordination forums, and contribute to collaboration mechanisms. Other ministries: Provide sectoral data. Involved in cross-sectoral coordination and data-sharing agreements.

<table>
<tr><td></td><td><u>UoL, WASCAL</u>: Co-develop modelling protocols, support SOP development for climate-sensitive disease modelling, and contribute expertise for integration of climate projection data (e.g. CMIP6).
<u>TDL</u>: Contribute expertise in data science and IT solutions, supporting interoperability development and integration of non-traditional data sources (e.g. satellite imagery, mobile metadata).
<u>ATD:</u> Contribute its expertise in national digital transformation and interoperability frameworks. It will support the development of collaboration protocols and coordination mechanisms between ministries and agencies to ensure that climate–health data exchange aligns with national e-government standards and digital infrastructure.
<u>CNSD</u>: Will provide governance oversight for digital health integration; ensures institutional arrangements and SOPs are aligned with national digital health strategies; anchors long-term sustainability of climate–health data systems.
<u>International Development Partners:</u> Potential MoU signatories to enable data sharing; contribute complementary financing and expertise.</td></tr>
<tr><td colspan="2">Sub-activity 1.2.1.3: Strengthening collaboration mechanisms (EE: GIZ)</td></tr>
<tr><td>Description</td><td>This activity focuses on enhancing collaboration across sectors and actors to enable seamless data exchange for climate-health modelling and decision-making. It will establish and strengthen partnerships between ministries, agencies, research institutions, and development partners, bridging institutional silos and aligning mandates. Coordination mechanisms will be reinforced at both national and sub-national levels to streamline roles, responsibilities, and decision-making processes. Technical integration will be supported by developing collaboration protocols that address interoperability barriers, methodological inconsistencies, and infrastructure needs, underpinned by clear coordination rules. By fostering collaboration and ensuring joint ownership of processes, the activity will create a sustainable framework for real-time and/or stepwise integration of weather, health, and related datasets into national modelling platforms. To ensure that collaboration mechanisms fully support the downstream processes of modelling (1.2.2) and early warning (1.3.1), this sub-activity will also define how institutions work together along the full surveillance–modelling–warning chain. This will include clarifying inter-agency handover points, decision pathways, and responsibilities for data quality checks, model interpretation, threshold validation and alert preparation. The collaboration framework will be developed jointly with ATD and Togo Data Lab to ensure alignment with national digital governance standards and interoperability requirements. These additions will enable predictable, well-coordinated workflows that connect data producers, analysts and decision-makers in a coherent operational cycle.

Coordination mechanism will be closely aligned with technical workshops and conferences of 2.1.3.2, 2.2.1.3.</td></tr>
<tr><td>Deliverables</td><td>• 1 Climate and Health Data Sub-Group established under the One Health Platform (Q4/Year 2)
• 1 annual coordination forum between ministries, agencies, and development partners held (Q2/Year 2)
• 10 institutional stakeholders trained on collaboration protocols and technical data integration (Q4/Year 2)</td></tr>
<tr><td>Key institutions involved</td><td><u>MSHPCSUA - DSNISI:</u> Ensure alignment of health data with climate information, co-chair the Climate & Health Data Sub-Group under the One Health Platform (2023).
<u>ANAMET</u>: Provide meteorological and climate forecast data; contributes to technical integration and interoperability solutions, co-chair the Climate & Health Data Sub-Group.
<u>UoL/WASCAL</u>: Provide technical expertise, support SOPs for data exchange, participate in strategic partnership with MSHPCSUA.</td></tr>
</table>

	<u>One Health Platform:</u> Provide the institutional framework, host the newly established Climate & Health Data Sub-Group to coordinate across sectors and actors. <u>ANPC</u>: Share disaster risk and emergency response data, participate in coordination and integration efforts (e.g. ANPC GEO-SIG). <u>Other ministries</u>: Provide sectoral data upon need. They will also be involved in cross-sectoral coordination and data-sharing agreements.
Sub-activity 1.2.1.4: Establishing the technical interoperability architecture and assurance (EE: GIZ)	
Description	A major challenge for climate and health surveillance in Togo is the lack of interoperability among institutional data collection systems, creating information silos that hinder effective analysis. The MSHPCSUA manages health data through its DHIS2 platform, while ANAMET manages climate and weather data. Tools such as CHAP or the DHIS2 Climate App already exist, but they are not yet fully integrated into the national health information system. As a result, important information remains in silos, and decision-makers cannot access a complete and timely picture. This sub-activity will establish the “digital bridges” that allow climate and health systems to exchange data smoothly, securely, and in line with national laws. Interoperability is more than just technology, it combines: • Technical connections (e.g. Application Programming Interface (APIs) that allow data to flow between systems), • Common standards (so that “rainfall” or “malaria cases” are always defined in the same way), and • Governance rules (agreements on who can use which data, how security is guaranteed, and how incidents are handled). The work will deliver a practical Interoperability Reference Pack, a set of SOPs for data exchange, a Security & Compliance Toolkit, and two concrete pilot integrations: 1. A direct pipeline that brings weather forecast and climate date (e.g. rainfall and temperature) data from ANAMET into DHIS2 for routine use, 2. Assess whether embedding selected functionalities from CHAP/Climate App into DHIS2 dashboards of climate-health dashboards will be an effective way to support program managers in their daily work, 3. Consider data sharing platforms that can be then scaled for the use of other diseases. To ensure sustainability, the sub-activity will also produce an Operations & Capacity Pack: a runbook with clear procedures, monitoring dashboards, data codebook and training for national staff at DSNISI, ANAMET, and Togo Data Lab. Involving the ANCy and the ADPD will make sure that all exchanges respect both security and privacy. The Climate & Health Data Sub-Group under the One Health Platform will serve as the institutional forum to review pilot results, validate data exchange protocols, and ensure that interoperability solutions are embedded into cross-sectoral governance structures. The Interoperability Reference Pack will be validated by MSHPCSUA/DSNISI and ANAMET with the main goal of guaranteeing seamless data exchange between the meteorological and health sectors. The Pack will contain a comprehensive set of documents, including a standards catalogue, a data mapping matrix, terminology value sets, API specifications, and SOPs for data exchange and integration. Critically, it will ensure alignment with both the national Master Facility Registry and geocoding standards to enable consistent location referencing across systems. Furthermore, the Pack will include a simple data dictionary documenting essential

	indicators, such as rainfall and disease cases, and will define aggregation and linkage rules explaining precisely how raw, station-level climate data is converted into actionable, district-level health information. The Security & Compliance Toolkit, developed and validated by ANCy and ADPD will serve as the official framework for secure and compliant data sharing. The toolkit will include a detailed security profile and templates for Basic Data Protection Impact Assessments (DPIA), in collaboration with the ADPD. Furthermore, it defines essential access-control rules and audit logging mechanisms. Finally, the toolkit will provide access-control rules, audit logging, and incident-response consistent with ANCy guidelines for handling security breaches or compliance issues. The Operations & Capacity Pack will be including runbook, SOPs for monitoring and maintenance, Service-Level Agreement (SLAs), monitoring dashboards, and the training of 12 technical staff. The pack will capture the operational responsibilities among ANAMET, MSHPCSUA, and ANPC, provide a sustainability plan, and run cost-estimates for maintaining data links and servers' post-project. It will also include data-sharing agreements and service-level expectations (update frequency, quality standards) among ANAMET, MSHPCSUA, and ANPC. To ensure that interoperability solutions are fully ready for the modelling functions (1.2.2) and early warning operations (1.3.1), this sub-activity will define the data transformations, aggregation rules, metadata standards and quality checks required for predictive analytics, threshold detection and alert workflows. Special attention will be given to the alignment of climate and health variables, including temporal resolution, geocoding practices, and vulnerability-linked disaggregation. The architecture will be developed jointly with ATD and TDL to ensure compliance with national digital governance and interoperability frameworks. An end-to-end integration test approach will be applied to validate that data move reliably across the entire chain — from ANAMET to DSNISI and analytical platforms — up to the systems used for risk mapping and alert generation. In short, this sub-activity transforms isolated pilots into a functioning climate–health data ecosystem, giving decision-makers the reliable, integrated information they need to anticipate risks, target interventions, and protect communities from CSHO.
Deliverables	• 1 Interoperability, Security and Compliance Framework established (Q4/Year 1) • Climate-health data interoperability and dashboard pilots implemented (Q2/Year 2) • Operations & capacity institutionalisation completed (Q2/Year 2)
Key institutions involved	MSHPCSUA - DSNISI: ensure alignment of health data with climate information, co-chair the Climate & Health Data Sub-Group under the One Health Platform. ANAMET: provide meteorological and climate forecast data, contribute to technical integration and interoperability solutions, co-chair the Climate & Health Data Sub-Group. TDL: Offer data science and IT solutions to address interoperability and integration barriers, support development of technical infrastructure. ATD: Ensure alignment of interoperability design with national digital governance and e-government architecture, support sustainability of hosting, systems integration and secure data exchange. ANCy: National authority for cybersecurity, ensuring alignment with national cyber regulations. One Health Platform (2023): Review and validate interoperability pilots, ensure cross-sectoral ownership, anchor technical outputs within a sustainable governance mechanism. ADPD: Independent authority for data protection ensuring compliance lawful usage of personal and health data.

	CNSD: Provide oversight, ensure alignment of pilots with future digital health strategy, and anchor sustainability. PNLP: Key end-user of climate–health dashboards (malaria + additional disease) and validator of use cases.

Baseline	Togo has taken initial steps toward linking health and climate information, but the capacity to operationalise disease modelling remains limited. At present, the national health system (DHIS2) provides a solid foundation for digital health surveillance, and pilot innovations such as the DHIS2 Climate App and the CHAP have demonstrated the potential of combining meteorological and health data to stratify malaria risks and align interventions with rainfall patterns. Yet, these tools remain pilots – partially integrated into DHIS2 and restricted in scope to malaria-without systematic application to other CSHO. On the meteorological side, ANAMET collects and processes daily climate data, applying tools such as Instat+ and the CPT to generate meteorological and climatological information. Forecasting capacities remain focused on weather and hydrology, with limited national expertise or institutional mechanisms in place for short-term or long-term disease modelling capacity within the MSHPCSUA. Critical gaps persist across several areas, especially concerning technical expertise for model development and application for health outcomes. While CHAP provides an important technological foundation for predictive analytics, the insufficient utilisation of locally generated weather parameters from ANAMET creates a fragmented approach in climate-resilient health planning. Beyond personnel training, there are broader systemic and infrastructural challenges, including incomplete integration of climate and health data into the DHIS2 platform, inconsistent availability and transmission of meteorological data, weak institutional mechanisms for applying model outputs in planning, and varying levels of digital literacy among health staff. Consequently, health partners and technical staff have not yet been equipped with either with the skills or enabling system conditions to construct or interpret predictive models. This leaves decision-makers without the robust evidence base needed to anticipate and timely respond to climate-sensitive disease risks. In addition, there is no systematic inventory of needs linked to CSHO. While malaria sentinel sites and diarrhoeal disease surveillance systems generate a broad set of valuable inputs, these remain underutilised for anticipative planning anchored in predictive capacities. From malaria surveillance, weekly morbidity and mortality data are collected alongside case incidence, geographical distribution at district and regional levels, demographic disaggregation (children under five, pregnant women, older populations), treatment outcomes, intervention coverage, and information on seasonal transmission peaks during rainy periods. Diarrhoeal disease surveillance contributes complementary data, capturing cumulative and disaggregated case counts, specific types such as bloody diarrhoea, severe diarrhoea, gastroenteritis, and intestinal amebiasis, as well as deaths attributed to diarrhoea. Together, these surveillance systems provide rich evidence base on disease patterns, yet this information is not systematically linked to climate forecasts or translated into a resource inventory - a dynamic catalogue of health system capacities such as infrastructure, personnel, medical supplies, financing, and data systems- aligned with forecasted disease risks. As a result, health authorities cannot pre-position supplies, adjust staff deployment, or activate preventive interventions in advance of expected weather-related disease outbreaks. Finally, there is no framework for monitoring and evaluating the effectiveness of the predictive (malaria) disease model in field settings. Pilot initiatives (CHAP, DHIS2 Climate App, One Health) have demonstrated proof-of-concept for integrating climate and health data, but mechanisms for testing model performance, refining

	parameters, and embedding adaptive learning into national planning are absent. This hampers long-term sustainability and undermines trust in modelling as a decision-support tool. These efforts will not only build national capacity to use disease models for planning, but also establish the technical foundation for Activity 1.2.3, which will rely on these models to generate risk maps and spatial decision-support tools.

Activity 1.2.2: Leverage integrated surveillance data to create CSHO-specific models that analyse the influence of weather on transmission and inform more effective planning

Description

This activity builds on the integrated data systems established under Sub-activity 1.2.1, leveraging them to support advanced analytics and data-informed decision-making. The activity will also support the increase of capacity to develop, adapt, and integrate CSHO models in established system.

Specifically, it focuses on the development and application of predictive models aimed at estimating the magnitude and patterns of weather-related impacts on disease transmission. By utilising real-time and historical climate and health data, these models can help identify the associations between weather variables such as temperature, rainfall, humidity, and to some extent extreme climate events such as heatwaves and floods on the incidence of CSHO.

Apart from quantifying the potential disease burdens under varying climate scenarios, this activity seeks to provide actionable insights for public health preparedness and response. These models will support both short-term forecasts (days to months) and long-term (yearly, decadal) projections of the impact of weather on CSHO. Short-term forecasting and risk assessment will inform proactive preparedness plans that can be activated before an outbreak occurs, during the peak of transmission, and in the recovery phase. The models will utilise ANAMET data that will either be integrated in real-time or on weekly basis to inform the forecasting. DHIS2 data and epidemiological surveillance data will be used for the development/training of the models as well as the assessment of its forecasting effectiveness as part of model validation. This proactive approach allows for the timely allocation of resources, targeted public health messaging, and tailored interventions that can reduce disease severity and prevent further spread.

Long-term projections will inform strategic decisions on resource allocation in medium-term plans, climate change health impact assessments, and provide assessment of effectiveness of interventions in a long-term horizon. By integrating modelling outputs in terms of number of forecasted cases into existing surveillance and EWS, health institutions can transition from reactive responses to a more predictive and preventative public health paradigm. This activity, therefore, serves as a critical bridge between data integration efforts and real-world application, transforming information into foresight and enabling climate-resilient health planning.

Model	Data integration	Forecasting/ projection time-step	Contribution
Short-term	• ANAMET weather forecasting for prediction • ANAMET climate data for training • DHIS2 epidemiological data for training and validation	Days - months	• Seasonal planning • Outbreak preparedness planning and triggering • Local/national response resource allocation • EWS deployment

Long-term	• ANAMET climate data for training • CIMP6 climate projection data • Socioeconomic data	Year(s) - decades	• Long term strategic decisions on resource allocation • investment prioritisation • Climate Change and Risk Assessment (CCRA) • Evaluation of vulnerability • Intervention effectiveness potential (such as EWS)

All modelling work under Activity 1.2.2 will build directly on the data governance, data flows, quality assessments and gap-closure measures established under Activity 1.2.1. This ensures that models use harmonised and validated datasets, follow clear decision pathways and are fully compatible with the requirements for automated threshold detection and early warning workflows under Activity 1.3.1. The modelling environment will therefore be developed in alignment with national digital governance standards, with ATD and TDL contributing to data harmonisation, computational design and system integration.

Moreover, the activity will focus on increasing the capacity to develop, adapt and integrate models in the established system, through targeted training on weather impact to CSHO modelling. The activity will build on the capacity developed during the rollout of the above-mentioned models, as well as the LSHTM CCRA model and train targeted health partners (University of Lomé/WASCAL, MSHPCSUA). The training will focus on model development and assessment for both forecasting and projection and how these models can be integrated into current health system platforms as part of an adaptive strategy that will be essential in institutional and human resource planning in health systems response.

Furthermore, emerging health issues with climate-impact potential such as AMR have been documented recently, prompting the need for its co-integration into existing climate-health systems. AMR has historically been absent from the climate–health nexus, which has prioritised heat stress, vector-borne diseases, and respiratory conditions. The rise of AMR while has been mainly attributed to the ineffectiveness due to misuse and overuse of antimicrobials, growing evidence demonstrates that weather variables such as temperature, precipitation as well as extreme climate events can influence the evolution, transmission, and persistence of AMR pathogens in human, animals, and environmental reservoirs. Climate change further strains health systems and alters antimicrobial use in agriculture and healthcare, further amplifying AMR risks.

Togo, which has been part of the WHO Global AMR Surveillance System (GLASS) since 2020, adopted a National Action Plan on AMR (2019–2023). However, implementation has been partial and significant barriers remain, including the lack of a national AMR reference laboratory, limited bacteriology and diagnostic capacity, fragmented data flows and evidence generation, and absence of integrated multisectoral reporting system. In response, this activity seeks to integrate AMR resistance data into DHIS2 to understand the current trends and subsequently to develop similar predictive and projection models with weather parameters in aid of developing updated AMR national action plans.

Activity 1.2.2 will be supported by five sub-activities:

- Sub-activity 1.2.2.1: Establish academic exchanges and partnerships
- Sub-activity 1.2.2.2: Strengthen climate-and weather-health modelling capacities

	• Sub-activity 1.2.2.3: Enhance interpretation and application of models in real-world settings • Sub-activity 1.2.2.4: Strengthen AMR data integration into surveillance systems • Sub-activity 1.2.2.5: Develop scale-up roadmap for climate and weather-health modelling These sub-activities form a pipeline: academic partnerships (1.2.2.1) enable capacity-building in modelling (1.2.2.2), which is translated into decision-making through improved interpretation (1.2.2.3), and expanded to include AMR surveillance integration (1.2.2.4). Together, they ensure both technical depth and practical application of climate–health modelling relevant in real-world settings. The activity builds on institutional capacity strengthening of Output 1.1.3 (ANAMET) and 1.2.1 (MSHPCSUA) and forms the basis for decision-making products (1.2.3 – risk maps and 1.3 – EWS). The activity uses improved data strengthened in 1.1.1 (meteorological data and 3.2.2 (health data).
Sub-activity 1.2.2.1: Establish academic exchanges and partnerships (EE: GIZ)	
Description	This sub-activity will enable Togolese universities (notably the University of Lomé and WASCAL) to strengthen their role in climate–health modelling by engaging in structured academic exchanges and re-establishing formal partnerships with regional and international universities, research institutions, agencies and alliances. These exchanges will provide opportunities for faculty and graduate students to visit partner institutions, participate in joint training programmes, and access advanced methods in climate-sensitive disease modelling, data integration, and AMR–climate linkages. Also, this will help apply the methodologies already in the literature in practice. Formal MoUs or cooperation agreements will be developed to frame long-term collaboration. By creating these partnerships, Togolese institutions will not only benefit from short-term learning opportunities but also build sustainable pipelines of expertise that feed directly into the technical training under Sub-activity 1.2.2.2 and into the integration of modelling outputs into national health systems.
Deliverables	• 3 MoUs signed between Togolese universities and regional/international universities (Q4/Year 2) • 6 faculty members participated in short-term academic exchanges (Q2/Year 5)
Key institutions involved	UoL/WASCAL: Lead the academic exchange process by identifying priority areas for collaboration, nominating faculty and graduate students for exchange visits, and ensuring integration of new knowledge into national research and teaching. They will also be responsible for maintaining formal partnerships (MoUs) with regional and international universities.
Sub-activity 1.2.2.2: Strengthen climate-and weather-health modelling capacities (EE: GIZ)	
Description	Sub-activity 1.2.2.2 builds upon the skill pool developed though the academic exchanges and partnerships in sub-activity 1.2.2.1 ensuring that the necessary skill sets in developing a weather-health model for the climate-sensitive diseases such as malaria and diarrhoea is sufficient. Specifically, this activity seeks to further utilise the data compiled from Sub-activity 1.2.1.1 to generate actionable insights, particularly in predicting and forecasting the short-term or near-term impacts of weather on malaria and diarrhoea. This sub-activity builds upon and complements the previous one by shifting the focus from data integration to data application. Fast-acting or short-term effects, and gradual or long-term effects- modelling approach, set of assumptions, and interpretative framework will be operationalised for malaria,

	diarrhoea and heat-impacts. Short-term predictive models will integrate high-resolution, near-real-time data and focus on immediate public health interventions, while long-term models will incorporate climate projections (e.g., temperature rise, precipitation patterns) and broader socioeconomic variables (population growth, land use changes, and socio-environmental shifts) to inform strategic planning and policy development. Model development will adhere to the data flows, metadata standards and transformation rules defined under Activity 1.2.1, ensuring that models are interoperable and can feed directly into risk mapping (1.2.3) and early warning thresholds (1.3.1). A model maintenance and update protocol will be introduced, defining responsibilities for recalibration, quality checks, version control and continuous improvement. TDL and ATD will support the computational design and alignment with national digital architecture to ensure long-term sustainability. The models will be integrated and hosted in the DHIS2 and will allow for both the real time and stepwise integration of ANAMET meteorological historical and forecasting data and DHIS2 data. In this activity, emphasis will be placed on training health sector partners in developing models that predict sub-seasonal or seasonal surges in cases for the short-term effects and longer-term future disease burden scenarios under varying climate trajectories. The sub-activity will provide hands-on training to 5 health partners from the University of Lomé and the MSHPCSUA's DNSISI and DivSIUSR, on developing forecasting and projection models.
Deliverables	• 5 professionals trained in short-term and long-term predictive/projection models for malaria and diarrhoea (Q3/Year 2) • 6 operational models for short-term effects (3) (Q1/Year 3) and long-term scenarios (3) of weather to malaria, diarrhoea, and heat integrating developed (Q1/Year 4)
Key institutions involved	MSHPCSUA - DSNISI and DivSIUSR: Receive training on modelling, delivered in collaboration with LSHTM. WASCAL-UoL: Participate in specialised training on climate–health and AMR-related modelling.
Sub-activity 1.2.2.3: Enhance interpretation and application of models in real-world settings (EE: GIZ)	
Description	The outputs generated from Sub-activity 1.2.2.2, focusing on short-term predictive models and long-term projection models, will be systematically synthesised and interpreted through a standardised framework that will be developed under this sub-activity. The framework will be based on the charting the model outputs against actual epidemiological data from DHIS2 as a means for model validation. Subsequently, validated results will be used to identify patterns, thresholds and triggers for short-term mobilisation and long-term strategic decision making. Once the framework is calibrated and validated, it will be operationalised and disseminated with the development of a dedicated manual of model output interpretation. The manual will account for the distinct assumptions, methodologies, and intended use-cases of short-term predictions versus long-term projections. The interpretation framework will be fully aligned with the decision use cases defined in Activity 1.2.1, ensuring that model outputs follow clear pathways for operational use. This includes the translation of predictive outputs into threshold-relevant indicators for the early warning system (1.3.1) and the definition of institutional roles for interpreting results, validating parameters and supporting decision-making. Regular review cycles will be established to update models as new data, system capacities or climate-health dynamics emerge The manual that will be disseminated across the relevant stakeholders (MSHPCSUA) and will ensure consistency, clarity, and usability. It will outline specific guidance on

	how to understand, apply, and communicate the results from both types of models in the context of climate-sensitive disease surveillance and public health decision-making. It will detail how short-term model outputs will guide outbreak response and resource deployment, seasonal resource allocation, etc. Long-term projections will inform policy planning, infrastructure investment, intervention effectiveness (EWS) potential and health system adaptation strategies. In addition to the development of the standardised framework and manual development, key personnel will be trained in the manual use and application ensuring that the predictive and projection models developed remain the most appropriate and context-relevant tools available at any given point in time. Personnel from the MSHPCSUA, UoL/WASCAL will, by continuously assessing model performance and relevance, refine the modelling approaches based on evolving needs, newly available data, and methodological advancements. This sub-activity will contribute to the calibration and the validation of the model outputs under 1.2.2.2 allowing for the provision of supplementary guidance or clarification if needed. It will also provide useful insights on how these models can be operationalised within the resource-constrained setting of Togo, capitalising on successful methods applications for future model iterations. Given the dynamic nature of climate and health data as well as improvements in modelling techniques there is a high likelihood that both data quality and analytical methods will evolve over time. To address the need for constant evolution the sub-activity will moreover support selected personnel from MSHPCSUA and UoL in drafting an operations manual to strengthen the national capacity to develop and integrate short- and long-term weather and climate impact forecasting and projection models for climate sensitive diseases. The trained health partners will build on the LSHTM model utilised for the CCRA of the current feasibility study; the operational models developed under activity 1.2.2.2, as well as the operational experience acquired. LSHTM will continue to build capacity, drawing on its modelling experience and expertise.
Deliverables	• 1 calibrated and validated standardised framework of interpretation (Q3/Year 2) • 2 manuals of interpretation developed (Q4/Year 2) • 4 health partners from MSHPCSUA and WASCAL-UoL trained to conduct model assessment and adaptation (Q4/Year 3)
Key institutions involved	MSHPCSUA - DSNISI and DivSIUSR: Standardise the interpretation framework and develop the response manual. WASCAL-UoL: Participate in standardising the interpretation framework. LSHTM: Provide access and documentation on the modelling developed for the project CCRA, train partners from academia and ministries.
Sub-activity 1.2.2.4: Strengthen AMR data integration into surveillance systems (EE: GIZ)	
Description	This sub-activity will strengthen the integration of AMR data into Togo's national health information system (DHIS2), ensuring that AMR surveillance is aligned with broader climate–health monitoring. The first step will be the revision of existing epidemiological surveillance tools across human, animal, and environmental health to include AMR indicators together with climate-sensitive variables such as rainfall, flooding events, and temperature patterns. Building on this, the DHIS2 platform will be configured to capture, analyse, and visualise AMR data alongside routine health and climate-related surveillance inputs. This will be supported by the training of data managers, laboratory staff, and

	epidemiologists on AMR data entry, interoperability, and use of DHIS2 dashboards to interpret climate-sensitive resistance trends. To strengthen the policy link, the activity will support operational research and data analysis on priority diseases (e.g., malaria, diarrhoeal diseases) where climatic conditions and antimicrobial misuse interact. Findings will be systematically fed into the national AMR technical working group to guide decision-making. The activity will build on Sub-activity 3.2.2, where stool samples from diarrhoeal cases in sentinel sites will be collected and analysed for AMR, and on Sub-activity 3.2.3, which will reinforce diagnostic capacities for AMR testing in participating laboratories. The resulting evidence on how climatic conditions intersect with antimicrobial misuse and resistance will be systematically inform decision-making and guide the revision of national strategies. The integration of AMR surveillance into DHIS2 will follow the harmonised data flows, metadata standards and interoperability requirements defined under Activity 1.2.1, ensuring consistency with broader climate–health analytics. TDL and ATD will support the integration to ensure compliance with national digital governance frameworks and long-term data sustainability.
Deliverables	• 1 synthesis report on climate-AMR linkages produced (Q3/Year 1) • 1 national AMR Action Plan updated to incorporate climate-sensitive surveillance and decision-making developed (Q2/Year 2)
Key institutions involved	MSHPCSUA: Lead sentinel site surveillance for diarrhoeal diseases (through the DLM), oversees stool sample collection, coordinates with laboratories on AMR testing, and ensures integration of diarrhoeal/AMR data into DHIS2. The DSNISI will be responsible for configuring DHIS2 to capture AMR and climate-sensitive indicators, managing interoperability with other systems, and ensuring routine reporting and data quality.
Sub-activity 1.2.2.5: Develop scale-up roadmap for climate and weather-health modelling (EE: GIZ)	
Description	This sub-activity will develop a scale-up roadmap to ensure climate and weather-health modelling at a national level. The activity will capitalise on the experience of the modelling in the three targeted areas and the key lessons learned to lay down an actionable roadmap identifying key priorities. The roadmap will take into consideration the added value of the different components of the modelling, including i) collection and availability of climate, weather, epidemiological and social determinants of health data, ii) data interoperability and iii) analysis of data, iv) physical and digital infrastructure and v) capacity of the human resources available. Through a series of scenarios to assess the sensitivity of the modelling outputs based on differentiated availability of inputs and the actual experience collected during the implementation period of the project, the roadmap will prioritise investment pathways to maximise effectiveness. Investment pathways assessed could include, but will not be limited to scaling-up the geographic and temporal granularity of climate data, improvements in weather forecast, improvements in granularity and quality of epidemiological surveillance, expansion of modelling to other CSHO, etc.
Deliverables	• 1 scale-up gender responsive roadmap validated (Q1/Year 5)
Key institutions involved	MSHPCSUA: Lead sentinel site (through the DLM), responsible for configuring DHIS2 (through the DSNISI). MSHPCSUA - DSNISI will execute the sensitivity analysis.

Output 1.3: An EWS for health is used by policymakers, HFs, the general and key vulnerable populations

Baseline	Togo currently lacks an integrated and functional EWS for CSHO. Existing mechanisms remain fragmented and sectoral: the MSHPCSUA, ANAMET, ANPC, and other institutions each collect their own data without a unified framework for coordination and interoperability. This results in weak synergies, an inability to transform information into actionable alerts, and responses that are mostly reactive rather than proactive. Technical constraints exacerbate these institutional gaps: ANAMET has limited infrastructure and modelling expertise, while the DHIS2 is not interoperable with meteorological or socio-economic databases. Protocols for alert communication are either missing or ad hoc, often dependent on isolated projects or under-resourced hotlines. As a result, correlations between climate and health variables are not systematically established, preventing timely anticipation of outbreaks such as malaria, meningitis, or diarrhoeal diseases. Although international partners (e.g. BOAD, WHO, GCF, the Pandemic Fund) have supported important pilots, these remain scattered and have not coalesced into a sustainable national system. To move from fragmented surveillance to a functional H-EWS, Togo must establish clear operational arrangements, define thresholds and digital infrastructure, and ensure long-term institutional and human capacity.
Activity 1.3.1 Strengthen operational arrangements to implement warning services delivery	
Description	This activity establishes the operational backbone of Togo's H-EWS, ensuring that climate- and health-related data are transformed into timely, validated, and actionable alerts. It builds directly on the data integration and modelling capacities developed under Activities 1.2.1–1.2.2 and provides the institutional and technical preconditions for the dissemination and community response mechanisms defined in Activity 1.3.2 and the communication channels under 4.2. The activity will focus on four mutually reinforcing areas. First, it will set up a governance framework and SOPs that clearly define roles, responsibilities, and decision-making workflows for the entire alert chain, while embedding health alerts into the national MHEWS. Second, it will establish validated thresholds and multi-source data integration, ensuring that surveillance, modelling, and risk maps can trigger alerts in a consistent and equity-sensitive manner. Third, it will operationalise these inputs through a digital platform that aggregates data, applies thresholds, and automates alert generation and validation, while linking seamlessly to the wider MHEWS. Finally, the activity will invest in capacity-building and sustainability, training national and regional staff, organising simulation exercises, and developing a roadmap for scaling the H-EWS to additional CSHOs, sentinel sites, and hydrometeorological functions. Activity 1.3.1 will be supported by four sub-activities: • Sub-activity 1.3.1.1.: Establishing the governance framework for Health Early Warnings • Sub-activity 1.3.1.2.: Defining thresholds and integrating data for health alerts • Sub-activity 1.3.1.3.: Developing the digital platform for health alerts • Sub-activity 1.3.1.4.: Building capacity and ensuring sustainability of the H-EWS By connecting governance, thresholds, digital infrastructure, and institutional capacity, this activity transforms fragmented pilots into a coherent national system. In doing so, it creates the essential interface between surveillance and modelling on

	the one hand (1.2) and communication and community action on the other (1.3.2 and 4.2), thereby enabling Togo to anticipate and respond more effectively to climate-sensitive health risks.
Sub-activity 1.3.1.1: Establishing the governance framework for Health Early Warnings (EE: MSHPCSUA)	
Description	This sub-activity establishes the governance and coordination backbone of the H-EWS to clearly define the roles and responsibilities of key actors – MSHPCSUA, ANAMET, ANPC, the TRC, and CHWs– and create binding procedures that turn technical signals into coordinated action. The process will begin with a comprehensive stakeholder mapping and joint workshops to validate institutional responsibilities. Based on this, SOPs and technical guidelines will be developed, covering the full alert workflow: from data input to threshold validation, to escalation and handover for dissemination. These SOPs will be harmonised with the broader MHEWS to ensure health alerts are seamlessly integrated into national disaster risk management structures. The governance framework will build directly on the data flows, modelling logic and interoperability standards established under Activities 1.2.1 and 1.2.2. It will define a full operating model for the health alert chain, including institutional responsibilities for data-quality checks, threshold validation, model updating, alert approval and escalation. ATD and TDL will contribute to ensuring alignment with national digital governance standards, secure data exchange and the long-term sustainability of alert workflows. This sub-activity directly builds on Activity 1.2.1, which established the general governance framework and MoUs for climate–health data integration which introduced SOPs for the use of risk maps. While those activities focused on data governance and analytical products, 1.3.1.1 translates them into operational rules for alert management. At the same time, it creates the institutional precondition for Activity 1.3.2, which will design the communication protocols and multi-channel dissemination of validated alerts. Finally, it provides a clear governance handshake to Activity 4.2, ensuring that once alerts are validated, they can flow seamlessly into the multiplier network and mass communication campaigns. In this way, the sub-activity creates the clear rules and predictable coordination required for timely and reliable health early warnings, while ensuring coherence across the wider climate–health EWS architecture.
Deliverables	• 1 governance framework for H-EWS validated and endorsed by MSHPCSUA, ANAMET, ANPC (Q3/Year 1) • 1 national SOPs for alert workflows finalised and disseminated (Q1/Year 2) • H-EWS annex integrated into national MHEWS procedures (Q4/Year 2)
Key institutions involved	ANAMET: Provide meteorological data and technical input on climate–health linkages, co-develop thresholds and support integration into national MHEWS procedures. ANPC: Guarantee coherence with the broader MHEWS, ensure that health alerts are embedded in national DRM workflows. ATD: Ensures alignment with national digital governance, hosting standards, interoperability and cybersecurity for the H-EWS. TDL: Supports data harmonisation, analytical workflows, interoperability testing and alignment between modelling and alert-generation systems. TRC: Mobilise community-level participation, act as a first responder in the alert chain, and ensure feedback loops from communities to national coordination structures.

	CHWs: Serve as the operational frontline, relaying alerts to households and reporting back on local response capacities. GIZ: facilitate multi-stakeholder processes and ensure alignment with international best practices and donor requirements.
Sub-activity 1.3.1.2: Defining thresholds and integrating data for health alerts (EE: GIZ)	
Description	This sub-activity will establish alert thresholds for CSHO (e.g. malaria, diarrhoeal diseases, and heat impacts) and configure the data flows that allow these thresholds to trigger automated warnings. Multi-source data from sentinel sites, socio-economic surveys, risk maps (1.2.3), and predictive models (1.2.2) will be harmonised and integrated into the national H-EWS platform (sub-activity 1.3.1.3). Outputs from risk maps (1.2.3) will not only provide data but will be systematically aligned with national EWS protocols, ensuring that when predefined thresholds are exceeded (e.g. malaria incidence combined with rainfall anomalies), alerts are automatically triggered and fed into the national system. The work will include joint technical workshops with MSHPCSUA, ANAMET, ANPC, and academic partners to define disease- and climate-specific thresholds, validate them against historical outbreaks, and embed them in automated algorithms. Once thresholds are crossed, alerts will be generated and passed on for validation under the governance framework (1.3.1.1) and dissemination through communication protocols developed in 1.3.2. Vulnerability overlays will ensure that alerts are equity-sensitive, targeting high-risk groups such as children under five, pregnant women, and remote populations. Threshold design and data integration will follow the harmonised data flows, metadata standards and transformation rules defined under Activity 1.2.1, ensuring that trigger logic for early warnings is directly aligned with predictive models developed under Activity 1.2.2. This includes defining clearly how climate anomalies, incidence patterns and vulnerability overlays interact to activate alert states. ATD and TDL will support the integration to ensure technical coherence with national data systems and interoperability frameworks. This sub-activity thus creates the operational trigger logic of the H-EWS: it translates surveillance and modelling outputs into concrete thresholds that reliably trigger timely alerts, ensuring full continuity between the technical foundation (1.2) and the communication and response mechanisms (1.3.2 and 4.2). A feedback loop will ensure that lessons from dissemination and community response (1.3.2 and 4.2) continuously inform the refinement of thresholds and the effective use of risk maps.
Deliverables	• Alert thresholds for malaria, diarrhoeal diseases, and heat impacts defined and validated by MSHPCSUA and ANAMET incorporating gender-responsive vulnerability criteria (Q2/Year 2)
Key institutions involved	MSHPCSUA – COUSP & DSNISI: Lead threshold validation, ensure integration of health surveillance data, and anchors disease-specific protocols. ANAMET: Provide meteorological and climate data; co-develops thresholds linking weather anomalies with disease risks. ANPC: Ensure consistency with the wider MHEWS and validate thresholds for escalation into national disaster response structures. Universities – WASCAL-UoL: Contribute to support with threshold design, statistical validation, and integration of vulnerability indices. ATD: Ensures alignment with national digital governance, hosting standards, interoperability and cybersecurity for the H-EWS. TDL: Support interoperability, data harmonisation, and algorithm configuration.
Sub-activity 1.3.1.3: Developing the digital platform for health alerts (EE: GIZ)	
Description	A functional H-EWS requires a digital backbone that can automatically generate, validate, and disseminate alerts. This sub-activity will establish such a platform by

	building on the interoperability solutions from Activity 1.2.1 and the risk maps and predictive models developed under Activities 1.2.2. The platform will integrate multi-source data, apply the thresholds defined in 1.3.1.2, and ensure that once these are crossed, alerts are triggered and routed through the governance chain defined in 1.3.1.1. Technically, the system will either expand existing platforms (e.g. DHIS2/CHAP) or deploy an equivalent EWS software such as Early Warning, Alert, Response System (EWARS). It will be fully interoperable with the national MHEWS, so that health-related alerts are aligned with disaster risk protocols. Automated workflows will cover the entire alert cycle: threshold detection, validation by responsible institutions, and forwarding to dissemination processes under Activity 1.3.2. The platform will be developed in alignment with the national digital architecture led by ATD, ensuring compliance with interoperability, hosting and cybersecurity standards. Data pipelines will follow the technical specifications established under Activity 1.2.1 and the threshold logic defined under Activity 1.2.2, allowing the system to automatically detect and validate alert conditions. An end-to-end integration testing process will be applied to verify that climate and health datasets flow reliably from ANAMET and DSNISI to the modelling environment and into the alert-generation modules. In parallel, the project will procure and install the necessary infrastructure (servers, computers, and secure networks) and provide training for system administrators and end-users. Communication protocols with CHWs and the TRC will ensure last-mile delivery to communities, closely linked with the multiplier networks and campaigns developed under Output 4.2. This sub-activity therefore transforms the technical and institutional inputs from earlier activities into a single operational platform that ensures health risks are translated into timely, validated, and disseminated alerts.
Deliverables	• 1 digital platform for H-EWS operational and linked to national MHEWS (Q3/Year 2) • Automated alert generation and validation workflows being functional (Q4/Year 2)
Key institutions involved	MSHPCSUA – COUSP & DSNISI: Lead integration with DHIS2, supervise platform operation, and validate alerts. ANAMET: Provide climate and weather data streams, ensure technical compatibility with hydromet systems. ANPC: Anchor alignment with the national MHEWS and validate escalation procedures. CHWs & TRC: Ensure dissemination of alerts and feedback from communities. ATD: Ensures alignment with national digital governance, hosting standards, interoperability and cybersecurity for the H-EWS. TDL: Provide IT expertise, support integration, and ensure system resilience.
Sub-activity 1.3.1.4: Building capacity and ensuring sustainability of the H-EWS (EE: MSHPCSUA)	
Description	This sub-activity focuses on strengthening the human and institutional capacities needed to run the H-EWS effectively and to ensure its sustainability beyond the project's lifetime. National and regional staff will be trained on the full alert cycle, including data interpretation, threshold validation, and coordination across sectors. Simulation exercises will test workflows under real conditions and feed lessons back into the governance arrangements established in 1.3.1.1. Continuous learning will be supported through a digital helpdesk, refresher courses, and on-the-job mentoring. Capacity-building will also cover the routine maintenance of the H-EWS, including data-quality controls, model-refresh processes, threshold recalibration and

	the application of alert-validation procedures defined under Sub-activity 1.3.1.1. Regular stress-tests and simulation cycles will ensure that national teams can operate and update the system autonomously and in alignment with evolving climate–health dynamics. This sub-activity complements the risk map capacity-building in 1.2.3.3 and the community-level training in 1.3.2. While those focus on the use of analytical products and community dissemination, 1.3.1.4 ensures that institutions can manage alert handling and long-term sustainability.
Deliverables	• 120 staff at national and regional level trained on Health EWS alert workflows (Q4/Year 2) • Digital helpdesk and refresher course for EWS established (Q4/Year 3)
Key institutions involved	ANAMET: Provide technical expertise on climate–health thresholds and contributes to simulation exercises. ANPC: Ensure alignment with national disaster preparedness and response mechanisms, co-validate the scaling roadmap. Universities (WASCAL-UoL): Provide technical training support, conduct evaluations, and contribute to scaling options. TRC: Mobilise regional trainers and supports simulations with frontline responders. GIZ: Finance capacity-building activities and ensure sustainability planning.

Baseline	As of January 2025, Togo does not operate an integrated EWS for health-related risks. Existing initiatives are fragmented and limited in scale. For example, community-based pilots, such as the FUNES system, which provides dam water forecasts from Nangbéto to local communities, remain highly localised and confined to specific hazards. A recent TRC review confirmed that no national system exists with harmonised procedures for the development, validation, and dissemination of warnings across hazards, including climate-sensitive health risks. Structural barriers further constrain the effectiveness of warning dissemination, including linguistic diversity, unequal access to mobile phones or radio, weak network coverage in rural areas, and the absence of clearly defined coordination and response protocols (TRC, 2023). In the health sector, systems for emergency preparedness and surveillance have been reinforced during the COVID-19 response (e.g., Argus digital reporting tool piloted in two regions), but these are primarily inward-facing data collection tools for HFs rather than mechanisms to communicate actionable warnings to the public (Guerra et al., 2020). As a result, communities rarely receive timely, trusted, and actionable guidance on malaria, diarrhoeal outbreaks, or heat-related illness linked to climate variability. Trusted community multipliers such as health workers, teachers, and local leaders remain largely absent from structured dissemination processes, leaving a critical gap between national-level alerts and household-level action. Evidence from other African countries highlights similar barriers that Togo is also facing. Research shows that many EWS fail due to socio-cultural obstacles, weak institutional coordination, and lack of participation of vulnerable groups (Gonah & Nomatshila, 2024; Handebo et al., 2024). Reviews from Cameroon and Niger underline persistent gaps such as the absence of disability-inclusive data, inaccessible communication formats, and weak political support for institutionalising EWS (CBM, 2022). In flood- and disaster-related warnings, studies also note that alerts are frequently misunderstood, ignored, or acted upon too late, often because messages are overly technical, disconnected from people's realities, or because households lack the resources to respond. In summary, Togo's baseline is characterised by fragmented pilots, structural communication barriers, and the absence of institutionalised, health-sensitive EWS

	mechanisms. These weaknesses mirror broader challenges across Africa: lack of inclusive design, missing feedback loops, limited capacity for impact-based forecasting, and fragmented health communication infrastructures. As a result, warnings, when issued, seldom translate into effective protective measures, leaving households and communities unprepared for climate-related health risks.
Activity 1.3.2: Deliver warning messages through multiple communication channels and strengthen response in affected communities	
Description	This activity addresses the existing gap between the early warnings generated at the national level and their effective transmission, comprehension, and use at the community level. While Activity 1.3.1 supports the development of the digital and governance foundations of the national H-EWS, many communities remain disconnected from these alerts and do not receive trusted, timely, or actionable guidance on how to respond. Fragmented communication channels, limited access to reliable media, and weak links between institutional actors and local structures further restrict the reach and impact of warning messages. To address these challenges, Activity 1.3.2 will develop and operationalise the communication and community-response component of the H-EWS for climate-sensitive health risks. It will ensure that alerts generated through the national platform and coordination mechanisms (1.3.1) are translated into clear, context-specific, and actionable messages that enable households and communities to take timely and protective measures. Building on the validated SBC Climate and Health Toolkit (4.2.1) and the multiplier training architecture (4.2.2), this activity will combine institutional communication design with local capacity development. First, a practical EWS communication approach and toolkit will be co-developed, mapping the pathways and actors involved in disseminating alerts from national to community level. Early-warning messages will be tested with diverse groups to ensure clarity, inclusiveness, and trust. In parallel, a dedicated EWS training module will be developed and integrated into the multiplier training package under 4.2.2. Through regional joint sessions, CHWs, teachers, Red Cross volunteers, and local leaders will acquire the skills to interpret alerts, differentiate forecasts from actionable warnings, and mobilise households in response. These trainings will reinforce coordination between national alert workflows and local response networks. Beyond immediate implementation, this activity will also strengthen institutional capacities of national partners—including the MSHPCSUA, ANPC, and ANAMET—by providing a replicable communication and coordination model for EWS in other sectors (e.g. agriculture, DRM, or water). Through joint development, testing, and documentation, the EWS communication approach will serve as a blueprint for scaling multi-hazard alert systems across sectors in Togo. By directly linking the technical and social dimensions of the EWS, Activity 1.3.2 will establish a reliable, inclusive, and sustainable communication chain. Alerts issued through the national platform (1.3.1) will be translated into understandable community messages (1.3.2.1) and acted upon by trained multipliers (1.3.2.2). Feedback from these processes will be systematically integrated into the SBC Climate and Health Toolkit (4.2.1) and future updates of the EWS governance framework, ensuring continuous learning and adaptation. Activity 1.3.2 will be supported by two sub-activities: • Sub-activity 1.3.2.1: Co-developing a practical communication approach for Togo's EWS • Sub-activity 1.3.2.2: Strengthening community capacity to understand and act on early health warnings

<table>
<tr><th colspan="2">Sub-activity 1.3.2.1: Co-developing a practical communication approach for Togo’s EWS (EE: GIZ)</th></tr>
<tr><td>Description</td><td>This sub-activity builds the operational bridge between the governance and digital alert system established under Activity 1.3.1 and the community-level communication and behaviour-change mechanisms developed under Output 4.2. Its main objectives are to co-design and validate a practical, inclusive, and interoperable communication approach that ensures health-related early warnings are not only generated and transmitted through the national EWS platform (1.3.1), but are also translated into clear, trusted, and actionable messages for communities.

The process will start with a mapping of communication pathways—linking the alert validation workflows from 1.3.1 to concrete dissemination channels at national, regional, and community level. Based on this mapping, an EWS communication methodology and toolkit will be developed, defining templates, formats, and language guidance for warning messages compatible with the digital platform outputs.

Two field campaign tests will then be carried out in selected pilot districts to evaluate the comprehension, trust, and timeliness of community responses. These pilots will be jointly implemented with Activities 4.2.2 and 4.2.3 to ensure consistency between institutional alerts and social-behavioural communication.

Finally, results and lessons will feed into a national EWS communication strategy harmonised with the governance framework and alert thresholds defined in 1.3.1. The strategy will serve as an operational reference for the MSHPCSUA, ANPC and ANAMET to deliver timely and culturally resonant alerts through multiple, redundant communication channels.</td></tr>
<tr><td>Deliverables</td><td>1 H-EWS communication methodology and toolkit developed and validated (Q2/Year 3)
1 H-EWS communication strategy for Togo finalised (Q4/Year 3)</td></tr>
<tr><td>Key institutions involved</td><td><u>MSHPCSUA</u>: Validate health-specific message content and ensure alignment with 1.3.1 governance and SOPs.
<u>ANPC/ANAMET</u>: Provide alert triggers, thresholds, and technical data from the 1.3.1 digital platform.
<u>TRC</u>: Facilitate local testing and feedback through its community networks.
<u>Universities (WASCAL-UoL)</u>: Support design, field evaluation, and methodological refinement.
<u>Local Media Partners</u>: Participate in pilot dissemination and gather audience feedback.</td></tr>
<tr><th colspan="2">Sub-activity 1.3.2.2: Strengthening community capacity to understand and act on early health warnings (EE: GIZ)</th></tr>
<tr><td>Description</td><td>This sub-activity ensures that communities in Togo can interpret, trust, and act upon early health warnings generated through the national digital EWS platform (Activity 1.3.1). It strengthens the last-mile connection between national alert systems and community action by equipping local multipliers with the knowledge and confidence to translate alerts into protective behaviour.

Building on the multiplier training architecture developed under Activity 4.2.2, a dedicated EWS training module will be created and integrated into the broader climate–health training package.

This module will cover:
Interpretation of alerts from the EWS digital platform (1.3.1);</td></tr>
</table>

	• Differentiation between forecasts and actionable warnings; • Rapid community mobilisation and response mechanisms; • Inclusion, gender, and accessibility standards for communicating alerts. The training will be co-implemented with the Red Cross, CHWs, teachers, and local leaders — trusted multipliers already engaged under 4.2.2. Joint regional sessions will build practical skills and foster coordination between institutional alert workflows and community networks. Feedback from these training sessions will be jointly analysed with MSHPCSUA, ANPC, and ANAMET to inform improvements to the SBC Climate & Health Toolkit (4.2.1) and the EWS communication strategy (1.3.2.1). In this way, the sub-activity closes the loop between the technical and social dimensions of the national EWS, ensuring that alerts reliably trigger timely and inclusive action at community level.
Deliverables	• 1 EWS training module developed (to be delivered into the multiplier training package of 4.2.2) (Q2/Year 3) • 3 regional joint training sessions delivered (together with 4.2.2) reaching at least 500 multipliers (CHWs, teachers, Red Cross volunteers, local leaders) who will also be trained on EWS (Q3/Year 3)
Key institutions involved	<u>MSHPCSUA</u>: Validate training content and ensure coherence with EWS workflows (1.3.1). TRC: Co-organise and deliver training; mobilise community multipliers. <u>CHWs, teachers, local leaders</u>: Apply EWS messages at community level, ensure inclusive outreach. <u>ANPC & ANAMET</u>: Provide alert triggers and technical input for the module content. <u>Universities (WASCAL-UoL):</u> Support curriculum design and evaluation.

Component 2: Building an enabling environment to increase health sector resilience

Output 2.1: Intersectoral collaboration, accountability, and leadership mechanisms on climate change and health issues is strengthened

Baseline	Since 2019, the MSHPCSUA identified the need to address the theme of climate change and health. This need was initially suggested and anchored within the DHAB of the MSHPCSUA. However, due to the multisectoral and transversal nature of the issues related to climate and health, it was quickly deemed more appropriate to escalate this initiative to a higher level to ensure better intersectoral coordination and a long-term strategic vision. In January 2024, a Climate-Health Task Force was created within the MSHPCSUA, consisting of 12 members representing various directorates of the Ministry such as DivIS, DivSIUSR, Nutrition Division, DPML, DL, DISEM, DHAB, DSNISI, Studies and Research Division, Training and Staff Capacity Development Division, PNLP, COUSP. The Task Force is led by the Secretary General of the MSHPCSUA, with a designated climate-health focal point to ensure liaison. However, this structure remains temporary, informal and non-institutionalised. It functions solely based on a service note acknowledging its existence, lacking a formal legal foundation, a clear institutional mandate, and permanent staffing. This absence of a strategic vision for integrating climate issues into national health governance represents a major barrier to implementing climate and health adaptation actions.

	Several significant challenges make this structure insufficient to effectively address the challenges of climate change in the health sector. Firstly, the members of the Task Force are not fully dedicated to this topic, being constrained by their multiple responsibilities within their respective directorates. This compromises their ability to focus on key tasks, make swift decisions, and carry out coherent long-term actions. Moreover, the lack of sustained funding to support the Task Force's activities limits its scope and effectiveness. Another barrier is the lack of intersectoral collaboration and synergies (meteorology, security, environment) with the health sector. The DHIS2 health information system also does not integrate climate data information into health sector planning and health service delivery. These challenges highlight the MSHPCSUA's objective, as expressed in the 2023-2027 PNDS of transforming this task force into a fully operational CCU. The CCU would be an integral part of the Ministry's organisational structure - fully institutionalised, with a formal legal status, permanent staff, and a clear mandate. This transformation would strengthen intersectoral coordination, ensure better resource management, and guarantee the sustainable integration of climate-related issues into public health policies. Furthermore, it would help mobilise regular funding and ensure a lasting impact in the fight against the health effects of climate change over the long term.
Activity 2.1.1: Establish a CCU dedicated to health and climate change issues within the MSHPCSUA	
Description	This activity focuses on institutionalising climate resilience within Togo's health sector by establishing a dedicated CCU under the MSHPCSUA. The CCU will act as a national coordination body to lead and implement climate-health initiatives, ensuring the long-term and systematic integration of climate change considerations into health system. The CCU will, among others, coordinate national efforts on climate change and health, lead the planning and implementation of adaptation and mitigation strategies within the health sector, and serve as a liaison between the health sector and intersectoral stakeholders such as Environment, Agriculture, and Civil Protection. Furthermore, the CCU will represent Togo in international platforms, including WHO's ATACH. Activity 2.1.1 will be supported by four sub-activities: • Sub-activity 2.1.1.1: Formal establishment of the CCU • Sub-activity 2.1.1.2: Capacity strengthening of the CCU • Sub-activity 2.1.1.3: Operational and strategic partnerships • Sub-activity 2.1.1.4: Provision of equipment and material resources for the CCU The sub-activities are designed to address the different components necessary to establish and operationalise a new institution. This activity is closely linked to Activity 2.1.2: while Activity 2.1.1 focuses on institutionalisation at the national level, Activity 2.1.2 addresses institutionalisation at the regional level. The newly created CCU will serve as the main governmental body responsible for coordination at the regional level (2.1.3) and with other sectors (2.2.2, 2.1.3).
Sub-activity 2.1.1.1: Formal establishment of the CCU (EE: MSHPCSUA)	
Description	This sub-activity aims to transform the existing climate and health task force into a fully institutionalised and operational CCU within the MSHPCSUA. The objective is to provide the new CCU with legal recognition, a defined organisational structure,

	and a clear mandate that ensures its full integration into the national health governance framework. The first step involves conducting a comprehensive assessment and situational analysis of the current Task Force's organisational and operational levels. This review will evaluate its current structure, roles, achievements, and limitations, and identify institutional requirements for transitioning into a permanent structure. Lessons will be drawn from comparable units in other countries and aligned with existing guidance from WHO and the ATACH initiative. Following this, a series of stakeholder consultations will be carried out. Internal discussions will be held with all members of the existing Task Force and key directorates within the MSHPCSUA to discuss expectations and options for structuring the CCU. At the same time, external stakeholders such as GIZ, the WAHO, and the MERFPCCC, the ANPC will be engaged to ensure alignment with climate and health policy priorities and to gather technical input on the CCU's scope and resources. Based on these consultations, the MSHPCSUA will lead the drafting of the legal and institutional framework required to formalise the CCU. This will include preparing a ministerial decree to officially create the Unit. The decree will define the Unit's organisational structure, legal mandate, mission, and functional responsibilities such as coordination, technical assistance, policy development, and monitoring. The next phase focuses on the organisational design of the CCU. A detailed organogram will be proposed, identifying leadership roles (likely housed under the MSHPCSUA's General Secretariat), technical staff (e.g., in climate surveillance, health systems, data analysis, communication), and administrative support. Job profiles, qualifications, and role descriptions will be developed to guide recruitment or internal appointments. Collaboration mechanisms with other MSHPCSUA departments and sectoral ministries will also be outlined. Once the structure is defined, resource planning will take place to determine the CCU's operational needs in terms of staffing, budget, equipment, and infrastructure. Dialogue meeting will be held with the executive management of MSHPCSUA, including the General Secretary, Directorate of Planning and Budgeting, etc., to include a clear budget line for the CCU in the Ministry's budget for functioning which will be used to purchase needed equipment. The formal establishment of the CCU begins with the development and validation of a comprehensive concept based on a detailed needs assessment. This concept outlines the Unit's mandate, roles, responsibilities, objectives, and the resources required for full functionality. Based on this, ToR will be drafted, defining the staffing structure, reporting lines, and operational scope of the Unit. Once finalised, the ministerial validation will follow, with an official decree. With its legal establishment, the CCU will be operationalised through the recruitment or assignment of essential personnel including the Unit's lead, technical experts, and administrative staff. Budget will be allocated, along with office space and equipment, and operational guidelines such as SOPs, reporting mechanisms, and coordination frameworks will be developed. The sub-activity will conclude with the official launch and inauguration of the CCU.
Deliverables	• 1 ministerial decree officially establishing the CCU within the MSHPCSUA issued, mandating a composition of ≥50% women and ≥10% women in leadership and decision-making positions (Q4/Year 1) • 1 institutional framework document for the CCU adopted by the MSHPCSUA (Q4/Year 1)

Key institutions involved	GIZ: Provide institutional strengthening support, backstopping for intersectoral coordination, and technical/financial contributions for operationalisation. MERFPCCC: Ensure alignment of CCU with national climate policies and environmental commitments. ANAMET: Supply climate and meteorological data, support risk mapping, and contribute to integration of EWS into health planning. WAHO: Provide regional alignment and contribute to integration of CCU within broader West African health–climate initiatives WHO/ATACH Secretariat: Offer normative guidance, tools, and best practices to strengthen the climate resilience of health systems and facilitate knowledge sharing through the ATACH platform. Ministry of Economy and Planning: Align CCU with national development priorities and support donor coordination for long-term sustainability.
Sub-activity 2.1.1.2: Capacity strengthening of the CCU (EE: GIZ)	
Description	This sub-activity aims to strengthen the operational, technical, and managerial capacities of the newly established CCU within the MSHPCSUA, ensuring its ability to lead and coordinate national health responses to climate change. Building on the formal creation of the CCU, this intervention will equip its members and affiliated directorates with the necessary skills, tools, and institutional culture to function as a dynamic, evidence-informed, and multi-sectoral Unit. The process will begin with a comprehensive capacity needs assessment, covering technical expertise, managerial competencies, and behavioural dimensions (through a Knowledge, Attitudes, and Practices - KAP survey). This dual assessment will identify gaps in climate-health knowledge, adaptive management skills, leadership, communication, collaboration, and institutional coordination. It will also provide insight into current perceptions and practices within the MSHPCSUA concerning climate and health integration. Based on the findings, a multi-dimensional capacity development plan will be designed. This plan will include: • Technical trainings on topics such as CSHO surveillance, health-related climate impact chain, climate-informed public health planning, and EWS. • Managerial trainings on strategic planning, results-based management, team leadership, project coordination, stakeholder engagement, and resource mobilisation. • Behavioural and change management workshops to foster proactive attitudes, collaboration, accountability, and an enabling institutional culture for innovation and climate resilience. The primary trainees will include CCU staff, heads of directorates, and technical staff from key MSHPCSUA directorates, as well as representatives from sectoral ministries and agencies such as ANPC, ANAMET, and the MERFPCCC, ensuring that both leadership and operational levels across sectors acquire the skills necessary for effective climate and health coordination. Training sessions will be modular, participatory, and practice oriented. They will be delivered through national workshops, virtual sessions, and mentoring by national and international experts, with co-facilitation by GIZ. Gender-sensitive and inclusive approaches will be adopted throughout. The CCU will be trained on the use of the different manuals and tools that will be developed as part of the project's deliverables. These manuals and tools will help ensure that the acquired capacities are translated into practice and embedded into daily operations. To broaden learning and foster a culture of innovation, regional peer exchanges and study visits will be organised, allowing CCU members to interact with counterparts

	in other countries with mature climate-health structures. This will be complemented by participation in regional ATACH knowledge-sharing events and communities of practice. The MSHPCSUA will lead the implementation, with technical and strategic support from GIZ. The capacity strengthening approach will be integrated into the CCU's annual planning to ensure continuity and long-term impact.
Deliverables	• 1 institutional capacity development plan validated and adopted by MSHPCSUA (Q2/Year 2) • 25 staff trained on technical and managerial topics, comprising an absolute target of ≥50% women (Q2/Year 3) • 2 regional peer learning or exchange visits completed (Q3/Year 4)
Key institutions involved	MSHPCSUA: Lead the process, select participants, ensure internal coordination and institutional uptake of new skills and tools. Host the CCU and integrate capacity development into national health planning. WAHO: Facilitate regional learning opportunities, coordinate technical exchanges and contribute regional tools and resources for institutional strengthening. WHO/ATACH Secretariat: Provide global knowledge products, guidance on institutional resilience building, and facilitate participation in global learning platforms.
Sub-activity 2.1.1.3: Operational and strategic partnerships (EE: GIZ)	
Description	This sub-activity focuses on the development and formalisation of operational and strategic partnerships to strengthen the mandate, outreach, and resource mobilisation potential of the newly established CCU. Recognising that climate and health challenges are inherently cross-cutting, the CCU will rely on a broad network of partnerships to support implementation, knowledge exchange, technical support, and sustainability. The process will begin with a stakeholder mapping and partnership analysis, identifying key national, regional, and international actors relevant to climate-resilient health systems. This includes public institutions, academic and research institutions, development partners (e.g. WAHO), NGOs, and technical agencies with complementary mandates. Based on this mapping, the MSHPCSUA, supported by GIZ, will convene a series of bilateral consultations and coordination meetings to explore potential areas of collaboration, define roles, and align expectations. These engagements will aim to formalise both operational partnerships (e.g., for data sharing, joint surveillance, infrastructure development) and strategic partnerships (e.g., for policy alignment, advocacy, funding mobilisation, and regional coordination). Partnerships will be framed through MoUs, cooperation protocols, or letters of commitment, clearly outlining objectives, shared responsibilities, and mechanisms for coordination and reporting. When possible, these will be included within the MoUs signed under Output 1.2. Special attention will be given to securing partnerships with ANAMET (targeted under Output 1.3 activities), the MERFPCCC, the Ministry of Economy and Planning, ANPC, and the Ministry of High Education and Research to ensure policy coherence, access to data, and donor alignment, as well as other non-state relevant institutions such as WASCAL, the Research and Public Health Training Centre, etc. To support sustained collaboration, a partnership coordination mechanism will be established under the leadership of the CCU. This may include a multisectoral working group or advisory committee with regular meetings, shared work plans, and

	a common results framework. The CCU will also develop a strategic engagement plan for continuous dialogue with donors, academic institutions, and regional platforms (e.g., WAHO/ECOWAS, WHO/ATACH). This sub-activity will be led jointly by GIZ and MSHPCSUA, with support from WAHO and other relevant actors. It will ensure that the CCU operates within a strong collaborative ecosystem, able to leverage external expertise, align with national and international agendas, and mobilise additional resources for implementation.
Deliverables	• 3 formal cooperation agreements (MoUs/protocols) signed with strategic institutions under Output 1.2 (Q3/Year 2) • 1 strategic partnership and donor engagement plan, including a coordination mechanism, is developed (Q4/Year 2)
Key institutions involved	MSHPCSUA: Lead the identification and engagement of key partners, sign cooperation agreements, and host the CCU as the central platform for partnership coordination. MERFPCCC: Support coherence with national climate adaptation policies and environmental commitments. ANAMET: Supply climate and meteorological data and collaborate on EWS and risk mapping. ANPC: Contribute to disaster risk management integration and emergency preparedness planning. WAHO: Facilitate regional coordination and ensures alignment of partnerships with West African health-climate strategies. Ministry of Higher Education and Research, WASCAL, CFRSP: Provide research collaboration, training opportunities, and ensure integration of CCU partnerships with academic and scientific networks.
Sub-activity 2.1.1.4: Provision of equipment and material resources for the CCU (EE: MSHPCSUA)	
Description	This sub-activity aims to ensure the full operationalisation of the CCU by providing the essential office infrastructure, IT hardware, and specialised tools required for both its technical and managerial functions. In line with the CCU's roles such as data management, coordination, communication, training delivery, and technical analysis adequate equipment and materials will be procured and installed. This support is critical to enable the Unit's staff to perform their tasks efficiently and to facilitate internal and intersectoral collaboration. The process will begin with a needs assessment conducted by the MSHPCSUA, in consultation with the CCU team and technical partners. Based on this assessment, a procurement plan will be developed to guide the purchase and installation of equipment. The procurement will include essential office and IT equipment, such as laptops, printers, a data server, internet connectivity tools, and videoconferencing kits. Furniture and supplies necessary for an ergonomic and professional working environment will also be included. A 4x4 utility vehicle will be procured to enable the CCU to access remote and hard-to-reach areas, conduct field visits and supervision, and ensure timely coordination and support during routine and emergency activities—essential given the limited road infrastructure and the need for rapid response. All purchases will comply with national procurement regulations and standards of transparency, with oversight by the National Directorate of Public Procurement. The MSHPCSUA, supported by GIZ, will coordinate the procurement and oversee the delivery and installation of the equipment. The process will be synchronised with the onboarding of CCU staff and finalisation of the unit's office space, ensuring that the equipment is in place and functional before full operations begin. The

	MSHPCSUA will be responsible for the maintenance of all equipment procured for the support of CCU after the implementation period of the project.
Deliverables	• 1 CCU with complete office setup (including IT) equipped (Q2/Year 2) • 1 operational 4x4 utility vehicle delivered and registered for CCU (Q3/Year 2)
Key institutions involved	National Directorate of Public Procurement: Provide oversight and ensure all procurement processes comply with national standards and regulations, promoting transparency and efficiency. GIZ: Support resource mobilisation and may co-finance procurement and installation, assist with identifying regional suppliers and technology options.

Baseline	The Regional CCUs will play a pivotal role in translating national climate–health strategies into locally relevant action. Their mandate includes guiding Health Districts, HFs, and CHW in the implementation of climate-sensitive health activities, while ensuring that climate adaptation and mitigation are systematically integrated into regional and district health planning, preparedness, and emergency response. They will serve as key coordination hubs, working closely with regional entities such as the ANPC, the ANAMET, the regional directorates of the MERFPCCC, and the DSIUR, particularly in the areas of EWS and DRR. In addition, the CCUs will support analysis and reporting of climate–health data from across the region, feeding into national platforms such as DHIS2 and providing critical evidence for health system planning. At the governance level, the CCUs will represent the health sector in regional multisectoral platforms, supporting the operationalisation of the One Health approach. They will also act as field-level implementers of centrally validated strategies, ensuring the rapid deployment of interventions during public health crises and climate-related emergencies.
Activity 2.1.2: Establish 5 CCUs in the Regional Directorates for Health	
Description	This activity aims to decentralise climate-health governance and action in Togo through the creation of five (5) Regional CCUs, each integrated within the Regional Health Directorate (*Direction Régionale de la Santé* – DRS). These regional units will serve as operational coordination hubs responsible for implementing, monitoring, and reporting on climate-health adaptation and mitigation interventions at the regional, district, and community levels. Each regional CCU will be staffed by designated MSHPCSUA personnel and equipped with operational tools, funding, and technical support. They will operate under the technical oversight of the central CCU, contributing to a national ecosystem of climate-health coordination and surveillance. A clear feedback mechanism will be established to ensure vertical alignment and continuous learning between national and regional levels. The Regional CCUs will guide Health Districts, HFs, and CHWs in implementing climate-sensitive health activities, while also integrating adaptation and mitigation measures into regional and district health planning, preparedness, and emergency response. They will coordinate with regional entities such as ANPC, ANAMET, and the regional directorates of the Ministry of Environment on EWS and DRR, and they will collect, analyse, and report climate-health data to strengthen national systems such as DHIS2 and inform health system planning. In addition, the Regional CCUs will represent the health sector in regional multisectoral platforms and contribute to the operationalisation of the One Health approach. Finally, they will serve as field-

	level implementers of centrally validated strategies and ensure the effective deployment of interventions during public health and climate-related emergencies. Activity 2.1.2 will be supported by three sub-activities: • Sub-activity 2.1.2.1: Institutional setup and operationalisation of Regional CCUs • Sub-activity 2.1.2.2: Capacity building and technical support • Sub-activity 2.1.2.3: Provision of operational tools and equipment The formal establishment of regional CCUs (2.1.2.1) provides the legal basis, staffing, and coordination framework for their functioning. This is reinforced through capacity-building (2.1.2.2), equipping staff with the skills needed to fulfil their mandate, and through provision of tools and equipment (2.1.2.3), ensuring they are adequately resourced. Together, these sub-activities strengthen the central CCU (2.1.1) by creating an integrated national–regional governance network. The regional CCUs will not only implement national climate–health strategies at field level but also generate insights to inform national decision-making.
Sub-activity 2.1.2.1: Institutional setup and operationalisation of Regional CCUs (EE: MSHPCSUA)	
Description	This sub-activity includes the legal and institutional establishment of regional CCUs within the five DRSs. It begins with the development and validation of a regional CCU framework aligned with the national CCU structure, including mandates, roles, staffing structure, SOPs, reporting lines, and coordination frameworks. Each CCU will be embedded in existing regional planning and coordination mechanisms to avoid duplication. Formal approval from the relevant ministries (Health, Finance, Civil Service) will ensure legal status and integration into performance-based management systems. Office spaces will be allocated, and focal personnel assigned. The process concludes with the official launch of the CCUs.
Deliverables	• 5 CCUs established through legal documents, with the formal assignment of personnel across these units comprising an absolute target of ≥30% women (Q3/Year 1) • ≥ 1 of the 5 regional CCUs will be headed by a woman from the assigned personnel, with the required technical, managerial, and leadership skills (Q3/Year 1)
Key institutions involved	Ministry of Finance/Civil Service: Provide legal and administrative endorsement, including staffing approval and integration into management systems. GIZ: Provide technical and financial support to strengthen institutional capacities and ensure alignment with the national CCU framework Decentralised actors (ANPC, ANAMET, MERFPCCC): Contribute technical input, data, and coordination to link regional CCUs with DRM, meteorology, and environmental services.
Sub-activity 2.1.2.2: Capacity building and technical support (EE: GIZ)	
Description	This sub-activity strengthens the technical, managerial, and operational capacities of regional CCU staff. Structured training programs will cover climate-health fundamentals, regional climate risk assessments, data management, DRR coordination, One Health integration, and climate-health surveillance. This will also include a 10 session formative supervision's missions conducted semi-annually. Heads of CCUs will receive tailored coaching on leadership, coordination, resource management, and donor engagement. Peer-learning exchanges with the central CCU and among regional CCUs will be institutionalised. All capacity-building

	activities will include cross-cutting themes such as gender, equity, and community engagement.
Deliverables	• 15 members of the 5 CCUs trained in technical, administrative, and management skills, ensuring an absolute target of ≥30% women within the training cohort (Q1/Year 2) • 10 regional peer-learning workshops conducted (Q3/Year 2)
Key institutions involved	MSHPCSUA - DRSs: Host the CCUs, coordinate training logistics, and ensure integration of capacity building into regional health planning. Regional CCUs: Receive technical, managerial and operational training.
Sub-activity 2.1.2.3: Provision of operational tools and equipment (EE: MSHPCSUA)	
Description	To ensure regional CCUs are operational, each unit will be equipped with the necessary tools, and communication equipment based on regional risk profiles and operational needs. Packages include office furniture, computers, internet connectivity, surveillance and data tools, and basic emergency response kits. Procurement will be centrally coordinated but regionally contextualised to address specific vulnerabilities and infrastructure gaps. Maintenance plans and equipment use protocols will be provided.
Deliverables	• 5 regional CCUs equipped with complete office setup (including IT) (Q2/Year 2)
Key institutions involved	GIZ: Support definition of technical specifications and procurement standards. Regional CCUs: Receive and operationalise the equipment, applying maintenance and equipment use protocols.

Baseline	The 2023 evaluation of the PNDS 2017–2022 identified the health system's vulnerability to climate change as one of its major weaknesses. A key finding was the insufficient integration of the One Health approach across sectoral policies, limiting the country's ability to address interconnected risks at the human–animal–environment interface. Togo previously adopted a National Strategic Plan for Health Research (2015–2020) to guide research priorities in line with its international commitments. However, implementation remained limited due to weak national coordination of health research activities. This resulted in the absence of a national framework to guide health research, low coverage of key health system and environmental determinants, limited promotion of research within hospitals and specialised institutions, and a low rate of uptake of research results in policy and practice. Coordination and knowledge-sharing on climate and health among national and regional actors also remain major challenges. Although the MSHPCSUA engages in various platforms—such as the One Health Platform and the National Adaptation Committee—there is no permanent, structured mechanism to ensure that climate–health issues are systematically addressed, coordinated or mainstreamed across these bodies. Existing interactions tend to be ad hoc and heavily dependent on the momentum of individual projects rather than aligned with a coherent national strategy. Cross-sectoral dialogue involving academia, civil society and development partners is similarly fragmented. Engagements are often punctual, project-driven, and lack the institutional mandates, resources and coordination mechanisms required to sustain knowledge exchange or align efforts. As a result, Togo has not fully benefited

	from regional and continental initiatives such as the African Union's climate–health programmes or technical knowledge platforms supported by GIZ and WASCAL. At the sub-regional level, Togo participates intermittently in ECOWAS and WAHO events, as well as in the WASCAL regional learning programme on climate change. The country is also a member of the ATACH, although its participation and contributions remain limited. Importantly, there is no dedicated channel to ensure that knowledge gained from these regional engagements is captured, institutionalised, and applied within national policy processes. This lack of structured coordination and continuous exchange has contributed to duplicated efforts, weak uptake of best practices, and missed opportunities for joint advocacy and resource mobilisation. It has also constrained Togo's ability to leverage regional expertise and partnerships to strengthen national climate–health governance.
Activity 2.1.3: Strengthen national and sub-regional coordination, knowledge, and learning mechanisms	
Description	This activity aims to institutionalise coordination, learning, and knowledge-sharing on climate and health in Togo. It will position Togo as an active contributor to sub-regional, continental, and global dialogue platforms, ensuring climate–health becomes a sustained priority in national policy, research, and civic engagement. Interventions will align with existing national platforms (e.g. One Health, National Adaptation Committee), regional entities (e.g. ECOWAS, WAHO), and continental frameworks (e.g. AU initiatives) to secure ownership, coherence, and sustainability. At the national level, the activity will build CCU and regional CCU capacities to engage in intersectoral mechanisms, organise thematic dialogues and academic fora, and strengthen the participation of CSOs—especially youth- and women-led groups—as well as partnerships with private actors. Multi-stakeholder learning sessions will capture project experiences and feed a national knowledge base linked to health observatories for decision-makers and practitioners. At the regional level, Togo will participate in joint learning missions, South–South exchanges, and technical workshops with peers such as Senegal, Malawi, and Benin, while engaging with ECOWAS, WAHO, the AU Climate and Health Working Group, and regional research bodies like WASCAL. Knowledge repositories will interconnect with continental hubs supported by GIZ, the African CDC, and UNFCCC. At the international level, the activity will strengthen Togo's engagement in WHO's ATACH, UNFCCC expert groups, and global South–South networks; promote joint publications with academic partners; and leverage alliances with initiatives such as the Welcome Trust C&H Science and Policy Centres and the Climate and Health Initiative. Activity 2.1.3 will be supported by three sub-activities: • Sub-activity 2.1.3.1: Strengthening MSHPCSUA and CCU's strategic engagement in national multi-sectoral platforms through institutional mapping, role clarification, and technical support • Sub-activity 2.1.3.2: Organisation and/or participation in inclusive national, regional, and international conferences, negotiations and fora • Sub-activity 2.1.3.3: Promotion of regional knowledge exchange and joint learning The activity is designed to align closely with Activities 2.1.1 (CCU) and 2.2.1 (strengthening academia), fostering knowledge exchange across sectors and stakeholders.

<table>
<tr><th colspan="2">Sub-activity 2.1.3.1: Strengthening MSHPCSUA and CCU’s strategic engagement in national multi-sectoral platforms through institutional mapping, role clarification, and technical support (EE: GIZ)</th></tr>
<tr><td>Description</td><td>This sub-activity will strengthen the participation of the MSHPCSUA and CCUs in national coordination mechanisms and enhance their ability to engage strategically in key platforms. Through tailored technical assistance, MSHPCSUA and CCUs will more effectively participate in and influence national multi-sectoral coordination mechanisms such as the One Health Platform, the National Adaptation Committee, and other sectoral bodies related to agriculture, water, and the environment.

A Strategic Engagement Plan will be developed and validated to guide MSHPCSUA and CCUs in sustaining effective participation across these coordination platforms. The plan will clarify institutional roles, identify engagement priorities, and include an implementation roadmap to reinforce cross-sectoral collaboration and policy influence.

To further support this engagement, the sub-activity will include capacity building for members of the One Health Platform, the National Adaptation Committee, and the CCUs on key topics such as health diplomacy, intersectoral coordination, and climate adaptation mechanisms.

By embedding health-climate priorities within these national coordination structures, this sub-activity will ensure policy coherence, reinforce ownership, and establish climate–health as a sustained policy and research priority. It also creates a strong foundation for meaningful engagement in regional and international platforms by aligning national contributions with broader frameworks (e.g., ECOWAS, AU, UNFCCC).</td></tr>
<tr><td>Deliverables</td><td>• 1 Strategic Engagement and Coordination Plan for CCUs validated by MSHPCSUA (Q1/Year 2)
• 1 Capacity Development Programme for One Health, National Adaptation Committee and CCUs delivered to 15 staff, aiming for an absolute target of ≥30% female participation in the training cohort (Q2-Q3/Year 3)
• National CCU participated in 3 climate-relevant coordination platforms (Q2/Year 5)</td></tr>
<tr><td>Key institutions involved</td><td><u>MSHPCSUA - CCU</u>: Lead institutional engagement, represent health in multi-sectoral platforms, and integrate climate–health priorities into policies.</td></tr>
<tr><th colspan="2">Sub-activity 2.1.3.2: Organisation and/or participation in inclusive national, regional, and international conferences, negotiations and fora (EE: GIZ)</th></tr>
<tr><td>Description</td><td>This sub-activity will enhance Togo’s role as an active contributor to national, regional, and international climate–health dialogues by supporting the organisation of inclusive national platforms and facilitating strategic participation in high-level international events. It aims to ensure Togo’s voice, experiences, and priorities are meaningfully represented in decision-making spaces, while strengthening national coordination and knowledge exchange.

At the national level, the sub-activity will focus on convening technical workshops and research–policy fora that bring together government institutions, academia, CSOs — with special focus on youth- and women-led groups — and the private sector. These spaces will promote multi-stakeholder dialogue, strengthen evidence-informed decision-making, and feed into national strategy development and international advocacy.</td></tr>
</table>

	At the regional and international levels, the sub-activity will facilitate Togo's engagement in key platforms advancing climate–health action, including: • The ATACH, hosted by WHO, where Togo will contribute to advancing health-system resilience and low-carbon health systems. • Clim-HEALTH Africa, the International Network for Climate and Health for Africa, where Togo will share data, research, and good practices while collaborating on joint initiatives across the continent. • The UNFCCC Conference of the Parties (COP), where Togo will participate in health-related negotiations, technical sessions, and side events to raise visibility of its climate–health agenda and commitments. To enable effective and strategic participation, the sub-activity will provide technical support to prepare high-quality briefing materials, position papers, and presentations for national delegates. It will also ensure representation is inclusive, evidence-based, and aligned with national policy objectives and regional frameworks such as the ECOWAS and AU climate–health strategies.
Deliverables	• CCU/MSHPCSUA participated in 5 regional or international conferences and fora on climate change and health (Q2/Year 5) • 2 national research-policy exchange fora conducted (Q2/Year 5)
Key institutions involved	MSHPCSUA - CCU: Represent Togo and lead national delegations, coordinate preparation of briefing materials, and convene national-level technical workshops and for a. WHO/ATACH Secretariat: Support preparation of technical content, connect with ATACH, Clim-HEALTH Africa, and UNFCCC processes.
Sub-activity 2.1.3.3: Promotion of regional knowledge exchange and joint learning (EE: MSHPCSUA)	
Description	This sub-activity will position Togo as a regional hub for climate–health knowledge exchange by fostering collaborative learning, peer engagement, and leadership in regional platforms and learning networks. Through structured learning missions, cross-country collaboration, and participation in regional research and innovation platforms, Togo will contribute to and benefit from shared experiences, good practices, and policy innovations from across Africa. The sub-activity will support the documentation and dissemination of national lessons learned, promote South–South cooperation, and strengthen national capacities to co-lead knowledge-sharing events at the regional and continental levels. It will also enhance Togo's leadership in key regional learning centres and initiatives, such as those supported by the Wellcome Trust, the AU, and the GCF implementing countries. These actions will contribute directly to the long-term sustainability and influence of Togo's climate–health agenda, ensuring that national progress feeds into regional platforms and that lessons from other countries are translated into local action. To promote regional knowledge exchange and joint learning, the sub-activity will first document and disseminate lessons learned from national climate–health initiatives through user-friendly products such as policy briefs and case studies, shared via regional platforms like Clim-HEALTH Africa and Wellcome Trust-supported C&H Science and Policy Centres. It will also strengthen the capacity of national stakeholders—including MSHPCSUA, CCUs, and academic institutions—to co-host regional and international events by providing targeted training on facilitation, technical communication, and event management. In parallel, joint learning missions will be organised with peer countries from the sub-region, the African Union, and GCF-implementing countries to exchange good practices and co-develop adaptation approaches.

Deliverables	• 1 regional or international event co-hosted by MSHPCSUA in Togo (Q3/Year 4) • 5 lessons learnt products produced and disseminated regionally (Q4/Year 4) • 3 joint learning missions conducted, with active recruitment and priority selection aiming for an absolute target of ≥30% female participation within the delegations (Q2/Year 5)
Key institutions involved	GIZ: Coordinate joint learning missions, strengthen facilitation and communication skills, and disseminate lessons learned. Wellcome Trust: Provide financial and technical support for regional *Climate & Health Science and Policy Centres,* strengthen Togo's role as a contributor and co-leader in regional learning networks, facilitate research partnerships and innovative pilot projects.

Output 2.2: Capacities of the health system to react to climate-sensitive health problems are built

Baseline	In Togo, the nexus between climate and health is now widely recognised as a major cross-cutting challenge, and there is strong consensus on the need to integrate it into the initial training of health professionals, guided by a One Health approach. However, the current academic and research landscape reveals significant and urgent gaps. At the university level, existing programmes remain insufficient and fragmented. The former WASCAL Togo Master programme on *Climate Change and Human Security*, now part of Lomé's University *Climate Change* Doctoral Program, only superficially addresses health impacts of climate change. This disciplinary compartmentalisation prevents the development of the cross-cutting skills required to address the complexity of the climate–health nexus. Strengthening and broadening these university programmes is therefore imperative to train a new generation of leaders equipped to respond to climate-sensitive health challenges. Curricular reforms must also embed gender dimensions, AMR management, and the One Health approach to ensure an integrated and inclusive perspective. Beyond curricula, researchers and academic actors lack structured opportunities for networking, knowledge exchange, and sustained collaboration. Existing conferences and workshops tend to be ad hoc and donor-driven, without mechanisms for continuity or institutionalisation. Support for applied research and funding proposal development is minimal, leaving promising initiatives under-resourced and disconnected from international financing streams. Without stronger platforms for collaboration, visibility, and resource mobilisation, climate–health research in Togo and the wider West African region risks remaining fragmented and underrepresented in global debates, limiting the sector's ability to generate evidence and solutions tailored to local realities.
Activity 2.2.1: Develop and implement climate and health training programmes	
Description	This activity seeks to develop a comprehensive and integrated training offer on climate and health on the university and professional level. It notably includes the strengthening of health-climate nexus in academia by creating a Climate Change and Health master's degree within WASCAL-Togo and the integration of the impacts of climate change on health of medical curricula led by the WAHO. The WASCAL Master's degree (Sub-activity 2.2.1.1) will provide an advanced academic foundation in the climate-health nexus, while medical curricular reforms (Sub-activity 2.2.1.2) will ensure that climate–health concepts are embedded in initial training for future health professionals. Complementary actions include

	promoting exchange through national and international conferences and providing targeted support for research proposal development. Capacity-building efforts will combine technical and pedagogical support, the mobilisation of scholarships to expand participation and the production of learning materials on the climate-health nexus, as well as the design of a strategy for long-term sustainability and visibility. Conferences and exchange platforms will facilitate knowledge sharing and collaboration, while tailored support will help researchers turn ideas into high-quality funding proposals. All interventions will systematically integrate gender considerations, the One Health approach, and AMR management, thereby ensuring a cross-cutting and inclusive perspective. Activity 2.2.1 will be supported by four sub-activities: • Sub-activity 2.2.1.1: Develop a Climate and Health Master's programme • Sub-activity 2.2.1.2: Adapt medical support curricula by integrating climate change and health • Sub-activity 2.2.1.3: Promote intersectoral and participatory research on climate and health, encouraging collaboration between academic, governmental, and community actors • Sub-activity 2.2.1.4: Support for research proposal submissions The different components of this activity are closely interlinked. The new master's programme (2.2.1.1) and medical curricula reform (2.2.1.2) will help to foster climate–health expertise in both advanced academic training and medical education, while research promotion (2.2.1.3) and proposal support (2.2.1.4) will translate this knowledge into applied research, collaboration, and resource mobilisation. Together, these activities build a coherent capacity-building and coordination ecosystem that links governance, education, research, and knowledge-sharing. Activity 2.2.1 is also closely interlinked with Activities 2.1.1, 2.1.2, and 2.1.3. The establishment of the national CCU (2.1.1) provides the institutional base for developing and owning climate–health training initiatives, while regional CCUs (2.1.2) ensure that this climate–health nexus is also embedded at decentralised levels through their coordination role. Regional knowledge-sharing platforms (2.1.3) then serve as channels to disseminate academic outputs and connect them with peer learning at the sub-regional and continental (South-South) levels.
Sub-activity 2.2.1.1: Develop a Climate and Health Master's programme (EE: GIZ)	
Description	This sub-activity focuses on creating a master's programme in *Climate Change and Health* at the University of Lomé to study the health impacts of climate change. The programme will be supported through technical and academic assistance, including student scholarships to expand participation, development of teaching resources, and training to equip faculty with certified technical and pedagogical skills, ensuring high-quality instruction in the long-term. In parallel, WASCAL will be actively supported to mobilise additional funding and scholarships (e.g. from philanthropic organisations, development partners, and within its own institutional framework). The aim is to position the University of Lomé and WASCAL as the leading francophone academic hub for training on climate and health. To achieve this, the project will help WASCAL enter new regional and international networks, strengthening partnerships with other universities and research institutions. Targeted support will be provided to graduates wishing to continue into doctoral studies, fostering a pipeline of advanced expertise in climate and health.

	Institutional and regional communication efforts will be intensified to enhance the programme's visibility and attractiveness. At the same time, the project will maintain close links with the master's programme to ensure relevance and practical orientation: students will be actively encouraged to align their research with activities under project implementation, thereby generating applied knowledge directly useful to national and regional climate–health priorities.
Deliverables	• 1 integrated and validated Master curriculum, including (online) teaching tools (Q1/Year 2) • 13 students (1 cohort) successfully complete the master's programme in Climate and Health (Q2/Year 5)
Key institutions involved	WASCAL-UoL: Serve as the implementing partner and intermediary beneficiary, provide academic leadership, coordinate the design and delivery of the Climate and Health Master's programme, manage scholarships and anchor the programme institutionally. Ministry of Higher Education and Research: Oversee programme accreditation and ensure compliance with national higher education standards. MSHPCSUA: Ensure coherence of the master programme with national health and climate adaptation policies.
Sub-activity 2.2.1.2: Adapt medical support curricula by integrating climate change and health (EE: GIZ)	
Description	This sub-activity aims to systematically integrate climate–health linkages, AMR, and the One Health approach into pre-service medical training curricula at national training institutions (Schools for Medical Assistants, National Schools for Medical Auxiliaries, and National Schools for Midwives). Rather than introducing these topics as stand-alone courses, the approach will embed climate change, AMR, and One Health perspectives across existing modules and teaching units. This will enable future health workers to understand current and emerging health risks, as well as anticipated climate-driven and epidemiological changes. Curricula will be reviewed and updated to ensure that these themes are coherently distributed, contextualised, and aligned with real-world practice. Where necessary, didactic and pedagogical approaches will be revised to support effective teaching and learning. The process will be carried out in close collaboration with WAHO focal points and relevant national stakeholders. Teaching staff will be trained on the updated content and pedagogical adjustments, and learning materials will be adapted accordingly.
Deliverables	• 2 medical curricula updated, integrating climate change, AMR, and One health concepts (revised didactic and pedagogical approaches) (Q3/Year 1) • Updated teaching materials are produced to reflect the revised curricula (Q4/Year 1) • 4 training sessions delivered for medical school teaching staff (Q4/Year 2)
Key institutions involved	MSHPCSUA: Coordinate stakeholders to ensure integration of revised curricula. WAHO: Oversee regional harmonisation and alignment with regional standards. Ministry of Higher Education and Research: Ensure accreditation and official recognition of updated curricula. Medical Schools: Adopt and deliver the updated curricula.
Sub-activity 2.2.1.3: Promote intersectoral and participatory research on climate and health, encouraging collaboration between academic, governmental, and community actors (EE: GIZ)	
Description	This sub-activity aims to foster intersectoral and participatory research on climate and health by strengthening collaboration among academic institutions,

	government agencies, and community stakeholders. It will promote the active engagement of researchers, policymakers, health professionals, and community representatives in both regional and international forums on climate–health. To support knowledge exchange and networking, ten participants will be sponsored to attend key conferences, while two national conferences will be organised in Togo to stimulate regional dialogue, disseminate scientific advances, and showcase ongoing research and training programmes. These exchanges will help to consolidate multi-sectoral partnerships, encourage inclusive dialogue, and generate collaborative research initiatives that directly address climate and health challenges. Moreover, both academia and MSHPCSUA will be encouraged to use existing platforms to share and use data and research (e.g., from ATACH or African Union).
Deliverables	• 2 national conferences in Togo focused on climate and health research organised (Q2/Year 5)
Key institutions involved	MSHPCSUA: Ensure policy linkage, facilitate events, and coordinate across government stakeholders. Academic Institutions – WASCAL-UoL: Provide research input, host the national hub and observatory, and disseminate scientific outputs. Community and CSOs: Ensure participatory research design, contribute local knowledge, and promote inclusive dialogue.
Sub-activity 2.2.1.4: Support for research proposal submissions (EE: GIZ)	
Description	A dedicated capacity-building programme will be established to strengthen the ability of researchers and professionals to design, write, and submit high-quality research proposals on climate and health. The training will be delivered by specialised consultants, who will also provide hands-on technical support throughout the proposal development process. The programme will place particular emphasis on mobilising resources from relevant grant opportunities (such as Wellcome Trust) that promote innovative and interdisciplinary research in this field. By enhancing the skills of national researchers to prepare competitive proposals, this initiative will increase their chances of securing funding and thereby accelerate the generation of knowledge and solutions to address climate–health challenges.
Deliverables	• 1 set of training materials on research proposal development developed (Q1/Year 2) • 4 capacity-building workshops (80 trainees) delivered for researchers on proposal design and grant writing delivered, aiming for an absolute target of ≥30% female participation (Q3/Year 2)
Key institutions involved	WASCAL-UoL: Serve as academic leads, mobilise faculty and researchers, host trainings, and coordinate the national research community's participation. MSHPCSUA: Ensure integration of research priorities with national health and climate policies and facilitate linkages between research and policy. Wellcome Trust: Provide grant opportunities for research proposals, including climate–health research.

Baseline	In Togo, the surveillance of CSHO continues to face major challenges. Extreme climate events are becoming increasingly frequent and intense, altering patterns of disease transmission and threatening public health and well-being. Yet the integration of these realities into health planning remains limited, and many health professionals — particularly at decentralised levels — still lack the technical knowledge and practical tools needed to anticipate, prevent, and manage diseases influenced by climate variability, such as malaria, cholera, dengue, and heat-related illnesses.

	Although awareness of the links between climate and health is growing, opportunities for targeted training remain scarce. Existing materials and initiatives developed at the central level have not yet been fully operationalised or translated into formats that frontline health workers can use effectively. Coordination between health and climate services also remains weak, with many actors still unfamiliar with early-warning systems, climate-based health risk mapping, and standard operating procedures designed to support joint action. A notable step forward was achieved in May 2025 with the launch of climate-health bulletins, the result of collaboration between the health sector, meteorological services, and research institutions. This initiative marks the beginning of a more integrated approach to epidemiological surveillance and risk communication. However, strengthening technical capacities at all levels of the health system remains essential to improve anticipation, planning, and response to climate-related health risks—particularly in regions most exposed to climatic shocks, such as Centrale, Kara, and Savanes. Capacity-building efforts should therefore prioritise training on data use and interpretation, the application of standard operating procedures, and enhanced coordination with environmental and civil-protection actors. To be effective and sustainable, these training activities must be inclusive, practice-oriented, and tailored to local contexts. A national process is currently under way to integrate climate-health content into health-worker training. These training programmes will need to be adapted to participants' knowledge levels and delivered in accessible formats and languages, as the climate-health nexus remains a complex subject that cannot follow a single model. Finally, capacity-building initiatives must consider the practical constraints associated with removing staff from HFs for training. Releasing personnel to attend sessions entails direct costs (per diems, transport, accommodation) and, above all, disrupts service continuity during their absence. It is therefore crucial to explore alternative approaches such as on-site training, blended learning (combining in-person and online formats), and cascade training models that allow knowledge to be rapidly disseminated across teams. These approaches can help reduce costs, limit service disruptions, and ensure broader ownership of knowledge on climate-sensitive health risks. To ensure effectiveness and sustainability, training approaches should be inclusive, practice-oriented, and adapted to local contexts.
Activity 2.2.2: Building technical capacities of key actors in the health sector in the prevention and management of climate-sensitive health outcomes through training	
Description	This activity seeks to strengthen the technical capacities of health professionals at the central, regional, and local levels, enabling them to more effectively prevent and manage CSHOs driven by climate variability. Efforts will be concentrated in three priority regions — Centrale, Kara, and Savanes — which are among the most vulnerable to climatic shocks. To ensure a wide-reaching and sustainable impact, the initiative will adopt a blended learning approach, combining in-person, hands-on training with digital and remote learning tools. This flexible model will enhance accessibility, promote continuous learning, and allow health professionals to engage with training materials at their own pace, regardless of location or resource constraints. Importantly, CHWs, who serve as vital links between the health system and local communities, will be actively involved in the training. Their participation is crucial for ensuring that climate–health information reaches the most remote and vulnerable populations. By equipping CHWs with the skills to interpret and apply

	climate–health bulletins, the program will empower them to play a proactive role in CSHO surveillance, preparedness, and response at the grassroots level. Health workers and CHW will receive practical, hands-on training and blended learning on how to prepare, interpret, and apply climate–health bulletins, using weather data generated under earlier activities (Activity 1.1.3). This approach will ensure that climate information is systematically translated into actionable knowledge for disease surveillance, preparedness, and response. To guarantee inclusiveness and equitable access to learning opportunities, the selection of participants will give careful attention to gender balance. By promoting collaboration across sectors and levels of the health system, the activity will contribute to building a climate-aware health workforce, capable of strengthening EWS, planning, and coordinated responses to climate-sensitive infectious diseases. Activity 2.2.2 will be supported by three sub-activities: • Sub-activity 2.2.2.1: Developing innovative blended learning formats • Sub-activity 2.2.2.2: Training national and regional health personnel • Sub-activity 2.2.2.3: Training community health workers Sub-activity 2.2.2.1 is designed to reduce the frequency with which health personnel are taken away from their HFs for training purposes. Sub-activities 2.2.2.2 and 2.2.2.3 will be implemented in close coordination to maximise impact and ensure coherence between health personnel at both the facility and community levels. The activity is designed to complement the initial trainings (2.2.1) and is directly linked to activities under Output 1, by strengthening the use of meteorological and health data through regular bulletins.
Sub-activity 2.2.2.1: Developing innovative blended learning formats (EE: GIZ)	
Description	This sub-activity aims to create modern, flexible eLearning content that combines digital and face-to-face methods to reach a broad audience. Hereby the focus lies on the full life cycle of developing, delivering, and embedding high-quality blended eLearning courses that will strengthen knowledge transfer and capacity building among the target audience. The process will start with the creation of a comprehensive suite of interactive modules, designed to meet established quality standards and tailored to the needs identified during the preceding training needs assessment (Sub-Activity 2.2.2.1). Hosting these courses on a designated digital platform and providing secure, user-friendly technical access will ensure that the learning materials are readily available to all intended users from the outset — a prerequisite for widespread adoption. To ensure the courses are relevant, engaging, and effective, they will be piloted with a representative group of target users. This step is critical for gathering practical feedback, identifying potential barriers, and making evidence-based refinements before wider rollout. Capacity building will be delivered through three carefully timed ToT sessions: one before the initial course launch, one during the early implementation phase, and one after the first full delivery cycle. This staged approach will allow trainers to apply learning in real time, adapt the trainer handbook where necessary, and proactively identify and address potential challenges. Recognising that continuous support is vital for sustained impact, a peer-to-peer trainer network will be established to facilitate ongoing exchange, problem-solving, and sharing of good practices. This collaborative environment will strengthen professional connections and encourage adaptive learning over time. For the

	handover phase, a comprehensive trainer guide, including adaptation instructions and a maintenance plan, will be developed to accompany the final materials. These will then be formally transferred to partner organisations, along with one follow-up support session, ensuring that partners are fully equipped to update and adapt the courses independently. This will guarantee that the content remains relevant, adaptable, and impactful long after the project phase concludes.
Deliverables	• 30 trainers trained in 3 ToT sessions to build capacity, ensuring an absolute target of ≥30% women (minimum 9 out of 30 trainers) (Q4/Year 2)
Key institutions involved	MSHPCSUA/DRS: Facilitate adoption of the digital courses, ensure health personnel participate, and integrate eLearning into routine training systems. Ministry of Science and Technology: Provide infrastructure support (server, platform).
Sub-activity 2.2.2.2: Training national and regional health personnel (EE: GIZ)	
Description	This sub-activity will ensure that health personnel responsible for disease surveillance at both national and regional levels are equipped with the knowledge and skills to integrate climate data into their routine work. The training programme will combine traditional classroom sessions with online modules, adapted to participants' specific roles and levels of experience. To strengthen practical competence, the programme will incorporate interactive elements such as case studies, data analysis exercises, and scenario planning. Beyond the training sessions, participants will benefit from post-training mentoring and peer support networks, helping to consolidate skills and foster ongoing knowledge exchange. All training schedules will be carefully coordinated with regional health authorities to ensure maximum participation while minimising disruptions to essential health services.
Deliverables	• 150 of national and regional health workers trained, with at least 80% of nationally trained female health professionals demonstrating adequate knowledge of Respectful Maternity Care, humanised childbirth approaches, and the use of carbetocin (Q4/Year 2)
Key institutions involved	MSHPCSUA: Support overall management of the training programme, coordinate scheduling, and ensure alignment with national health priorities. DRS: Organise local coordination, mobilise participants, and facilitate training delivery at regional level.
Sub-activity 2.2.2.3: Training community health workers (EE: MSHPCSUA)	
Description	CHWs are the first line of defence in detecting and responding to CSHO. This sub-activity focuses on strengthening their capacity through training designed to be both accessible and effective. Learning materials will be simplified, visually engaging, and adapted to different literacy levels. Training will combine short, face-to-face workshops with mobile-based modules that CHWs can easily access on their phones. To consolidate knowledge, participants will engage in practical exercises and role-playing in real community settings, while regular support meetings will help sustain motivation and provide a forum for collective problem-solving. A tailored training manual, developed specifically for CHWs' needs and local contexts, will guide the sessions and remain available as a practical reference tool. To ensure quality and sustainability, the MSHPCSUA and local partners will collaborate with GIZ to develop training materials and didactic support, including

	simplified manuals, visual aids, and mobile-based modules, guaranteeing that CHWs have accessible, context-appropriate resources for continuous learning and community engagement. Through this approach, CHWs will be better equipped to contribute to early detection of CSHO and to communicate climate-related health risks effectively within their communities.
Deliverables	• 150 CHWs trained (Q4/Year 2)
Key institutions involved	GIZ: Provide technical expertise.

Component 3: Climate-resilient and low-carbon infrastructures, technologies, and supply chain

Output 3.1: The resilience of health infrastructure is strengthened

Baseline	Togo's northern regions (Centrale, Kara and Savanes) are experiencing the increasing effects of climate change, including rising temperatures, extreme heat waves, unpredictable rainfall and more frequent flooding. These changes are putting increasing pressure on public health and the provision of basic services, particularly in underserved rural areas and intensified with aging and inadequate infrastructure. Health infrastructure within those regions, particularly facilities serving mothers and infants and other highly vulnerable groups, is poorly adapted to climate change and generally in a deteriorated condition. At the same time, significant opportunities exist to reduce the environmental footprint and GHG emissions of the sector through improvements in energy and building efficiency, water management, and the safe use and disposal of healthcare waste. During a mission to USPs type I and type II in July 2025 (see Annex 2c), significant shortcomings were observed, including the absence of adapted and functional spaces, low conformity with national standards, lack of standard planning, unreliable energy and water supply, and widespread damage to buildings as well as supply and waste management infrastructure. Sanitary installations were dysfunctional or unusable, sustaining open defecation. Open standing water as a common driver of malaria and water-borne diseases was commonly found around buildings and in sanitary installations. Building structures display several thermal bridges (walls and openings) due to poor material quality and poor finishing, preventing effective thermal insulation and protection from mosquito-borne diseases. The surrounding areas of the buildings show missing effective drainage and fencing systems, making them prone to damages from flooding and intruding wildlife. The access roads to the USPs were reported to be frequently flooded during the rainy season, reducing the accessibility of the health infrastructure during this period. A health facility's functionality and efficiency, as any infrastructure, is heavily impacted by its environment and climate conditions. In addition, climate-related stresses such as drought, flooding or a sudden climate shock like a heatwave could impact a health system and its capacity to respond and fulfil its functions. The capacity of an infrastructure to withstand extreme climate events and to maintain its operation depends on early-stage decisions making while designing a health facility to its operation, management and maintenance. Failing to provide healthcare during times of climate-related stresses can lead to a range

	of possible outcomes: from health system misfunction to a total collapse with severe impacts on the population. Climate-resilient health infrastructure is essential for efficient health system functioning and to reduce vulnerability. This means ensuring that the design and building norms of HFs consider current and projected risks (e.g. extreme heat or floods). It also includes climate-resilience of essential services to HFs, such as water and sanitation services which may be compromised by flood or drought, and electricity supply that may be cut off during extreme climate events. In conclusion, the HFs in Centrale, Kara and Savanes are currently not sufficiently equipped to withstand heat-related stress or shocks, they are not equipped to prevent climate-related water- and mosquito-borne diseases, and they are not sufficiently accessible during rainy seasons. Against the background of rising temperatures and frequency of extreme climate events, this puts the health and resilience of the local population in these regions at risk.
Activity 3.1.1: Improve health infrastructures to increase resilience (water-related, heat-related, vector-related health outcomes)	
Description	This activity undertakes integrated adaptation measures to HFs in Centrale, Kara and Savanes, to increase their resilience to climate change, subsequently improving the resilience of the local population to climate-induced diseases and health outcomes. The adaptation measures target water-, heat-, and vector-related health risks, which are key drivers of maternal and neonatal mortality and morbidity. They include the renovation, extension, and construction of USPs-I and II and their surrounding infrastructure, with a particular focus on maternity wards and related general medicine units, in line with the proposal's priority group of women and children. This activity consolidates infrastructure norms and revises HF master plans to include targeted adaptation measures. This will provide a guideline for the individual adaptation measures. Secondly, a list of eligible HFs will be identified together with partners and MoUs will be concluded. Thirdly, in parallel with the preparation phase, the local population will be trained in resilient construction techniques to ensure the availability of skilled labour for the implementation. Fourthly, the individual adaptation measures will be prepared technically and, after formation of Management Committees (*Comités de gestion*, COGES), will be implemented. Fifthly, the HFs will be equipped to be fully functional and the staff trained to use the equipment. GIZ will contract construction planners and resilient constructions experts, local or regional construction companies as well as technical supervision, while the Construction Section of GIZ will ensure the oversight, orderly spending of funds and project steering. This activity will directly contribute to increasing the climate resilience of Togo's population in the northern region by adapting local HFs to withstand heat and to lower temperatures in the maternity and neonatal wards, to withstand flooding and drought and to prevent mosquito-borne as well as water-related diseases. It will implement infrastructure-related activities from Activity 3.2.1 and thus improve the cold chain infrastructure in HFs. It will provide valuable insights, guidelines and best practices for the adaptation of local health infrastructure to climate change. Through its participatory approach it will contribute directly to the transformation of the health sector, as well as to the capacity building of the political partners, local actors, construction and planning companies and service providers, as well as communities and will thus lay the foundations for the broader adaptation of the health sector to climate change.

	Activity 3.1.1 will be supported by five sub-activities: • Sub-activity 3.1.1.1: Consolidation of infrastructure norms and co-revision of health facilities master plans • Sub-activity 3.1.1.2: Assessment and selection of health facilities • Sub-activity 3.1.1.3: Capacity building on construction techniques and resilience measures • Sub-activity 3.1.1.4: Rehabilitation of health facilities and construction of resilient maternity blocks in USP-I and II • Sub-activity 3.1.1.5: Procurement of health facility equipment These sub-activities form a coherent sequence: revised infrastructure norms and master plans (3.1.1.1) guide the assessment and prioritisation of intervention sites (3.1.1.2), while capacity development (3.1.1.3) ensures that local labour can apply resilient construction techniques. Based on this foundation, HFs are rehabilitated and new maternity blocks constructed (3.1.1.4), with the final step equipping facilities (3.1.1.5) to deliver quality, climate-resilient care for women and children. This activity is closely interlinked with Activity 4.1.1, which focuses on construction measures at the community level, and Activity 3.2.1, which focuses on cold chains. Both have been jointly planned to complement and reinforce one another. It is also connected to Activity 3.1.2, which addresses maintenance mechanisms to ensure that infrastructure investments are effectively preserved over time.
Sub-activity 3.1.1.1: Consolidation of infrastructure norms and co-revision of health facilities master plans (EE: GIZ)	
Description	This sub-activity aims to strengthen the exchange on resilient health infrastructure taking into consideration the needs, national orientations, international norms, climate and diseases resilience, to enable the consolidation of infrastructure norms and implementation documentation intended for infrastructure projects. Moreover, technical and operational guidelines will be developed to strengthen health infrastructure against water-related, heat-related and vector-borne diseases. It reviews standards and best practices. This documentation will constitute an asset for the technical services of the MSHPCSUA and guidance for technical experts operating in the infrastructure sector (designers, experts, contractors and suppliers). Through this activity, experts, decision-makers, and relevant regional and local actors will establish a common understanding of what constitutes resilient health infrastructure and co-develop, based on existing data and lessons learned, clear guidelines for the planning and implementation of health infrastructure projects, both new construction and retrofitting. These guidelines will embed resilience as a core principle for implementation, operation, and maintenance, introducing engineering and design orientations adapted to climate conditions, grounded in reliable data, and guided by parameters of safety and risk mitigation. A series of co-development workshops, designed and facilitated by international experts, will introduce a framework for resilient health infrastructure and adapt it to the Togolese context at national, regional, and local levels. Building on global experience and local lessons learned, these workshops will produce co-developed guidelines that will serve as a reference for all construction and infrastructure-related service tenders (new construction, retrofitting,

	rehabilitation, and equipment). Once validated with national partners, the final document will be disseminated to technical services across the country. The dissemination of these guidelines on regional and local level, will be conducted through capacity development sessions targeting technical personnel and health facility managers involved in construction, operation and maintenance of infrastructure and equipment of HFs.
Deliverables	• 1 set of resilient health infrastructure guidelines developed (Q4/Year 1) • 25 personnel members trained in the application of the guidelines (15 technical personnel and HF managers and 10 technical personnel from the Regional Departments) (Q2/Year 2)
Key institutions involved	MSHPCSUA/DISEM**:** Lead decision-making on health infrastructure, validate related documents, contribute technical input, and benefit from capacity building. The DHAB complements this role by providing technical expertise on hygiene and sanitation aspects, ensuring that these dimensions are fully integrated into the development of the guidelines.
Sub-activity 3.1.1.2: Assessment and selection of health facilities (EE: GIZ)	
Description	This sub-activity focuses on assessing and prioritising HFs for construction, extension or rehabilitation, ensuring alignment with national standards and maximising both impact and the number of beneficiaries. The selection will combine technical, financial, and regulatory criteria, as indicated below, and will inform the concept of intervention per site: • service demand (number of expected and actual births, number of annual patients), • regional coverage (up to ten centres in Savanes, Kara, and Centrale), • climate vulnerability (extreme temperatures, flooding, malaria, diarrhoea, heat-related deaths), • accessibility and security (excluding conflict-affected or GIZ red zones), • absence of overlapping donor investments, • legal ownership (land title with the state or commune), • organisation of health services (separate or integrated maternity wards), • the presence of schools and markets nearby with land-use and water-usage rights by the state or community (to maximise impact of WASH activities under 4.1.1), • sludge treatment availability (distance to existing sludge treatment plants, available public land for local sludge treatment facilities), • availability of adjacent public land (minimum 200m² for extensions), • facility size, • technical soundness of buildings and sites (uncontaminated, not flood-prone, no displacement risks), and • the condition and structural soundness of infrastructure, which will also be assessed and taken into consideration. Based on these criteria, a prioritisation framework will be developed jointly with DISEM. GIZ will utilise the climate vulnerability studies conducted during the preparation of the funding proposal, organise scoping missions with consultant support, and apply the second-round criteria. DISEM will prepare and screen regional lists of centres, while the final prioritisation will be conducted jointly by DISEM, GIZ, the project steering committee, and regional representatives, ensuring a participatory, evidence-based, and needs-driven selection process.

Deliverables	• 1 prioritisation framework for the selection of HFs developed (Q3/Year 1) • 1 list of eligible and selected HFs validated by PSC (Q1/Year 2)
Key institutions involved	MSHPCSUA/DISEM: Provide the technical input for planning and design and is a direct beneficiary of capacity-building and infrastructure investments. DRS/DHAB): Coordinate and oversee implementation at regional level, facilitate site assessments, and ensure alignment with regional priorities.
Sub-activity 3.1.1.3: Capacity building on construction techniques and resilience measures (EE: GIZ)	
Description	This sub-activity aims at enhancing the capacities of the local construction workforce on construction techniques and resilient construction measures. It targets especially remote areas with limited access to trainings and limited skilled construction workforce. This sub-activity consists of developing and coordinating customised trainings for local construction workers or inhabitants willing to integrate into the construction market. The trainings will cover the sectors which play a major role on the resilience of a health facility (electrical works, solar and thermal installations and maintenance, and other expertise like general construction, WASH, earth works and any other identified field in sub-activity 3.1.1.1). Participation will be organised via a call of expression of interest announced in the identified regions and within the communities. The training will be offered to adults from the local community per site. Several places will be given to adults with technical background, expertise or formal education in the field of construction or engineering with the aim to establish a supply of qualified workers for the implementation of construction activities under 3.1.1.4 and to increase the persons employability. The remaining places will be given to adults without, with the aim to introduce them into the field and increase the labour supply for the construction sites and increase the employability. Participation by women will be encouraged and a quota of 30% women participation will be targeted. This capacity building will contribute to other activities related to cold chains, maintenance and WASH 4.1.1. The trainings will be conducted after the elaboration of a concerted list of needed trainings and intervention sites. The training program would include a practical part either in the construction sites under the sub-activity 3.1.1.4 or allow the trainees to conclude practical work in the construction sites or get hired for the construction works. This aspect will be defined in tender documents for the sub-activity 3.1.1.4 to encourage employability of the trainees. The trainings programs will be designed based on best practices from existing initiatives. They will be supplemented with additional expertise on aspects and construction techniques focusing on building resilience.
Deliverables	• 1 training program developed (Q2/Year 2) • 225 core team of construction/maintenance personnel trained, with priority selection aiming for an absolute target of ≥30% female participation among providers and artisans (Q4/Year 3)
Key institutions involved	MSHPCSUA/DISEM: Participate in assessing needs within the local workforce and ensure training priorities align with health sector requirements. Local Communities: Strengthen their skills through the offered training, contributing to community resilience through reinforcing technical expertise. NGOs: Support networking, communication, and outreach to maximise the impact and sustainability of the training program.

Sub-activity 3.1.1.4: Rehabilitation of health facilities and construction of resilient maternity blocks in USP-I and II (EE: GIZ)

Description

This sub-activity entails the piloting and implementation of construction and rehabilitation measures in selected sites across the three target regions. Each intervention builds on the outputs of Sub-activity 3.1.1.1 (infrastructure norms and guidelines) and integrates resilience measures, as well as the WASH-related standards developed under Sub-activity 4.1.1.1. The implementation concepts for each site are based on detailed pre-studies assessing needs and site conditions and focus on the rehabilitation or retrofitting of HFs and the construction of resilient maternity blocks in USP-I and USP-II. Which option is chosen case-by-case will depend on the functionality of the existing layout and maternity ward.

Interventions will address:

- Heat resilience and thermal comfort,
- Sustainable water, sanitation, hygiene, and waste management in line with the WASH concept of Activity 4.1.1,
- Sustainable energy services and cold chain infrastructure (see Activity 3.2.1),
- Context- and climate-appropriate technologies and processes, including adaptation to site-specific conditions, such as flooding and erosion risks, and
- Humanisation of birth.

The implementation will follow the full project cycle for infrastructure measures, aligned with national regulations and GIZ procedures:

- Development of implementation concepts and preparatory documentation and planning: Includes property assessments (land rights with the state, no evictions or displacements), detailed building diagnostics and soil investigations (including checking for any hazardous material), and topographical surveys. Design briefs will be prepared with technical specifications based on resilience guidelines, and qualified design companies will be contracted. The design phase will produce detailed plans and tender documents, developed by contracted planners in consultation with project construction staff, the WASH concept (Activity 4.1.1), cold chain concept (Activity 3.2.1) the partner, and beneficiary representatives (COGES).

2. Tendering and contracting: Once planning documents and technical files are complete, building companies will be selected through a competitive tender process. Tender documents will explicitly require the integration of local labour and materials in the works, taking into consideration climate-friendly materials where feasible. Contracts cover the full realisation of construction, including mobilisation, site preparation, rehabilitation, retrofitting, or new construction, as well as compliance with warranty obligations. They include obligations to follow international and Togolese standards on health and safety.
3. Construction works and supervision: Building companies will implement the works under close supervision from the contracted planner. The planner monitors construction quality and compliance with design, while the project's construction team coordinates implementation and ensures adherence to quality standards, incl. health and safety standards such as needed for the removal of asbestos, if needed.
4. Taking-over and handing-over: Upon completion, the infrastructure will undergo a joint inspection by the building company, planner, GIZ, and DISEM. Taking-over and handing-over will be formally documented with co-signed protocols.

	5. Warranty management: Following handover, a 12-month defects liability period will apply, during which GIZ will monitor the infrastructure and request corrections if needed. After this period, maintenance responsibilities will be transferred to (local representatives of) MSHP/DRS in line with Activity 3.1.2. Through this structured approach, the sub-activity will deliver climate-resilient, fully functional maternity wards and rehabilitated HFs, providing safe and sustainable spaces for maternal and child healthcare while ensuring long-term sustainability through integration with national maintenance systems.

Deliverables	• 100% of construction plans developed or updated under the project are based on participatory needs assessments and comply with person-centred care standards by the end of the project and undergo validation by OGES, local women representatives, medical staff and project team in the design phase. (Q1/Year 2)
	• 15 HFs rehabilitated or extended or newly constructed considering climate resilience (Q4/Year 4)
	  ◦ At least 60% (9 out of 15) have separate maternity wards in accordance with the revised standard
	  ◦ 100% (up to 15 facilities) provide gender-responsive, inclusive and confidential climate-sensitive health services
	  ◦ 100% demonstrate effective use of accessibility features by patients with reduced mobility
	• At least 60% (9 out of 15) health care facilities have separate maternity wards in accordance with the revised standard (Q4/Year 4)
	• At least 30 staff members (2 per upgraded facility) trained on survivor-centred GBV/SEAH case management and referral protocols (Q4/Year 4)
	• 3 operation and maintenance (O&M) plans developed (1 per region, covering the 15 HFs) (Q4/Year 4)

Key institutions involved	MSHPCSUA/DISEM**:** Contribute with technical expertise and oversight for planning, design, and validation of construction and rehabilitation works, ensuring compliance with national standards. COGES: Participate in consultations during design and implementation and ensure that constructed facilities reflect community needs while fostering local ownership.
Sub-activity 3.1.1.5: Procurement of health facility equipment (EE: GIZ)	
Description	The aim of this sub-activity is to equip newly constructed or renovated HFs with cold chain and technical equipment as part of the rehabilitation of health infrastructure (3.1.1.4). To ensure sufficient capacity, a feasibility study will be carried out in the targeted facilities to establish a reliable energy supply for needed cold chain and technical equipment. A technical assessment for needed equipment will be carried out. Based on this assessment, a structured process will be undertaken to develop technical specifications with the support of technical experts and relevant stakeholders. The assessment will take into account the inventory of cold chain equipment to be done in Activity 3.2.1. The equipment will be procured and installed. This process will take into account the development of a national catalogue of technical specifications (Activity 3.1.2) as a harmonised reference for future health investment projects, thereby promoting coherence, transparency, and sustainability in equipment procurement across the health sector. In addition, end-users will be trained to ensure the proper and safe use of the newly acquired equipment. The procured equipment will also be integrated into the

	facility-level maintenance plans, ensuring routine servicing, timely repairs, and long-term functionality through the national maintenance system.
Deliverables	• 15 USP equipped (Q4/Y4-Q1/Y1)
Key institutions involved	MSHPCSUA/DISEM: Develop the catalogue of technical specifications and support the procurement process. DRS: Conduct the state-of-play assessments of the Regional Maintenance Centres (RMCs), oversee the installation of equipment, train end-users, and ensure the integration of equipment into facility maintenance plans.

Baseline	The maintenance of health infrastructure and equipment in Togo is critically undermined. In terms of governance, the country still lacks a comprehensive legal and regulatory framework governing the maintenance sector. Although a strategy covering the period 2026-2030 (MSHP, 2025) has been validated in September 2025 it falls within the framework of implementing the Government Roadmap 2025 and the PNDS 2023–2027, no official policy or legislative texts currently define the standards, procedures, or institutional arrangements required to operationalise and enforce maintenance practices. Roles and responsibilities for maintenance are not clearly defined between the central level DISEM, DRS, and HFs. As a result, maintenance efforts are fragmented, and technical and financial partners frequently implement infrastructure and equipment projects without involving national maintenance services. On the human resources side, there is only one private biomedical engineering training institution in the country. The national public education system does not offer biomedical engineering programs, and there is no formal pathway for training infrastructure maintenance professionals. In 2023, several regions reported having no biomedical technicians at all (MSHPAUS, 2024b). There is also no continuous professional development system or validation of experiential learning for existing maintenance staff. The EPL, the key engineering training institution, plans to launch a maintenance programme with which the MSHPCSUA intends to align its workforce development strategy (MSHPAUS, 2025). Furthermore, by Decree 014/2025/METFPA/ of 30 April 2025, the Ministry of Technical Education, Vocational Training and Apprenticeship (*Ministère de l'enseignement technique, de la formation professionnelle et de l'artisanat* – METFPA) opened a course on the installation and maintenance of healthcare equipment at the technical and professional high school in Aneho-Glidji. The effective implementation of this program has been delayed due to resource constraints. In terms of financing, there are no fixed or protected budget lines for maintenance. Facilities often fund urgent repairs through internal reallocation, and no operational maintenance fund exists at any level. Partnerships with the private sector remain limited to isolated initiatives. From an operational management perspective, over 90% of facilities have no preventive maintenance plans. There is no centralised inventory or codification system for infrastructure or biomedical equipment, and more than two-thirds of equipment lacks documentation. Spare parts are not managed systematically, and communication between maintenance teams and managers is weak. Finally, monitoring and evaluation of the current maintenance system is virtually absent. There are no defined KPIs for maintenance, no routine audits, and no national tools for supervision. Digital tools to support maintenance management are also largely absent. The use of Computerised Maintenance Management Systems (CMMS) is minimal, and there is no centralised platform for collecting, analysing, and acting on

	maintenance data. Paper-based records dominate, limiting oversight and the capacity for performance monitoring or risk mitigation. Broader issues of workplace safety, environmental risk, and infrastructure resilience are not yet integrated into maintenance planning. The absence of standard safety protocols for maintenance staff, combined with poor storage and working conditions, creates additional risks for personnel in charge of maintenance. There are currently no formal systems or plans in place for the decommissioning or recycling of obsolete or non-functional equipment, leading to growing environmental and safety concerns related to waste accumulation and improper disposal. Furthermore, climate-sensitive infrastructure elements, such as ventilation, water access, and flood protection, are often neglected in maintenance routines, despite their direct impact on health outcomes. Moreover, gender aspects are not yet considered in any of the existing mechanisms.
Activity 3.1.2: Maintain health infrastructure to increase resilience	
Description	This activity aims to strengthen the operational and institutional foundations for maintenance of health infrastructure and biomedical equipment in Togo by addressing key gaps in human resources, governance, digitalisation, and inclusion. Activity 3.1.2 will be supported by five sub-activities: • Sub-activity 3.1.2.1: Strengthening gender transformative professional training and in-service training • Sub-activity 3.1.2.2: Strengthening partnership engagement for maintenance • Sub-activity 3.1.2.3: Support gender transformative and climate-sensitive operationality of maintenance in the health facilities • Sub-activity 3.1.2.4: Support digitalisation of maintenance processes • Sub-activity 3.1.2.5: Support a financing mechanism for the Regional Maintenance Fund The sub-activities are all derived from the five strategic axes of the National Strategy for the Maintenance of Health Infrastructure and Equipment (2026-2030) which was developed with the support of GIZ. Their interrelation reflects a coherent implementation roadmap for strengthening maintenance governance, workforce development, operational management, digitalisation, and partnerships. This activity is essential to ensure the long-term functionality and resilience of health infrastructure. It complements Activity 3.1.1 on building climate-resilient infrastructure and Activity 3.2.1 on strengthening cold chain systems. By focusing not only on infrastructure deployment but also on its functionality and maintenance, this activity contributes directly to the overall objective of building a robust and climate-adaptive health system.
Sub-activity 3.1.2.1: Strengthening gender transformative professional training and in-service training (EE: GIZ)	
Description	This sub-activity introduces a two-tiered approach to strengthening technical maintenance capacities for climate-resilient health services, beginning with pre-service vocational training and extending to in-service skill development within 50 HFs. First, health maintenance skills are integrated into BT-level technical training through the design and piloting of a new module for students pursuing the Technician Certificate (*Brevet de Technicien - BT),* a nationally recognised intermediate technical diploma typically completed after three years of post–lower secondary education. The process starts with a comprehensive review of existing vocational curricula and an assessment of competency gaps related to health-facility maintenance. Building on this analysis, a practical, polyvalent

	module is co-developed to equip future technicians with applied skills in electricity, plumbing, refrigeration, and basic biomedical equipment maintenance. The module is piloted in three training centres, where final-year students engage in combined classroom and hands-on learning, including supervised exposure to real operational environments in selected HFs. Trainers receive targeted support to deliver the enhanced curriculum, and successful students are awarded certification upon completion. In parallel, in-service maintenance capacities are strengthened across 50 HFs through a structured, three-part capacity-building package targeting both maintenance professionals and end-users. This package includes the development of a national recognition framework designed to incentivise and standardise good maintenance practices; regional refresher trainings for biomedical engineers focused on preventive maintenance, diagnostics, and problem-solving; and on-site training for end-users—such as nurses and support staff—on the proper operation and basic care of essential medical and energy-related equipment. Capacity-building activities are delivered through regional workshops, practical field sessions, and the distribution of user-friendly materials, including job aids and visual guidance tools. Certificates and other recognition mechanisms are issued to reinforce motivation and promote sustained improvements in equipment care and maintenance.
Deliverables	• 1 BT-level Technical Training module on maintenance in HFs developed (Q1/Year 2) • 20 BT students certified and included in a national technician registry, supported by targeted awareness-raising campaigns aiming for an absolute target of ≥25% female participation (Q2/Year 5) • 1 national recognition framework for maintenance staff implemented in 50 HFs (Q1/Year 2) • 200 end-user training sessions delivered (Q2/Year 5)
Key institutions involved	MSHPCSUA: Lead the overall coordination of the sub-activity, with technical facilitation provided by the project team. METFPA: Oversee the validation of the module.
Sub-activity 3.1.2.2: Strengthening partnership engagement for maintenance EE: GIZ)	
Description	This sub-activity aims to strengthen collaboration between the public sector, private health clinics, and biomedical industry stakeholders to improve the sustainability of infrastructure and equipment maintenance in Togo. Initially, a diagnostic of existing public-private partnerships (PPPs) in the health sector will be conducted to identify current gaps and potential entry points. Based on this, a multi-actor task force will be established to define strategic directions and modalities for engaging the private sector in maintenance systems. Concretely, the task force will explore and pilot collaborative mechanisms such as setting up internship schemes for biomedical engineering students in private clinics and with equipment manufacturers, as well as cross-training programmes for polyvalent technicians (e.g. electricians, plumbers, refrigeration specialists). These partnerships will help strengthen local human resource capacity and promote shared responsibility for quality maintenance.
Deliverables	• 1 Public-Private Maintenance Partnership (PPMP) Task Force established (Q4/Year 1) • 1 MoU signed between the MSHPCSUA, and the private sector signed (Q2/Year 2)
Key institutions involved	MSHPCSUA: Support the coordination with technical facilitation provided by the project team.

	Private sector: Private clinics, training institutions, and medical equipment suppliers will be engaged as co-designers and hosts for internship and training schemes.
Sub-activity 3.1.2.3: Support gender transformative and climate-sensitive operationality of maintenance (EE: GIZ)	
Description	The MSHPCSUA plans to establish RMCs in each of Togo's six health regions as part of its strategy to decentralise and professionalise maintenance services. This activity will support the operationalisation of three of these centres by providing the essential diagnostic and repair equipment, spare parts, information systems, and logistical resources required for them to function as fully capacitated technical hubs. Once operational, each centre will act as the regional base for the coordination, planning, and delivery of maintenance interventions related to health infrastructure and biomedical equipment, including cold chain systems. By strengthening these centres, the Ministry aims to improve the sustainability, responsiveness, and accountability of the national maintenance system. This activity establishes a comprehensive framework for monitoring and improving the quality of maintenance planning and implementation across all tiers of the health system. It involves the development of standardised procedures and supervision protocols, as well as both digital and paper-based tools to ensure consistent documentation and traceability of all maintenance activities. Regular audits will be conducted to assess compliance with maintenance plans and evaluate overall service quality. These audits will cover every level — from the RMCs to district health services and peripheral health units — and will examine both preventive and corrective maintenance practices. Alongside audits, the activity will introduce structured supervisory visits, develop technical checklists, and define performance indicators to monitor service standards, response times, equipment functionality, and budget execution. Feedback mechanisms will be established to collect insights from field technicians and facility managers, enabling issues to be addressed promptly and supporting continuous improvement. Ultimately, this activity will help institutionalise a culture of quality assurance in maintenance services, strengthening planning, resource allocation, and evidence-based decision-making across the national health maintenance system.
Deliverables	• 3 RMCs established (Q2/Year 2)
Key institutions involved	MSHPCSUA/DISEM: Coordinate and establish the strategic framework. DRS: Regional coordination and implementation.
Sub-activity 3.1.2.4: Support digitalisation of maintenance processes (EE: GIZ)	
Description	This activity aims to set up a structured, integrated, and efficient system for collecting, processing, analysing, and disseminating information related to the maintenance of medical equipment and health infrastructure. It also includes the effective management of inventories to ensure a clear overview of the existing assets and their operational status. The overarching goal is to enhance traceability, transparency, and planning of maintenance operations throughout the equipment and infrastructure lifecycle, thereby supporting evidence-based decision-making.
Deliverables	• 1 national digital inventory of health facility equipment and infrastructure completed and validated (Q3/Year 2) • 1 GMAO system deployed (with software, licenses, server hosting, digital devices) operationalised (Q2/Year 3) • 6 GMAO training programmes delivered (1 for 20 principal users and 5 regional workshops for 100 users), aiming for an absolute target of ⩾ 30% female participation within the training cohorts (Q2/Year 3)

Key institutions involved	MSHPCSUA: Coordinate and establish the strategic framework (DISEM) and digitalise the maintenance processes (DSNISI).
Sub-activity 3.1.2.5: Support a financing mechanism for the Regional Maintenance Fund (EE: MSHPCSUA)	
Description	This activity aims to strengthen the establishment of an autonomous mechanism for the maintenance of health infrastructure and medical equipment through the operationalisation of the Regional Maintenance Fund (RMF). It will support the development of the legal and regulatory framework, the definition of eligibility criteria, and the formalisation of stakeholder commitments. A governance structure will ensure transparent and accountable management, while the reserve will mobilise diversified resources from public budgets, HFs, insurance schemes, the private sector, and development partners. Financial protocols, audits, and a digital monitoring platform will guarantee traceability and efficiency. A pilot phase, supported by the project in 2026, will generate evidence to inform administrative and legislative decisions for full-scale implementation, with RMCs facilitating the execution.
Deliverables	• 1 strategy for resource mobilisation developed (Q3/Year 1) • 75 staff members trained (45 regional and 30 prefecture level), aiming for an absolute target of ≥30% female participation within the training cohorts (Q2/Year 3)
Key institutions involved	DRS: Regional coordination and implementation. GIZ: Provide technical support.

Output 3.2: Prevention and treatment of climate-sensitive health outcomes through resilient supply chains is enhanced

Baseline	The introduction of the R21 malaria vaccine and other temperature-sensitive medical products has heightened the need for Togo's health system to deliver climate-sensitive medicines and diagnostics through a reliable cold chain. The new malaria vaccine in particular requires consistent temperature control to preserve its efficacy. However, the cold chain remains fragile across the northern regions of Centrale, Kara and Savanes. A 2023 situational analysis of Togo's immunisation programme found that 11% of HFs lacked a functioning refrigerator approved for vaccine storage, and 59% had no motorcycle for vaccine distribution or supervision. Domestic financing for cold chain infrastructure is limited, and regional equipment shortages contribute to periodic vaccine stockouts. With national deployment of the malaria vaccine anticipated, these weaknesses will directly undermine CSHO control. Many HFs, including some district facilities, do not have functional refrigerators or freezers. Ageing equipment suffers repeated breakdowns due to power fluctuations and the absence of voltage stabilisers; during grid outages, vaccines and laboratory reagents are frequently transferred into passive coolers or ice boxes that cannot maintain the recommended 2–8°C range for long periods. USPs depend heavily on cold boxes or backpacks of inconsistent quality, resulting in temperature excursions during storage and transport. The lack of dedicated specimen containers at community level means that coolers used for vaccines are also used for diagnostic samples, increasing the risk of cross-contamination. Transport capacity is equally constrained. Motorcycle-based vaccine delivery remains the primary mode of distribution, yet more than half of HFs report having no transport means at all. Where motorcycles are available, they struggle with long distances, rough terrain and mechanical unreliability, causing delays and spoilage. Purpose-built refrigerated vehicles for moving larger

	consignments between regional depots and districts are scarce, and cold chain-compliant outreach backpacks are insufficient in number. Temperature monitoring systems are fragmented, with many health workers relying on offline thermometers and paper-based logs. Reusable thermologgers are available only in a few locations and are not connected to cloud-based platforms. When temperature excursions occur, there is no real-time alert mechanism, making timely corrective action impossible. National reference laboratories—the National Institute of Hygiene and the National Malaria Control Programme laboratories in Lomé—store specimens at –20°C and –80°C but lack high-precision monitoring equipment and solar backup systems. Unreliable electricity exacerbates these challenges. Rural areas experience frequent outages and voltage fluctuations that damage sensitive cold chain equipment. Hybrid solar-electric systems are uncommon, and few facilities are equipped with uninterrupted power supplies or solar-powered air conditioning to stabilise ambient temperatures. Voltage variations often exceed the ±7% tolerance recommended by WHO for vaccine refrigerators, and without stabilisers or regulators, compressors and thermostats fail prematurely. Global analyses indicate that around 20% of HFs in Gavi-eligible countries do not have access to cold chain equipment, highlighting the scale of investment required. The LMIS for health products, including cold chain assets, is described across multiple documents and supported by several electronic tools that are not interoperable. Data on equipment status, stock levels, and maintenance history are still frequently recorded in separate spreadsheets or paper registers. The LMIS has not yet been standardised nationally through a single manual, hindering the transition to a fully electronic system (e-LMIS/e-SIGL). With Global Fund support, the DPML is currently harmonising LMIS forms and processes into a national LMIS manual, after which the e-LMIS will be developed; however, national hosting infrastructure and rollout support remain unfunded. This fragmentation continues to impede early warning, timely replenishment and evidence-based, climate-sensitive planning. Taken together, these barriers demonstrate that supply chains for climate-sensitive medicines and diagnostics in Togo require far more than cold chain equipment alone: they depend on reliable energy, dedicated transport, real-time monitoring, integrated information systems and environmentally sustainable delivery solutions.
Activity 3.2.1: Strengthen cold chains for vaccines, climate-sensitive medicines and diagnostics	
Description	This activity adopts a comprehensive approach to strengthening Togo's cold chain and wider supply chain, spanning the national warehouse through to community health posts. It begins with a detailed mapping and upgrading of stationary infrastructure, combining asset assessments with the deployment of solar-powered refrigerators and freezers, voltage stabilisers and hybrid energy systems to ensure that all levels of the health system can reliably maintain safe 2–8 °C storage conditions. The activity then focuses on building a modern logistics fleet by introducing cold chain backpacks for outreach, refrigerated vans for bulk transport and electric vehicles for low-emission, last-mile delivery. A cloud-connected temperature-monitoring system is rolled out across both stationary equipment and mobile transport units, with data feeding into a DHIS2 dashboard to enable real-time alerts, rapid corrective action and proactive maintenance planning. To strengthen system-wide visibility and coordination, cold chain data are integrated into the national LMIS, allowing health managers to track stock levels, equipment functionality and transport routes through a single platform.

	In parallel, the programme introduces a Smart Vaccination Certificate, providing citizens with secure proof of vaccination accessible via print, SMS or web-based channels. This integrated package ensures that climate-sensitive vaccines, medicines and diagnostics are safely stored, transported and monitored throughout the entire supply chain. Activity 3.2.1 will be supported by three sub-activities: • Sub-activity 3.2.1.1: Survey and strengthen cold chain and energy infrastructure • Sub-activity 3.2.1.2: Improving cold chain transport and distribution of medicine products • Sub-activity 3.2.1.3: Support to national e-LMIS roll-out Each sub-activity is designed to reinforce the others: baseline findings guide what to procure and where to deploy it; reliable storage and hybrid power systems ensure vaccines remain potent; modern transport and electric vehicles move those products safely; digital monitoring and LMIS integration provide data for resupply and maintenance; and the Smart Certificate ties immunisation data into a trusted digital record. The upgrading of the stationary cold chain infrastructure will be integrated in the strengthening of the HF infrastructure (Activity 3.1.1). Together they link cold chain strengthening with specimen transport and disease surveillance (Activities 3.2.3 and 3.2.2) and complement the modelling and early warning services under Activity 1.2.1 by ensuring that vaccines and diagnostics remain effective as climate risks change.
Sub-activity 3.2.1.1: Survey and strengthen cold chain and energy infrastructure (EE: GIZ)	
Description	First, the existing cold chain system at all levels (national, regional, district, community) is inventoried. This covers refrigerators, freezers, cold boxes, transport means, energy sources, and maintenance arrangements; climate risks are assessed, and all assets are registered in a DHIS2-based database. In parallel, a geo-referenced supply-chain model is built to optimise storage capacity, delivery frequency, routing, and safety stocks. A technical assessment of the needed energy supply system for the selected sites is conducted (Activity 3.1.1). Based on these results, selected sites are equipped with solar direct-drive vaccine refrigerators/freezers and voltage stabilisers (Activity 3.1.1); existing units are retrofitted, and staff are trained in operation, maintenance, and energy management (Activity 3.1.1). A cloud-connected temperature-monitoring system is introduced for both stationary and mobile units, generating real-time alerts for excursions including laboratories in Lomé. In addition, hybrid solar-electric systems (PV + inverter-battery + optional grid) are piloted in district cold chain rooms (sites from Activity 3.1.1), with optional e-motorcycle charging in surplus-solar windows.
Deliverables	• 1 assessment package of cold chain and energy infrastructure validated (Q4/Year 1) • 15 USPs with stationary cold chain upgraded (Q4/Year 3) • End-to-end temperature monitoring operational (Q2/Year 2)
Key institutions involved	MSHPCSUA: Provide strategic and technical guidance on cold chain systems and ensure coordination with all relevant actors (DPLM), integrate cold chain data into DHIS2 and ensuring interoperability with national systems (DSNISI), responsible for technical coordination (DivLab), vaccine integration, and strategic communication as required (DivIS). GAVI: Contributes technical information on vaccine needs, support alignment. GFATM: Support alignment with other funded health system strengthening and supply chain initiatives.

Sub-activity 3.2.1.2: Improving cold chain transport and distribution of medicine products (EE: GIZ)	
Description	To ensure safe and reliable delivery to the last-mile, the transport fleet will be modernised and expanded. High-performance cold chain backpacks will be deployed to support community outreach and vaccination campaigns, while climate-friendly vans and cars will be used to transport larger consignments between regional depots and district stores. All vehicles and cold chain backpacks will be equipped with reusable thermologgers linked to the cloud-based monitoring platform, ensuring continuous temperature tracking during transport. The activity also introduces electric motorcycles—and, where appropriate, electric cars—to reduce fuel consumption, lower emissions and improve access to remote areas. Drivers and logistics personnel will receive training on correct packing techniques, temperature control, safe vehicle operation and battery maintenance. Charging and servicing arrangements will be coordinated with national e-mobility initiatives, and both operating costs and emission reductions will be regularly assessed to inform future scaling.
Deliverables	• 1 cold chain transport system in place (vehicles, backpack, trained personnel) (Q4/Year 2)
Key institutions involved	MSHPCSUA: Lead cold chain procurement and the transport strategy (DPML), oversee technical coordination and vaccine integration (DivLab), advise on facility-level readiness for charging and integration (DISEM). GAVI: Support technical alignment and harmonisation. GFATM: Support technical alignment and harmonisation. MTRAF: Ensure compliance with transport regulations and support for e-mobility integration. MERFPCCC: Oversee environmental compliance and monitor climate co-benefits. UNEP: Partner on e-mobility initiatives under regional frameworks.
Sub-activity 3.2.1.3: Support to national e-LMIS roll-out (EE: MSHPCSUA)	
Description	In close collaboration with the DPML, this sub-activity supports the national transition from a paper-based LMIS to an electronic version. Building on the nationally validated Manuel SIGL (LMIS Manual) that is currently developed with Global Fund support, it finances central digital infrastructure and initial configuration required to operate the e-LMIS and provides technical assistance for partner-led testing, validation and roll out. This sub-activity focuses primarily on central infrastructure (servers, storage, backup and recovery, security, monitoring and test environment). GIZ will coordinate closely with the Global Fund, Gavi and DPML to ensure technical alignment, avoid duplication and enable a phased roll-out to priority, climate-vulnerable HFs in the three northern regions. Sustainable capacity is built through a ToT approach and targeted support to DPML for system administration, user management and change management, complemented by end-user trainings across 207 HFs and practical learning materials.
Deliverables	• 1 national e-LMIS system in place and validated (Q4/Y2) • 5 trainers trained, aiming for an absolute target of ≥30% female participation (Q4/Y3)
Key institutions involved	CAMEG: Contributes in-country expertise on procurement, stock management, and distribution of medicines and vaccines. GIZ: Provide capacity support, including development of technical specifications, pilot testing, and training for LMIS integration.

	GAVI: Contribute expertise on vaccine logistics, cold chain standards, and data requirements for integration. GFATM: Support alignment with existing supply chain and health system strengthening initiatives.

Baseline	Sentinel sites are essential components of health surveillance systems. Epidemiological sentinel sites monitor trends in disease incidence by collecting routine data on suspected and confirmed cases. Parasitological sentinel sites contribute by validating diagnoses and identifying shifts in parasite behaviour, including drug resistance. Entomological sites, on the other hand, track mosquito population density, species variation, and resistance to insecticides—providing essential information for vector control strategies. In parallel, climatological or ecological sentinel sites are increasingly used to monitor climate-sensitive variables such as rainfall, temperature, and breeding site dynamics, which can help anticipate vector-borne disease outbreaks. In Togo, progress has been made in establishing epidemiological and parasitological surveillance. Since 2017, a malaria sentinel site pilot has been implemented in 17 HFs across four districts, focusing on routine case reporting and diagnostic confirmation using microscopy and RDTs. These sentinel sites already operate on a weekly reporting basis, which is critical for tracking fast-changing transmission dynamics. However, their geographical and functional coverage remains limited, especially since it does not systematically include entomological surveillance. Likewise, environmental or ecological indicators are not yet systematically integrated into routine surveillance practices. This gap becomes increasingly urgent in the face of climate variability. Effective modelling of CSHO requires high-frequency data—daily or weekly—depending on the disease. For malaria, for instance, weekly data is essential to align health trends with meteorological changes like rainfall, temperature, and humidity. Togo's current network of weekly-reporting sentinel sites provides a valuable foundation, but it needs to be scaled up and diversified to support comprehensive, CSHO forecasting. To address this, Togo plans to pilot climate-integrated sentinel sites that combine health outcome surveillance with environmental monitoring. These enhanced sites will link routine epidemiological and entomological data with climate variables (temperature, humidity and rainfall) to support the development of an EWS. Expanding the scope and use of these sites marks an important step toward shifting from reactive to anticipatory public health responses in the face of increasing climate threats. Beyond data collection, the quality, timeliness, and use of data are central to effective surveillance. Fever clinics, when institutionalised within HFs, play a strategic role in triaging acute febrile illnesses and capturing syndromic trends for CSHO such as malaria and dengue, and COVID-19. Monthly data reviews at district level are designed to consolidate, analyse, and use routine data for local planning and response and serve on central level for resource allocation. In Togo, data collection and analysis on HF, district and regional level remains inconsistent with many data errors. At the district level, monthly data review meetings exist, but their frequency, consistency, and analytical quality vary. Despite efforts of the MSHPCSUA, health workers still lack capacities to interpret data effectively. Challenges include difficulty identifying trends and cross-checking variables for internal consistency. These limitations reduce the ability of decision-makers to detect early warning signals or adapt interventions based on evidence. The Ministry is already part of « Support for Coordination and Use of Surveillance Information" project (*Appui à la Coordination et à l'Utilisation des Informations de Surveillance* – ACUIS), which is designed to

	enhance the coordination, interoperability, and analytical use of surveillance information across national and regional levels in West Africa. It supports evidence-based decision-making by linking epidemiological, laboratory, and climate-health data under a unified regional framework. The piloting of fever clinics as a strategic surveillance approach will make it possible to distinguish whether fever cases are due to malaria, dengue outbreaks, lingering COVID-19 infections, or newly emerging threats. This differentiation will enable decision-makers to allocate resources more effectively based on local needs, rather than applying a uniform distribution approach. At the same time, strengthening monthly data analysis processes will be essential to build routine data literacy among district teams and facility-level staff.
Activity 3.2.2: Strengthen surveillance and monitoring of climate-sensitive health outcomes	
Description	This activity aims to enhance Togo's CSHO surveillance system to enable earlier detection, better analysis, and more targeted responses to climate-sensitive health risks such as malaria, diarrhoeal diseases, and emerging febrile illnesses. It expands the scope of existing sentinel systems and improves the quality and use of health data. The activity is implemented through the upgrading and diversification of sentinel sites, the piloting of fever clinics to improve syndromic detection, and the strengthening of analytical capacities in alignment with the ACUIS framework. These interventions are carried out in close collaboration with the DSNISI, PNLP, the DLM of the MSHPCSUA, DRS, and selected HFs. Activity 3.2.2 will be supported by five sub-activities: • Sub-activity 3.2.2.1: Extension of epidemiological sentinel sites for malaria • Sub-activity 3.2.2.2: Expansion towards entomological and parasitological sentinel sites for malaria • Sub-activity 3.2.2.3: Expansion towards climatological sentinel sites for diarrhoeal diseases • Sub-activity 3.2.2.4: Pilot of fever clinics in sentinel sites • Sub-activity 3.2.2.5: Strengthening of monthly data quality reviews at district and regional levels These sub-activities are designed to complement each other. Enhanced epidemiological, entomological, parasitological, and environmental data from sentinel sites will improve the diagnostic accuracy and timeliness of fever clinics. In turn, standardise the methodology of district-level data reviews will improve information interpretation and sharing for national decision-making processes. The outputs of this activity contribute directly to Activity 1.2.1, which focuses on strengthening national and regional capacity for surveillance of CSHO. The improved sentinel site network will also generate the high-quality, integrated data required under Activity 1.2.2 to develop disease models that capture climate-health dynamics that influence prioritised CSHOs (malaria, diarrhoeal, direct impacts of heat) and inform planning. Lastly, Activity 1.2.3 will benefit from this data through the generation of maps to identify high-risk zones and vulnerable groups, incorporating gender and equity considerations to better target interventions. Furthermore, the activity supports Activity 1.3.1 by providing reliable, locally generated data streams necessary to implement operational early warning services. The improved data flow and interpretation mechanisms serve as a

	backbone for delivering timely alerts and guiding public health response in vulnerable regions.
Sub-activity 3.2.2.1: Extension of epidemiological sentinel sites for malaria (EE: MSHPCSUA)	
Description	This sub-activity aims to expand the network of existing epidemiological sentinel sites to improve the detection, monitoring, and analysis of malaria trends. The activity begins with the selection of additional HFs across diverse ecological zones. These facilities will be equipped and trained to report malaria cases weekly using standardised case definitions and diagnostic tools. Existing data collection and reporting tools will be upgraded, and digital systems will be progressively introduced. Weekly data from sentinel sites will be integrated into the DHIS2 platform and linked to national surveillance structures. Capacity building will be provided to facility-level staff, including training on data collection, diagnostic quality assurance, and trend analysis. Regular supervisory visits and quarterly feedback workshops will reinforce quality and promote learning. The selection of sites will also consider gender and equity aspects to ensure representativity. Activities will closely be aligned with University of Tübingen "Improving Infrastructure for Surveillance of Malaria Drug Resistance and Vaccine Impact in Togo" project (funding confirmation outstanding but expected) with regards to implementing standardised sampling and biobanking.
Deliverables	• 15 new epidemiological sentinel sites operational (Q4/Year 1) • 60 health professionals trained on malaria surveillance, aiming for an absolute target of ≥30% female participation (Q2/Year 2)
Key institutions involved	PNLP: Coordinate site selection, training, and supervision. University of Tübingen/UoL: Support sample collection and biobanking. HFs (Hospitals and USPs): Responsible for weekly case reporting and data quality.
Sub-activity 3.2.2.2: Expansion towards entomological and parasitological sentinel sites for malaria (EE: MSHPCSUA)	
Description	This sub-activity supports the expansion of surveillance to include vector and parasite dynamics to strengthen early warning and resistance tracking. Initially, six entomological sites will be identified in collaboration with research institutions and regional health teams. Necessary equipment will be made available and entomological technicians and lab personnel will be trained in mosquito collection, species identification, and insecticide resistance testing. In parallel, parasitological surveillance will be reinforced through improved slide reading practices and external quality controls. Bi-monthly entomological monitoring and parasite resistance tracking will be conducted, with data feeding into both the NMCP and DHIS2 platforms.
Deliverables	• 6 entomological and parasitological sentinel sites operational (Q2/Year 2) • Protocols for insecticide resistance and parasite monitoring validated (Q3/Year 2)
Key institutions involved	PNLP: Oversee technical guidance and data integration. HFs (Hospitals and USPs): Local implementation, conduct field sampling and diagnostics.
Sub-activity 3.2.2.3: Expansion towards climatological sentinel sites for diarrhoeal diseases (EE: MSHPCSUA)	

Description	This sub-activity introduces climatological surveillance into the sentinel site system to strengthen early detection of diarrhoeal disease outbreaks linked to climate events (e.g., floods, heatwaves). It involves identifying 6 health districts in at-risk areas where ecological variables (e.g., water quality, rainfall, temperature) will be monitored alongside health data. Each site will be equipped with basic environmental sensors and linked with meteorological data services (see Output 1). Health workers will be trained to record and interpret environmental indicators and cross-reference them with diarrhoeal disease trends. In addition, stool samples from diarrhoeal cases will be routinely tested for AMR to track the emergence of resistant pathogens (e.g. *E. coli*, *Shigella*, *Salmonella*, *Vibrio cholerae*) and understand how climate-related factors influence AMR dynamics. A protocol for integrated reporting will be developed, ensuring that both environmental and AMR data feed into DHIS2, WHO GLASS, African Union Digital One Health Platform (AU-DOHP) and national early warning tools.
Deliverables	• 6 climatological sentinel sites operational (Q3/Year 2) • 20 health and environmental officers trained on integrated climate-health surveillance, aiming for an absolute target of ≥30% female participation (Q3/Year 2) • 100% of project-supported surveillance systems report sex-disaggregated data on climate-sensitive diseases (Q3/Year 2)
Key institutions involved	DLM: Lead integration with disease surveillance. ANAMET: Support installation of sensors and interpretation of climate data. HFs (Hospitals and USPs): Local implementation, conduct field sampling and diagnostics GIZ: Provide capacity building and reporting tools.
Sub-activity 3.2.2.4: Pilot of fever clinics in sentinel sites (EE: MSHPCSUA)	
Description	This sub-activity aims to operationalise 15 fever clinics within HFs to strengthen the early identification, triage, and reporting of febrile illnesses such as malaria, dengue, typhoid, and emerging infectious diseases. The fever clinics will serve as a structured entry point for febrile patients and enhance the capacity of facilities to respond to potential outbreaks through improved clinical protocols and surveillance integration. Each site will be equipped with essential diagnostic and reporting tools and staffed by trained personnel. Fever clinics will also contribute to the timely generation of syndromic surveillance data and reinforce the national EWS.
Deliverables	• 15 fever clinics established and equipped (Q3/Year 1) • 60 health professionals trained and deployed, aiming for an absolute target of ≥30% female participation (Q2/Year 2)
Key institutions involved	PNLP: Lead coordination, site selection, and supervision. Ensure alignment with national disease surveillance priorities. District: Responsible for operating the fever clinics, collecting and reporting data, and ensuring case triage protocols are followed. HFs (Hospitals and USPs): Manage day-to-day clinical triage and data collection. GIZ: Provides capacity-building.
Sub-activity 3.2.2.5: Strengthening of monthly data quality reviews at district and regional levels (EE: GIZ)	

Description	This activity aims to improve the quality, timeliness, and usability of health data in 16 districts through an integrated approach combining capacity building, digital innovation, and motivation. It includes continuous coaching of district focal points and monthly monitoring meetings to strengthen analytical skills and follow-up. Complex indicators will be translated into simple, user-friendly support aids and engaging visual materials that highlight common mistakes and their causes to support district-level learning. To sustain motivation, focus groups will define transparent approaches for recognising high performance (e.g., public mention, awards, or ceremonies). Appreciation prizes will be distributed to top-performing districts. The activity also provides technical support for "Electronic Data Quality Review" (eDQR) rollout, which is a digital system designed to systematically assess and improve the quality of health data within DHIS2 and builds on the WHO "Data Quality Review" (DQR) framework, which provides standardised methods to evaluate data accuracy, completeness, timeliness, and consistency across health programs. Furthermore, it will introduce gamification tools within DHIS2 accompanied by user testing and short explanatory screencasts. These materials will also be embedded in a helpdesk chatbot for continuous learning. Support will be aligned with on-going efforts in the ACUIS framework.
Deliverables	• 6 districts in data improvement supported (focal point coaching, monitoring meetings) (Q2/Year 5) • All project-supported surveillance systems configured to report sex-disaggregated data on climate-sensitive health outcomes (Q2/Year 5) • 30 data managers trained on eDQR, including the mandatory provision of one female-only training session for women staff of ministerial data units (DSNISI) to build leadership and confidence (Q2/ Year 5) • Gamification dashboards in DHIS2 operation in the three regions (Q2/Year 5) • By end of project, 100% of the project-supported surveillance systems (epidemiological, entomological, and climatological sentinel sites) regularly produce report including report sex-disaggregated data on at least 3 priority climate-sensitive health (Q2/Year 5)
Key institutions involved	Regions: Conduct monthly data reviews, coordinate feedback to health districts, and act on identified data quality gaps. Districts: Analyse and report data, provide feedback and support to HFs. GIZ: Provide capacity building. GFATM: Contribute synergies with eDQR and ACUIS.

Baseline	The northern regions of Togo (Centrale, Kara and Savanes) face a high burden of CSHO. Malaria alone caused over 2 million cases in 2021 and more than 3,700 deaths, while recurrent diarrhoeal outbreaks from unsafe water remain among the top causes of morbidity. Cholera outbreaks persist (209 cases and five deaths by June 2025). Climate variability aggravates these problems: heavy rain and flooding contaminate water sources and delay access to care, while heat and drought reduce safe-water availability and strain cold chains. Maternal health is also affected - postpartum haemorrhage remains a leading cause of maternal deaths worldwide; yet during heatwaves and road flooding, unstable cold chains impede timely administration of oxytocin. Heat stable carbetocin is effective for three years at temperatures up to 30°C but has not yet been institutionalised in Togo. These climate-related stresses require an integrated approach to diagnosis, laboratory systems, treatment and information flow. RDTs for malaria remain underused, frequently stocked out and sometimes mistrusted, leading clinicians to treat presumptively. When RDT results are negative, clinical algorithms are not followed because alternative tests are

unavailable or unfamiliar. There is no public-sector use of rapid tests for Shigella or rotavirus; rotavirus RDTs are used only in some private clinics, while Shigella testing has not been introduced at all. Without such tests, clinicians cannot distinguish climate-sensitive diarrhoeal diseases from other causes, so outbreaks go unnoticed, and treatment is empirical. Microscopy verification occurs at only a few sites and RDT performance is rarely evaluated; front-line health workers receive little training in test use and interpretation. These diagnostic gaps create a feedback loop: limited test options and poor verification erode confidence, resulting in continued presumptive treatment and inappropriate use of antimalarials and antibiotics.

Most laboratories work with outdated equipment, weak internal quality control and infrequent external quality assessment. Supportive supervision tends to focus narrowly on staff competencies rather than comprehensive quality systems, and advanced confirmation of diarrhoeal pathogens beyond basic microscopy is scarce. Sample referrals from peripheral sites to reference laboratories are slow, and essential consumables and reagents are often lacking. Furthermore, no facility conducts molecular surveillance for histidine-rich protein HRP2/HRP3 (gene deletions in malaria parasites) or antimalarial resistance markers; therefore, the health system cannot validate malaria RDT performance or adopt treatment policies, so timely surveillance is essential. Building this capacity will also enable other priority tests that currently must be done outside of the country.

On AMR, routine bacteriology and antibiotic-susceptibility testing remain limited outside CHU/CHR/INH with many district laboratories restricted to Gram staining and shortages of trained staff, or recurrent supplies. AMR results are not standardised or routinely reported into DHIS2/GLASS and resistance trends in key diarrhoeal pathogens (e.g. Shigella, Vibrio cholerae) are poorly characterised, weakening treatment choices during climate-related surges.

In parallel, the University Hospital Tübingen and the INH have proposed a complementary project in Kara to establish molecular testing. Although not yet approved, the project will actively seek synergies regarding aligned SOPs, shared training and data flows, if it proceeds. These weaknesses undermine trust in point-of-care tests and delay detection of outbreaks — just when climate variability increases the frequency of waterborne and vector borne disease surges.

Without reliable diagnosis and timely confirmation, treatment is largely empirical. Antimalarial therapies are prescribed without evidence of efficacy because therapeutic efficacy studies are not routinely conducted. For climate related diarrhoeal diseases, ORS and zinc—simple interventions that mitigate dehydration during heat and flood events—are not consistently available or not yet framed as climate adaptation measures. Current ORS + Zinc supply relies on long overseas routes, long lead times and avoidable CO^2 emissions. Regional African manufacturers could shorten routes, but unit prices remain higher when orders are small and irregular, and suppliers lack predictable multi-year demand signals. Without a quantified annual forecast and a vehicle to convert it into multiyear agreements – either directly with qualified West African producers or via ECOWAS pooled procurement – stocks arrive late or in emergency buys, undermining diarrhoeal case management during climate-driven peaks. Management of postpartum haemorrhage relies on oxytocin, which depends on cold chains, vulnerable to heat waves and power disruptions; meanwhile heat-stable carbetocin, which could reduce maternal deaths under climate stress, has not yet been widely adopted. Diagnostic uncertainty and fragile supply systems therefore translate into avoidable morbidity and mortality.

<table>
<tr><td></td><td>Climate variability magnifies the burden of malaria, diarrhoeal disease and maternal emergencies while straining diagnostic and treatment infrastructure. The barriers described are not isolated; they reinforce each other. Weak frontline diagnostics lead to empirical treatment; laboratory quality gaps erode trust and delay confirmation, and treatment practices lag behind climate-resilient options. By addressing these barriers as a connected system — introducing Shigella and rotavirus RDTs into public health practice, improving RDT quality assurance and training, upgrading laboratory equipment and molecular surveillance, and institutionalising climate resilient treatments like carbetocin and ORS/zinc — Togo can move from reactive care to climate informed CSHO control in its northern regions. Completing this system also requires modernising procurement, shifting to predictable, regional, multi-year arrangements for ORS + Zinc and other essentials (aligned with ECOWAS/AU platforms), to cut lead times and CO^2 while targeting prices at or below long-haul imports.</td></tr>
<tr><th colspan="2">Activity 3.2.3: Strengthen diagnostic and treatment of climate-sensitive health outcomes</th></tr>
<tr><td>Description</td><td>This activity aims to improve access to accurate diagnostics and reliable treatment for CSHO (malaria, dengue, cholera, shigellosis, rotavirus, diarrhoea and post-partum haemorrhage) in the three northern regions of Togo. It will introduce and scale-up rapid and confirmatory diagnostic tools, embed updated clinical algorithms, strengthen laboratory quality systems and molecular capacity, institutionalise innovative treatments such as heat-stable carbetocin and oral rehydration salts. It will also help existing institutions like DivLab, the PNLP, the INH and other Technical and Financial Partners (TFPs) such as GFATM to improve the laboratory information system, including an electronic laboratory information system for timely data flow and specimen tracking. The implementation will involve the stakeholders mentioned above.

Activity 3.2.3 will be supported by three sub-activities:
Sub-activity 3.2.3.1: Institutionalise diagnostics and strengthen laboratory systems for climate-sensitive diseases
Sub-activity 3.2.3.2: Strengthening access to essential medicines and preventative service
Sub-activity 3.2.3.3: Regional access to essential climate-relevant medicines
These interventions reinforce each other: improved diagnostics reduce presumptive treatment; stronger laboratories build clinician confidence and generate high-quality data; effective treatment reduces mortality and enhances trust in the health system, and a functional laboratory information system ensures timely data for outbreak detection, quality monitoring and supply management.

Outputs from this activity will feed into the broader surveillance and climate-health modelling efforts (Activity 1.2.1 and 1.2.2) by providing high-quality diagnostic and laboratory data. They will support the mapping of high risk-zones and vulnerable groups in activity 1.2.3 and contribute to operational early-warning services (Activity 1.3.1). In turn, sub-activity 3.2.2. (sentinel sites) will benefit directly from the improved diagnostics delivered here, strengthening the effectiveness of fever clinics through better rapid testing, confirmatory microscopy and quality systems. As set out in 1.2.2 and 3.2.2, stool samples from diarrhoeal cases at sentinel sites will be tested for AMR; this activity (3.2.3) reinforces laboratory capacity to perform AMR testing and ensures integrated reporting the laboratory information system.</td></tr>
<tr><th colspan="2">Sub-activity 3.2.3.1: Institutionalise diagnostics and strengthen laboratory systems for climate-sensitive health outcomes (EE: MSHPCSUA)</th></tr>
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Description	This sub-activity combines the institutionalisation of rapid and confirmatory diagnostics with the strengthening of laboratory quality systems and molecular capacity. It ensures that frontline health workers and laboratories can quickly identify CSHOs (malaria, cholera, dengue, rotavirus diarrhoea, shigellosis) and that results are reliable and feed into national systems. The programme will update and disseminate national diagnostic algorithms, develop a cadre of master trainers and ToT, and roll out RDTs to peripheral HFs while reinforcing confirmatory microscopy. In parallel, it will modernise laboratory quality management by updating policies and standard operating procedures, implementing an external quality assessment and supervision programme, and equipping peripheral laboratories with essential instruments. To support treatment policy and surveillance, the national reference laboratory will expand molecular testing to detect antimalarial resistance markers and routine AMR testing; regional laboratories will gain basic AMR capacity. Gender-responsive training and supportive supervision will be maintained throughout. The upgraded diagnostics and laboratories will provide high-quality data to feed into sentinel surveillance sites and national early warning services.
Deliverables	• 1 operational procedure validated and disseminated (Q4/Year 4) • 900,000 rapid diagnostic tests available in targeted areas for 3 years (Q2/Year 2)
Key institutions involved	PNLP/INH/DivLab: Jointly provide the strategic and technical guidelines for the use of RDTs and confirmatory diagnostics, ensure national diagnostic algorithms are updated and aligned with WHO recommendations, coordinate procurement and distribution, and supervise training, supervision, and quality assurance across facilities and CHW. GIZ: Provide support for capacity building, integration with health information systems, and quality assurance. GFATM: Align with and co-finance diagnostic procurement and laboratory strengthening to avoid duplication and ensure harmonisation. University of Tübingen: Provide technical expertise and help in creating synergies regarding molecular biology units
Sub-activity 3.2.3.2: Strengthening access to essential medicines and preventative service (EE: MSHPCSUA)	
Description	This sub-activity aims to improve treatment outcomes for CSHO. National maternal health guidelines will be updated to include heat-stable carbetocin, which will be distributed to maternity facilities, with health personnel trained in its use. A pharmacovigilance system will accompany this introduction to monitor and report potential adverse effects, ensuring patient safety. In parallel, annual therapeutic efficacy studies of antimalarial drugs will be conducted in collaboration with the PNLP and research institutions, while biannual audits will compare prescriptions with diagnostic results to promote rational use. To address diarrhoeal dehydration exacerbated by heat waves and floods, ORS and zinc will be integrated into treatment protocols, HFs supplied, and clinicians and CHW trained, with these measures presented as climate adaptation strategies to protect vulnerable populations.
Deliverables	• 1 set of pharmacovigilance guidelines developed and disseminated (Q2/Year 2) • Heat-resilient essential medicines available in the 3 regions (Q3/Year 5) • 2 studies of therapeutic efficacy of anti-malaria drugs published (Q3/Year 5)
Key institutions involved	MSHPCSUA - Division of Maternal, Child Health, and Family Planning: Update maternal health guidelines, oversee procurement and distribution of heat-stable carbetocin, and coordinate training of health staff.

	PNLP: Lead coordination of antimalarial drug efficacy monitoring, support data collection and analysis, and provide feedback to prescribers to promote rational use of medicines. DPML: Monitor and report adverse drug reactions, provide guidance on pharmacovigilance systems, and ensure patient safety in HFs. GIZ: Offer capacity support, including support for therapeutic efficacy studies, rational treatment audits, and clinician training. United Nations Population Fund: Provide technical support on maternal health, postpartum haemorrhage prevention, and community education campaigns, ensuring alignment with global standards.
Sub-activity 3.2.3.3: Regional access to essential climate-relevant medicines (EE: GIZ)	
Description	This sub-activity will secure steady, affordable access to a small set of, to be determined, climate-relevant medicines (e.g. ORS + zinc and others) by partnering with qualified African manufacturers and putting in place multi-year supply agreements. The sub-activity aims to pursue two complementary routes – direct agreements between Togo and selected suppliers and participation in ECOWAS pooled procurement – while staying aligned with the upcoming African Union strategy on pharmaceutical manufacturing that promote African manufacturing, shared quality standards and regulatory convergence. By sourcing regionally this sub-activity shortens long shipment routes, cuts related CO^2 costs and reduces delays while paying similar prices with a more diversified supply chain. Simple national forecasts and climate alerts will guide when we call for deliveries, so stocks are in place when demand rises.
Deliverables	• 10 HFs supplied with climate-relevant medicines through regional procurement agreements (Q2/Year 5)
Key institutions involved	DPML/DLM: Lead procurement processes, negotiates supply agreements, and ensures regulatory compliance (DPLM), provide technical input to align the procurement of ORS, zinc, and other climate-relevant medicines with national treatment protocols and climate-sensitive health outcome priorities (DLM). GIZ: Offer for capacity support, including development of forecasting tools, training of MSHPCSUA officials, and facilitation of regional procurement processes.

Component 4: Enhancing community adaptation and engagement

Output 4.1: Improve community infrastructure to be more resilient to water-related climate-sensitive health outcomes

Baseline	In the northern regions of Togo (Centrale, Kara, Savanes), community sanitation and water infrastructures remain highly vulnerable to hydrological hazards such as heavy rainfall, flooding, stagnant water, and prolonged droughts. These conditions intensify the transmission of waterborne diseases (diarrhoea, cholera) and increase exposure to vectors associated with stagnant water. Public amenities, such as primary schools and kindergarten, face severe WASH challenges. Latrines are often poorly designed, vulnerable to climate risks, and inadequately maintained. Handwashing facilities are either scarce or non-functional. Access to safe drinking water is also limited. Boreholes and storage systems are unreliable, failing to provide water year-round, and are often located too far from the point of use and consumption. Water access in these community spaces varies widely and faces numerous challenges. Most institutions depend on boreholes operated by manual pumps, while some use solar-powered pumps or hybrid system. A few systems include elevated storage cisterns, which require additional pumping but provide gravity-

<table>
<tr><td></td><td>fed water and ensure supply during outages. However, solar pumping systems demand regular maintenance and technical expertise for repairs. The lack of a dedicated maintenance budget often results in defective water supply systems. A persistent issue is the significant distance between boreholes and sanitation infrastructure. This separation discourages proper hygiene and sanitation practices, ultimately reducing the effectiveness of sanitation facilities.

Most sanitation facilities rely on "VIP latrines"— dry toilets that aren’t connected to sewer systems. These latrines use semi-lined pits to contain waste, with ventilation provided by plastic pipes. However, these pipes frequently break, compromising functionality. A major issue is the filtration of liquid waste through the pit bottom, which risks contaminating groundwater. In urban centres, faecal sludge management services exist but are underutilised. During heavy rains or floods, poorly lined or unlined pits overflow, rendering latrines unusable. This often forces communities to resort to open defecation, posing serious environmental and public health risks. Many facilities are old, structurally weak, and non-adapted to socio-cultural needs. In schools, toilets are often unsuitable for children, and poorly positioned, raising safety concerns, particularly for girls. They also fail to accommodate menstrual hygiene needs.

Existing handwashing facilities are frequently non-functional, with defective taps, blocked pedals, leaking reservoir or piping system, and no soap available. In schools the handwashing facilities are under designed and cannot accommodate multiple students at once, discouraging handwashing during critical times, such as after using the toilet, or before eating. The lack of a reliable water supply exacerbates the problem. In most cases, water sources are located too far from the sanitary blocks, discouraging use for pouring flush, handwashing, and appropriate menstrual hygiene practices, as well as regular cleaning of the infrastructures.

The management and maintenance of these infrastructures face structural and financial obstacles. Community-based management committees are fragmented, with weak coordination between different groups. There are no sustainable financial strategies in place to cover routine maintenance, repairs, or desludging. Reliance on voluntary contributions and limited municipal funding leads to neglect. The absence of faecal sludge collection and treatment services do not encourage the construction of septic tanks over pit latrines.

WASH facilities in schools are particularly inadequate in both number and design, failing to meet the specific needs of students and teachers. Latrine blocks are often unsafe due to their positioning, typically placed at the far edges of school grounds to demarcate property boundaries. Maintenance responsibilities usually fall on students organised into WASH committees or clubs. While some schools allocate a budget for WASH facility upkeep, these funds rarely cover major repairs, such as fixing water pumps, solar panels, or desludging pit latrines and septic tanks.</td></tr>
<tr><th colspan="2">Activity 4.1.1: Improve community infrastructure to be more resilient to water-related climate-sensitive health outcomes</th></tr>
<tr><td>Description</td><td>This activity aims to strengthen the resilience of schools and kindergartens in Centrale, Kara, Savanes against water-related health threats, including diarrhoeal diseases. By addressing risks linked to stagnant water, flooding, and contamination, the project will implement a holistic WASH program. This will improve access to clean water, enhance sanitation infrastructure, and promote better hygiene practices, thereby reducing exposure to disease vectors and mitigating the impacts of climate-related events.

To holistically enhance community resilience against heat-, water-, and vector-related health risks, the WASH activity interventions will target the same</td></tr>
</table>

communities selected for health infrastructure improvements under Activity 3.1.1. The selection of WASH interventions will align with the rehabilitation, extension, and new construction of HFs (as outlined in the deliverables of Activity 3.1.1.2). Interventions will be prioritised based on the condition and sustainability of existing infrastructure, the adequacy of water and sanitation services, and user density (e.g., student populations). The selection process will be collaborative, involving both GIZ and local communities, and will focus on four priority areas: water supply systems in schools (Sub-activity 4.1.1.1); sanitation facilities in schools and kindergartens (Sub-activity 4.1.1.2); management and maintenance of WASH facilities (Sub-activity 4.1.1.3) and WASH behaviour change (4.1.1.4). These interventions are strategically concentrated in educational environments — key locations where children, one of the project's primary focuses, spend substantial time. By targeting these high-impact areas, the project ensures that improvements directly enhance resilience and well-being for the most vulnerable groups.

The project will prioritise ensuring a reliable water supply for schools. This will be achieved through either the rehabilitation of existing infrastructure or the construction of new boreholes equipped with hybrid pumping systems, combining manual and solar pumps, along with elevated cisterns for storage and gravity-fed distribution. The system will also include a connection from the water cistern to the sanitary blocks, ensuring efficient operation and maintenance, as well as improved hygiene practices.

Activities will address the entire sanitation service chain (containment, emptying, transport and treatment) with a focus on specific stages tailored to the urban or rural context.

- Urban and peri-urban areas (within a 20 km radius of existing faecal sludge treatment facilities): Precast sanitation blocks with improved, hygienic sanitation interfaces connected to septic tanks will be constructed. Existing VIP latrines will be decommissioned, and pits will be secured using the *Arboloo*[19] approach. The project will ensure that infrastructure recipients subscribe to the municipal emptying service by supporting the municipality in establishing a sustainable and profitable service delivery model.
- Remote areas (beyond the 20 km radius of treatment facilities): Similar sanitation infrastructure will be implemented, but septic emptying will be replaced by decentralised small-scale treatment facilities (DEWATS).

The project will emphasise handwashing and menstrual health. Precast sanitation blocks will include handwashing stations directly connected to the water supply, equipped with durable taps. A standpipe near each block will also be installed for filling water jerrycans. Additionally, women's cabins will be designed to meet the specific needs of women and girls for menstrual hygiene and health.

Activity 4.1.1 will be supported by four sub-activities:

- Sub-activity 4.1.1.1: Rehabilitate water supply systems in schools
- Sub-activity 4.1.1.2: Implement improved sanitation facilities in schools
- Sub-activity 4.1.1.3: Build capacity for WASH infrastructure management in schools
- Sub-activity 4.1.1.4: Promote WASH innovations for community behaviour change

[19] *This approach consists of removing superstructures and slabs and filing pits with soil and planted with a tree to repurpose the nutrient-rich soil.*

	These sub-activities are interconnected and designed to complement each other, creating a holistic and sustainable WASH ecosystem in schools and surrounding communities. Sub-activity 4.1.1.1 ensures reliable access to safe water, which is critical for toilet flushing, cleaning, handwashing, and menstrual hygiene management. This directly supports Sub-activities 4.1.1.2, which focus on constructing inclusive, climate-resilient sanitation facilities that reduce exposure to waterborne health outcomes and promote dignity and safety for all users. Sub-activity 4.1.1.3 strengthens the capacity of local institutions to manage and maintain WASH school infrastructure, ensuring long-term sustainability and fostering a sense of ownership among stakeholders. Finally, Sub-activity 4.1.1.4 encourage proper sanitation, hygiene, and menstrual health practices in the communities through promotion of innovative WASH solutions for households. Together, these sub-activities contribute to strengthening health system resilience. Improved water and sanitation in schools enhance educational outcomes and support child and adolescent health initiatives. By reducing risks associated with flooding, stagnation, and contamination, the activities also support climate adaptation efforts and complement investments in cold chain systems (Activity 3.2.1). Additionally, they reinforce CSHO surveillance and EWS by lowering baseline vulnerability to water-related outbreaks and fostering community engagement in climate-health preparedness. This integrated approach ensures that investments are sustainable, inclusive, and aligned with local development priorities.
Sub-activity 4.1.1.1: Rehabilitate water supply systems in schools (EE: GIZ)	
Description	This sub-activity focuses on rehabilitating and expanding access to safe drinking water in schools and kindergartens across northern regions. The focus is on schools near targeted healthcare facilities, those with the highest student populations, and those with critical gaps in water and sanitation services access. It begins with a comprehensive assessment to identify sites where existing boreholes are non-functional or where water access is inadequate. Based on the assessment, interventions will include rehabilitating damaged boreholes or installing new ones, each equipped with a hybrid pump system, combining manual and solar pumps, to ensure uninterrupted water supply. Water will be pumped to an elevated cistern for storage and gravity-fed distribution to nearby connections. The system will also include a direct connection to sanitation blocks, ensuring efficient operation, maintenance, and improved hygiene practices. By bringing water closer to points of use, this approach minimises contamination risks linked to water transport and storage while reducing the physical burden of carrying water over long distances. Climate-resilient features will be integrated into the design, including a hybrid manual and solar pumping system, an elevated water tank with protective structures, solar panels mounted on an elevated roof above the tank, and secure fencing to protect the infrastructure. A comprehensive report will document the current state of water supply systems in target schools and markets, including functionality, user needs, and gaps. This report will serve as the foundation for decision-making on whether to rehabilitate existing boreholes or install new systems, ensuring interventions are data-driven and tailored to school's needs.
Deliverables	• 15 schools with drinking water supply systems installed/rehabilitated (Q4/Year 4)

Key institutions involved	Ministry of Education (*Ministère de l'Éducation Nationale* – MEN): Facilitate integration of safe water supply in schools, monitor proper use of infrastructure, and promote hygiene awareness, ensuring improved learning environments and sustained access for students Ministry of Water and Village Hydraulics (*Ministère de l'Eau et de l'Hydraulique Villageoise* – MEHV): Oversee planning and implementation of water and sanitation infrastructure, validate technical standards, and ensure compliance with national policies, guaranteeing reliable service delivery and institutional ownership Togolese Water Company (*Société Togolaise des Eaux* – TdE): Ensure technical management and maintenance of water points (urban/semi-urban areas). GIZ: Deliver technical expertise, support climate-resilient system design, and strengthen national capacities.
Sub-activity 4.1.1.2: Implement improved sanitation facilities in schools (EE: GIZ)	
Description	This sub-activity aims to replace outdated sanitation blocks in schools and kindergartens across northern regions with safe, inclusive, and climate-resilient facilities. The focus is on schools near targeted healthcare facilities, those with the highest student populations, and those with critical gaps in water and sanitation services access. The activity begins with a comprehensive assessment which will not only evaluate the condition of the current infrastructure but also define the design specifications for new sanitation blocks, including the number of cabins, handwashing stations, and optimal placement based on the specific needs and capacity of each school. Outdated and non-functional sanitation blocks with pit latrines will be decommissioned using the *Arboloo* approach. New sanitation facilities will be built in strategic locations on the school plot to replace the decommissioned ones. These locations allow for access control and monitoring, ensuring visibility from classrooms. To standardise quality and efficiency, the project will introduce modular precast sanitation blocks. These blocks are prefabricated using standardised moulds, either centrally or on-site, ensuring consistent quality, faster installation, and cost savings in materials and labour. Their modular design allows for customisation based on school needs and facilitates scalability across multiple sites. Additionally, these blocks are designed for easy maintenance, enabling municipalities and school committees to implement a uniform operation and maintenance plan. To ensure broad adoption and sustainability, the design will seek endorsement from the MSHPCSUA and the Ministry of Education, positioning it as a scalable model for potential nationwide implementation. As part of this process, the project will develop a technical design and construction manual, which will be continuously refined during implementation based on lessons learned. A first phase will involve constructing an initial batch of 5 sanitation blocks in schools located near a treatment facility and associated emptying services. This first phase will focus on testing functionality, durability, and user-friendliness, with provisions to adjust the design or construction processes based on feedback and performance. This iterative approach ensures that the final design is optimised for effectiveness, sustainability, and user satisfaction. The new sanitation blocks will be built with climate-resilient features: precast construction to reduce material use, water-saving toilets, integrated rainwater and runoff systems to prevent erosion and eliminate standing water, and elevated design to help mitigate flooding risks.

	Facilities will also be gender-inclusive, with separate buildings for boys and girls, and enhanced provisions for menstrual health and hygiene, including wider cabins for ease of movement, disposal bins, mirrors, cloth racks, shelves, and dedicated cleaning areas with water buckets and drains. The new sanitation blocks will also include handwashing facilities strategically positioned outside the blocks to enable school staff to monitor water usage and handwashing practices effectively. These facilities will be directly connected to the water supply system and equipped with water-saving, durable, and theft-resistant taps. In terms of excreta management, the sanitation blocks located in a 20km radius of a treatment facility, will include sealed septic tanks with improved soak pits (thicker filter media) to prevent groundwater contamination. The project will ensure that each school benefiting from a new septic tank subscribe to the municipal emptying service, ensuring that faecal sludge is safely transported to designated treatment facilities. In remote areas beyond a 20 km radius of treatment plants, decentralised, small-scale treatment facilities (DEWATS) with three distinctive treatment stages will be implemented: a settler stage, an anaerobic baffled reactor stage and a planted gravel filter stage (constructed wetland).
Deliverables	• 15 schools with improved sanitation blocks installed/rehabilitated (Q3/Year 4) • 5 DEWATS treatment facilities installed (Q3/Year 4)
Key institutions involved	MEN**:** Identify priority schools and kindergartens, facilitate access and integration of sanitation infrastructure within the education system, and monitor their use, ensuring improved learning environments and long-term sustainability. MSHPCSUA/DHAB**:** Provide technical guidance on sanitation and hygiene standards, validate designs of sanitation blocks, and ensure alignment with national public health strategies, contributing to safer and more resilient school environments. MSHPCSUA/DLM-PSP: Leads hygiene promotion and health education activities, support social mobilisation around sanitation practices, and monitors behaviour change, fostering the sustainable adoption of good hygiene practices in schools. Oversee health and hygiene promotion, support monitoring of sanitation-related health outcomes, and mobilise communities around behaviour change, ensuring improved hygiene practices and reduced disease risks. Municipal Technical and Financial Directorates (Sokodé, Kara, Dapaong)**:** Ensure integration into municipal infrastructure plans, manage financial contributions and operation & maintenance frameworks, and oversee faecal sludge management contracts, guaranteeing sustainability and institutional ownership at the local level.
Sub-activity 4.1.1.3:	**Build capacity for WASH infrastructure management in schools (EE: GIZ)**
Description	This sub-activity is designed to ensure the long-term sustainability of WASH infrastructure investments in schools by strengthening the technical and institutional capacities of stakeholders, authorities, and asset holders responsible for their management. The goal is to establish robust institutional mechanisms that guarantee the sustainable operation, maintenance, and upkeep of WASH facilities. This aligns with Activity 4.1.2, which supports the development of communal hygiene and sanitation plans and further reinforces municipal capacities for effective WASH governance.

	A sustainable WASH system in school settings requires a clear division of roles and responsibilities among all involved actors. The project will define these roles and based on local institutional capacities, select an appropriate management model. To ensure financial viability, the model will incorporate context-adapted financing mechanisms, to support gradually transitions to locally sourced funding. Once the management model is established, the project will provide training and tools to stakeholders, covering essential aspects of WASH management, including preventive maintenance, budgeting, and governance of water and sanitation school facilities. Practical tools, such as asset registers, maintenance schedules, and monitoring checklists, will be introduced to streamline school facility management. In the case of faecal sludge management, the project will facilitate collaboration between establishments and municipalities to ensure timely emptying, transport, and treatment services. Schools benefiting from new sanitation blocks and septic tanks will be connected to municipal emptying services, with the cost of these services integrated into their budgets. The project will also support municipalities in developing a scheduled emptying services model that can be extended to other customers beyond the project's scope. The WASH in Schools and Faecal Sludge Management model will be integrated into the revision of municipal hygiene and sanitation plans and the associated capacity-building activities for municipal staff as part of Activity 4.1.2. This will ensure that local authorities are equipped to implement and sustain these improvements effectively.
Deliverables	• 1 WASH in Schools framework developed (Q3/Year 2) • 3 workshops on WASH facility management conducted (including participants from the 15 schools), aiming for an absolute target of ≥30% female participation (Q1/Year 3) • Formal agreement between the municipal emptying service in place for all schools signed (Q1/Year 3)
Key institutions involved	<u>MEN:</u> Define roles and responsibilities for school WASH management, integrate facility management into the education system, and ensure long-term monitoring, contributing to sustained functionality of school sanitation and water services. <u>MHSPCSUA/DHAB:</u> Provide technical standards for hygiene and sanitation, validate WASH operation and maintenance guidelines, and train stakeholders on preventive maintenance, ensuring compliance with national strategies. Ministry of Territorial Administration, Decentralisation, and Customary Chieftaincy (*Ministère de l'Administration Territoriale, de la Gouvernance Locale et des Affaires Coutumières* - MATDCC): Strengthen governance frameworks for market sanitation management, integrate WASH management models into decentralisation processes, and ensure alignment with local development planning. <u>Municipal Technical and Financial Directorates (Sokodé, Kara, and Dapaong):</u> Implement locally adapted management models, oversee budgeting and financial mechanisms for WASH infrastructure, supervise faecal sludge management contracts, and ensure long-term ownership and sustainability.
Sub-activity 4.1.1.4: Promote WASH innovations for community behaviour change (EE: GIZ)	
Description	This sub-activity aims to promote appropriate sanitation, hygiene, and menstrual health practices among communities benefiting from WASH facilities within the project scope and beyond. By encouraging behavioural change and adoption of innovative WASH solutions, the intervention seeks to reduce the transmission of waterborne diseases, particularly diarrhoeal illnesses, and improve overall health outcomes. The promotion of WASH products under this sub-activity will be closely aligned with and complement the awareness-raising

	efforts under Activity 4.2.3, ensuring a cohesive approach to fostering improved WASH practices. The intervention focuses on educating communities about the correct use of WASH infrastructure, using facilities in schools and HFs (Activity 3.1.1) as practical examples for households. It emphasises the importance of sustainable and resilient WASH technologies, as well as proper hygiene and menstrual health management, to enhance dignity and well-being for women and girls. In collaboration with Activity 4.2.3, it supports awareness-raising campaigns to promote both hygiene practices and innovative WASH products, ensuring a coordinated approach to behaviour change. To achieve these goals, the project will partner with local private sector actors—including healthcare facilities, kiosks, hardware stores, and community associations — to develop marketing and business strategies for distributing essential WASH products. These include water-saving toilet pans, durable taps, and reusable menstrual pads. The project will provide an initial stock of products to selected distribution points, with sales revenue reinvested to maintain availability. It will also facilitate supply chain development until the system becomes self-sustaining, while offering training in management, marketing, and logistics to local sellers. Ultimately, this sub-activity aims to increase community awareness of proper WASH and menstrual health practices, boost the adoption of innovative WASH technologies, and strengthen local capacity for sustainable product sales and revenue generation.
Deliverables	• WASH products distributed in 15 Sanimarkets (Q4/Year 1) • 3 training in the 15 Sanimarkets on innovative WASH products delivered (Q4/Year 2)
Key institutions involved	MSHPCSUA/DHAB: Provide technical guidance and validation of hygiene and sanitation awareness materials, ensure compliance with national public health strategies, and support integration of innovative WASH solutions into community practices. MEN**:** Facilitate integration of hygiene and menstrual health promotion into schools, mobilise teachers and parent-teacher associations, and ensure dissemination of messages to students and their families.

Baseline	The PNLP serves as the primary institution responsible for coordinating malaria interventions nationwide. Despite notable progress over the past decade, malaria remains one of the leading causes of morbidity and mortality, particularly among children under five and pregnant women. Climatic conditions, including long rainy seasons and poor drainage systems, contribute to sustained transmission in both rural and peri-urban areas. At the national level, Togo benefits from a well-established policy framework aligned with global malaria control strategies. The country receives support from partners such as the Global Fund, Malaria Consortium, and previously the U.S. PMI, although its funding has recently been critically reduced, creating a financial gap. Interventions currently implemented at scale include SMC for children, distribution of ITNs, IPT during pregnancy. CHW also play an important role in case identification and the integration of additional services such as the vaccination of zero-dose children during SMC campaigns. However, other interventions—such as IRS, larval source management, entomological surveillance, and insecticide resistance monitoring—have not been fully scaled up due to limited resources and logistical challenges. WHO recommends the introduction of the RTS,S/AS01 and R21/Matrix-M malaria vaccines, administered from 5 months of age through the EPI, to reduce

child mortality. These vaccines target the circumsporozoite protein of *Plasmodium falciparum* by inducing protective antibodies and immune responses. Most endemic countries adopted this strategy in 2024, and Togo has introduced the R21/Matrix-M vaccine in 2025 under its 2023–2026 strategic plan.

The health system itself faces systemic challenges. Many HFs operate with insufficient personnel, limited diagnostic capacity, and recurring stockouts of essential commodities. Geographic and financial barriers continue to limit access to care, especially in rural communities. Surveillance systems remain fragile, with entomological and epidemiological data often incomplete or delayed, complicating decision-making and the introduction of innovative tools such as targeted sugar baits. Community acceptance of new interventions also poses challenges, given cultural perceptions, environmental concerns, and the need for sustained sensitisation.

The decentralisation framework defined by Decree No. 2023-046/PR assigns a crucial role to local governments in the domains of public health, hygiene, and sanitation. Communes are expected to develop communal hygiene and sanitation plans, adapt national regulations to the local context, monitor sanitary conditions in public spaces, and mobilise resources to improve health outcomes. In practice, however, most communes lack institutional frameworks, financial means, and technical expertise to fulfil these responsibilities. PDCs, where they exist, rarely incorporate vector control, and the majority of communes do not have formal hygiene and sanitation plans in place. Home visits for health surveillance are also limited, as local actors often lack the necessary training and resources.

Beyond the health sector, coordination among actors across education, environment, land use planning, and WASH remains weak, undermining the coherence and effectiveness of community-based interventions. A recent study conducted in eight communes revealed that intersectoral collaboration, which is meant to be led by local authorities, is often fragmented or absent. This lack of coordination not only reduces the impact of individual programs but also prevents the establishment of integrated, sustainable approaches to malaria control and broader health promotion.

Taken together, these factors highlight both the progress achieved and the persistent gaps in Togo's malaria response and local governance structures. While national policies are well aligned with international standards, the limited decentralisation of health-related responsibilities, financial constraints, and weak community-level coordination continue to hinder effective implementation. This baseline provides a critical foundation for assessing the feasibility of new interventions and for identifying opportunities to strengthen health systems, improve local government capacity, and ensure greater community ownership in malaria control and public health initiatives.

The PNLP faces significant operational constraints that limit the effectiveness of its interventions, particularly the insufficient consideration of environmental determinants linked to malaria and diarrhoeal diseases. Moreover, coordination among actors in the health, education, land-use planning, environmental, and NGO sectors remains limited, preventing concerted and coherent action at the local level. Although municipalities are legally responsible for coordinating interventions within their territories, this mandate remains largely under-implemented.

The enforcement of Decree No. 2023-046/PR, which defines the shared responsibilities between the State and municipalities in the health sector, is still limited. This decree entrusts municipalities with the responsibility of developing communal hygiene and sanitation plans, locally implementing national

	regulations, monitoring sanitary conditions in hotels, restaurants, drinking establishments, and public transport, conducting household visits for health surveillance, and mobilising resources to support these actions. However, in most municipalities, hygiene and sanitation plans are absent, and vector control activities are either lacking or insufficiently integrated into the PDCs. Due to inadequate training and resources, community actors are unable to consistently conduct household visits to sensitise families and verify hygiene and sanitation practices, reducing the effectiveness and coherence of community-based interventions.
Activity 4.1.2: Strengthen community engagement and local government capacity for integrated health, sanitation, and malaria control interventions	
Description	Community interventions will be essential to complement actions such as the improvement of hygiene and sanitation infrastructure, establishment of menstrual hygiene management facilities, safe water provision in schools and USPs. To ensure effectiveness and sustainability, these interventions will be based on an integrated, multi-level, multi-sectoral, and multi-strategy approach. The PNLP, in collaboration with the municipalities and Regional CCUS, will ensure the coordination of efforts at local, regional, and national levels, foster collaboration among relevant sectors, integrate malaria control and climate change adaptation into communal development plans, and strengthen the coordination of actions at the community level. The aim will be to strengthen the capacity of local governments and communities to effectively prevent and control malaria, improve sanitation and hygiene, manage menstrual health, ensure access to safe drinking water, and adapt to the challenges posed by climate change, to sustainably improve population health. Activity 4.1.2 will be supported by three sub-activities: • Sub-activity 4.1.2.1: Pilot innovative and environmentally safe anti-larval intervention • Sub-activity 4.1.2.2: Develop or update communal hygiene and sanitation plans incorporating malaria prevention and control • Sub-activity 4.1.2.3: Strengthen communal coordination of health, sanitation, and vector control interventions Synergies with related activities will further enhance impact: sustainable handwashing and menstrual hygiene facilities (4.1.1, 3.1.1) will complement sanitation planning in schools, , and HFs; local committees (4.1.2.3) will support monitoring of water and hygiene infrastructure with the INH in Kara; and communication and mobilisation initiatives (4.2.1-4.2.3) will reinforce community awareness and ownership for lasting results.
Sub-activity 4.1.2.1: Pilot innovative and environmentally safe anti-larval intervention (EE: GIZ)	
Description	This activity aims to significantly reduce vector-borne disease transmission, with a particular focus on malaria, through a comprehensive package of household and community-based interventions. The first component focuses on building the capacities of CHWs in larval source management and the promotion of repellent plants. CHWs will be trained to support households in preventing mosquito breeding by managing water sources and treating stagnant water, while also conducting household visits to raise awareness and verify hygiene and sanitation practices. Complementary measures will include the promotion of locally available repellent plants such as neem (*Azadirachta indica*), eucalyptus, and citronella. These actions together will strengthen mosquito control both within households and in the surrounding

	environment. This activity will be integrated into Sub-Activity 2.2.2.5, which falls under the responsibility of the MSHPCSUA of Togo. Accordingly, the TRC will work closely with the Ministry to jointly organise this training, which will be implemented in an integrated manner to ensure a harmonised and coherent approach aligned with national priorities. A contract will be established with the TRC, working in collaboration with local CSOs in the regions of Centrale, Kara, and Savanes to introduce mosquito screens on the Togolese market. Within this framework, TRC will develop and test the product design, set affordable prices and payment modalities for communities using a health solidarity fund, select and train local providers, ensure production quality, and lead community sensitisation and marketing efforts. To reduce installation costs and promote greater ownership as well as sustainable scale-up of the intervention, the activity will prioritise the use of universal or adjustable mosquito nets that can be easily installed by households themselves, following simple instructions. Feedback mechanisms will be integrated throughout implementation to adapt interventions to community needs.
Deliverables	• 1 training manual for CHW to include safe anti-larval interventions updated (Q3/Year 2) • 30 local providers selected and trained on mosquito screen production and installation, aiming for an absolute target of ≥30% female participation (Q4/Year 2) • 16 community awareness and marketing campaigns on mosquito nets in the targeted areas delivered (Q3/Year 3)
Key institutions involved	<u>TRC:</u> Lead the coordination and implementation of integrated vector control interventions at the household level. Responsibilities include household selection, coordination of screen installation, and targeted larval source management activities. <u>Local NGOs in Centrale, Kara, and Savanes:</u> Support field implementation, community mobilisation, beneficiary engagement, and contribute to the monitoring of interventions at the local level. <u>Households:</u> Receive insecticide-treated screens, benefit from larval source management interventions, and contribute to the sustainability of activities.
Sub-activity 4.1.2.2: Develop or update communal hygiene and sanitation plans incorporating malaria prevention and control (EE: GIZ)	
Description	This sub-activity aims to strengthen local governance in malaria prevention through the development or updating of communal hygiene and sanitation plans that incorporate vector control measures. For this, the creation of the five regional CCUs within the DRSs, as described in activity sheet 2.1.2, will facilitate the development, implementation, and monitoring of communal hygiene, sanitation, and vector control plans, while providing technical support to municipalities to translate strategic priorities into concrete actions on the ground, ensuring effective coordination between national, regional, and communal levels. The activity will support municipalities in assessing existing hygiene, sanitation, and environmental management practices to identify gaps related to mosquito breeding sites and define strategic actions to address them. Through a participatory approach involving local authorities, technical services, and community representatives, the plans will include specific interventions such as environmental sanitation campaigns, waste management, and the promotion of good household-level vector control practices. Special attention will be given to ensuring that malaria prevention activities are fully integrated into local development and health strategies.

	Capacity-building sessions will be delivered to municipal staff ahead of the drafting or revision of the plans, equipping them with the skills and knowledge required for integrated planning. Technical assistance will then support municipalities in preparing or updating their plans in line with national guidelines. This process will ensure that the new WASH standards and infrastructure to be developed under Sub-Activity 4.1.1.2, as well as the communication and behaviour-change activities under Sub-Activities 4.2.1, 4.2.2 and 4.2.3, are fully incorporated. Integrating these elements during the planning updates will strengthen coherence across interventions and improve alignment with national priorities. Once finalised, these communal plans will serve as key reference documents for resource mobilisation, coordination of interventions, and community engagement in the fight against malaria. Additionally, each municipality will be supported to implement at least two priority measures from its plan, such as environmental clean-up campaigns, waste management activities, or targeted larval source reduction actions, to ensure that strategic priorities are translated into concrete actions on the ground.
Deliverables	• 80 municipal agents (10 per municipality) trained in integrated planning, aiming for an absolute target of ≥30% female participation (Q2/Year 2) • 8 municipal hygiene and sanitation plans updated or developed (Q4/Year 2)
Key institutions involved	Municipalities: Lead the assessment, coordination, and development or revision of communal hygiene and sanitation plans, organise participatory workshops, ensure alignment with local priorities, and oversee the adoption and implementation of selected priority measures. PNLP: Provide overall supervision and issue technical and policy guidance for malaria prevention and health-climate integration. CCU: Operational units responsible for supporting municipalities, facilitating plan development, providing technical assistance, and monitoring the implementation of hygiene, sanitation, and vector control measures. Local NGOs and CSOs: Support community mobilisation, participate in planning workshops, and assist municipalities in implementing selected priority actions, particularly at the community level.
Sub-activity 4.1.2.3: Strengthen communal coordination of health, sanitation, and vector control interventions (EE: GIZ)	
Description	This sub-activity aims to strengthen mechanisms to ensure the effective and sustainable implementation of health, sanitation, and vector control interventions. It includes reinforcing the functionality and capacity of local committees and HFs so that they can effectively monitor and manage infrastructure, including hygiene facilities. Furthermore, municipal capacity to monitor water quality in collaboration with the INH will be strengthened, thereby ensuring safe drinking water for communities and preventing diarrhoeal diseases. Active collaboration between municipalities and the CCUs will be promoted to harmoniously and sustainably integrate health, sanitation, and climate resilience actions at the local level. These efforts will be reinforced through sub-activity 4.2.1, which focuses on developing and delivering localised training programs for community-level multipliers on climate-health risks. The training curriculum and modules to be developed will serve as a key resource to build the technical and operational capacity of municipal staff, local NGOs, and CBOs engaged in health, sanitation, and vector control. By training and certifying community-level multipliers and trainers, this sub-activity will ensure that knowledge on SBCC and impact measurement is widely disseminated and sustained. The synergies between sub-activities 4.1.2.3 and 4.2.1 will therefore guarantee that local

	committees and municipalities not only have the structures and mandates to act, but also the knowledge, tools, and skills to effectively implement, monitor, and sustain integrated climate-health interventions.
Deliverables	• 2 workshops on strengthening communal communication of 15 local HF committees delivered, aiming for an absolute target of ≥20% female participation (Q4/Year 2)
Key institutions involved	Municipalities: Coordinate and supervise vector control interventions at the local level. They chair the Multisectoral Municipal Vector Control Committees (Green Brigades). GIZ: Support municipalities in strengthening the capacities of Municipal Committees, develop coordination tools, assist in planning, and ensure quality monitoring of interventions through supervision visits and feedback workshops. INH: Support municipalities by monitoring water quality, providing laboratory expertise, and ensuring safe drinking water to prevent diarrhoeal diseases.

Output 4.2: Community awareness and understanding of climate-health linkages are enhanced

Baseline	By the start of this project phase (01/2027), the Johns Hopkins CCP will have developed a foundational SBC Climate and Health Concept composed of a strategy and a toolkit. This is created through desk research and formative studies in collaboration with the MSHPCSUA, GIZ, and WASCAL, focusing on climate-health impacts in the Centrale, Kara, and Savanes regions. A national TWG on SBC for Climate and Health has been established, with a regional hub in Kara, and participatory workshops have co-created a first draft of the strategy, including a theory of change, core messages, and recommended interventions across levels of the socio-ecological model. Further, a CCU within the MSHPCSUA will contribute to institutionalising the knowledge of the TWG. This framework provides a theory of change, key messages, and recommended interventions across levels of the socio-ecological model. However, it remains largely untested in practice. Validation with frontline multipliers and rural communities has not yet taken place, and the strategy lacks systematic mechanisms for adaptation and feedback. An additional challenge lies in linguistic accessibility. In northern regions, many local languages lack established terms for climate and health phenomena, forcing reliance on French terminology, which is often perceived as abstract or external. This undermines both trust and relevance. As a result, the existing strategy and toolkit represent an important foundation but remain incomplete, with significant gaps in validation, linguistic inclusivity, and adaptive use at scale.
Activity 4.2.1: Develop communication messages, tools, and channels for different key populations to alert them on climate-induced changes to health risks	
Description	To overcome the current fragmentation, lack of localisation, and absence of feedback loops in climate-health communication, this activity will ensure that the SBC Climate and Health Strategy and Toolkit become a validated, inclusive, and adaptable national reference. While a first draft has already been developed with national partners, it remains to be systematically localised and equipped with mechanisms for continuous learning and adaptation. The activity will begin with an independent evaluation of the existing strategy and toolkit. An international research institution will lead a participatory evaluation together with regional experts and multipliers to assess the cultural fit, usability, and behavioural relevance of messages and materials. Where gaps are identified, such as missing local vocabulary, weak connection to behavioural

	drivers, or insufficient practical guidance, targeted additional research will be carried out and the toolkit revised accordingly. In parallel, a Translation and Communication Guide will be developed to ensure that the concepts of climate and health can be communicated in clear, actionable, and culturally resonant language. This guide will cover French and at least three major local languages and will integrate co-created metaphors and storytelling devices to bridge linguistic gaps. Importantly, it will also be linked to the EWS (1.3.2) so that standard triggers, such as alerts on malaria outbreaks or heatwaves, are available in immediate and consistent translation. Finally, the activity will establish a framework for ongoing monitoring and adaptation of the strategy. Evaluation will combine quantitative data such as reach, recall, and uptake of protective behaviours with qualitative insights from communities and multipliers. Annual review cycles will feed lessons learned back into the toolkit, ensuring that it evolves as a living document. This way, the strategy will not only serve as the framework for localised multiplier training (Activity 4.2.2) and nationwide mass campaigns (Activity 4.2.3) but also provide clear guidance on how to measure and adapt impact over time. Activity 4.2.1 will be supported by three sub-activities: • Sub-activity 4.2.1.1: Evaluate and refine the SBC Strategy and Toolkit • Sub-activity 4.2.1.2: Develop a translation and communication guide for climate-health concepts • Sub-activity 4.2.1.3: Evaluate, monitor impact, and adapt the SBC Climate and Health Strategy
Sub-activity 4.2.1.1: Evaluate and refine the SBC Strategy and Toolkit (EE: GIZ)	
Description	This sub-activity will ensure the independent evaluation and refinement of Togo's SBC Climate and Health Strategy and Toolkit, transforming it into a validated, inclusive, and user-friendly national reference for climate–health communication. Building on the draft developed with the MSHPCSUA, WASCAL, and Johns Hopkins CCP, the evaluation will test the practical usability, cultural fit, and behavioural relevance of messages and tools among diverse user groups in the Centrale, Kara, and Savanes regions. An international academic partner will lead the evaluation together with regional universities (e.g. WASCAL and University of Kara) to guarantee scientific rigour and independence. The process will combine participatory methods such as usability walkthroughs, testimonial exchanges, and scenario testing with frontline multipliers (CHWs, teachers, NGOs, religious leaders). Findings will feed into a structured revision of the Toolkit, ensuring that it addresses local communication realities, linguistic gaps, and behavioural drivers. Where knowledge gaps are identified, targeted formative research will be undertaken jointly by WASCAL and local universities. At the same time, this sub-activity will strengthen national capacity by training regional researchers and members of the Climate and Health Unit in participatory evaluation approaches. Through this process, partners will gain methodological foundations and documentation to replicate similar SBC toolkit evaluations for other health or climate sectors in the future. The refined SBC Toolkit v1.0 will serve as the operational backbone for localised multiplier training (4.2.2) and national awareness campaigns (4.2.3).

Deliverables	• 1 SBC Toolkit based on evaluation results revised (Q1/Year 2)
Key institutions involved	International university: Lead evaluation design, facilitate workshops, and synthesise results. Regional universities (WASCAL-UoL): Conduct data collection, co-lead participatory analysis, and receive targeted training in human-centred design methods. CCU: Coordinate stakeholder engagement and ensure methodological consistency with the national SBC framework. Multipliers (CHWs, teachers, religious leaders, CSOs): Participate in usability testing and provide feedback on practicality.
Sub-activity 4.2.1.2: Develop a translation and communication guide for climate-health concepts (EE: GIZ)	
Description	This sub-activity will develop a Translation and Communication Guide that ensures climate–health information is communicated in clear, inclusive, and culturally resonant language across Togo's diverse linguistic and cultural contexts. It will serve as a shared reference for all activities under Output 4.2 and the EWS (1.3.2), guaranteeing consistency and accessibility across languages and audiences. The guide will build on the existing glossary methodology developed at the University of Kara, expanding it to at least three additional widely spoken local languages. Using a participatory and human-centred approach, linguists, multipliers, and community representatives will collaboratively identify terminology gaps and co-create culturally meaningful metaphors, analogies, and storytelling expressions that make scientific concepts locally relevant and easy to understand. Each language cluster will organise validation workshops bringing together linguists, climate and health communicators, and local leaders to test and refine translations. The process will be supported by an inclusion and accessibility advisor to ensure gender-sensitive, literacy-appropriate, and disability-inclusive phrasing. The final guide will provide not only standardised terminology and examples for everyday communication but also pre-translated EWS triggers and protective action messages (from 1.3.2), enabling consistent and immediate communication when alerts are issued. Beyond its direct use, the methodology will equip national partners and universities with a replicable framework for producing similar linguistic tools in other thematic sectors, fostering national capacity and long-term institutional learning.
Deliverables	• 1 Translation and Communication Guide formally endorsed by the TWG and integrated into the national SBC Climate and Health Toolkit with the participation of ≥ 1 woman, 1 LC representative, and 1 representative of persons with disabilities in the development process. (Q2/Year 2)
Key institutions involved	Universities: Lead the translation process, coordinate linguistic research, and manage participatory validation. International university: Support methodological design and ensure coherence with behavioural and communication science standards. CCU: Validate technical consistency with the SBC Strategy and integration into the Toolkit. CSOs and community representatives: Co-create and field-test translations for clarity and cultural resonance.
Sub-activity 4.2.1.3: Evaluate, monitor impact, and adapt the SBC Climate and Health Strategy (EE: GIZ)	

Description	This sub-activity will establish a systematic framework for monitoring, evaluation, and adaptive learning to ensure that the SBC Climate and Health Strategy remains evidence-based, inclusive, and responsive to evolving community needs and climate-health risks. While Activities 4.2.2 and 4.2.3 implement localised training and national campaigns, this sub-activity will generate the data and feedback mechanisms required to measure their effectiveness and continuously refine the overarching communication approach. An international academic institution will lead the evaluation in close collaboration with regional universities (e.g., Kara, WASCAL) to guarantee methodological rigor and independence while building national capacity in behavioural research and participatory evaluation. The framework will combine quantitative measures, such as campaign reach, message recall, and adoption of protective behaviours, with qualitative insights from multipliers and communities (focus groups, storytelling feedback, usability testing). Findings will be synthesised into annual review cycles discussed within the Climate and Health Unit of the Health Ministry on SBC for Climate and Health. These cycles will ensure that lessons learned are translated into tangible updates of the SBC Toolkit, communication materials, and training modules. Special attention will be given to the integration of early warning messages (1.3.2): if alerts or campaign triggers do not result in expected communication responses, these gaps will be documented and corrected through targeted improvements. By embedding continuous evaluation and learning, this sub-activity will transform the SBC Strategy into a living national framework, allowing partners to measure communication impact systematically and adapt interventions over time. The approach will also serve as a replicable monitoring model for other sectors working on risk communication and behaviour change in Togo.
Deliverables	• 1 final consolidated evaluation and lessons-learned report feeding into the national SBC Toolkit developed (Q2/Year 5)
Key institutions involved	International university: Lead design and implementation of the M&E framework, ensure neutrality and methodological rigor. Regional universities (e.g., WASCAL-UoL): Co-lead data collection and qualitative research, receive capacity-building in participatory evaluation methods. CCU: Coordinate data flow, validate findings, and ensure integration into the national SBC Toolkit. Multipliers (from 4.2.2) and media partners (from 4.2.3): Provide community-level feedback on message comprehension and behavioural response.

Baseline	At project outset, community awareness of climate–health linkages in Togo's northern regions remains low. Local multipliers, including CHWs, teachers, religious leaders and other trusted figures, have limited access to reliable information on climate-sensitive health risks and lack the tools and training needed to communicate these issues effectively. Although previous phases of the project ProSanté and other related initiatives have developed communication strategies and materials, these have not yet been systematically integrated into capacity-building efforts for multipliers. Many of these actors have limited climate change awareness, are unfamiliar with climate-health data and do not have the tools or resources to communicate this information in local languages or in accessible culturally appropriate formats suitable for low-literacy audiences.

	At the community level, multipliers are generally among the most trusted actors for household- and community-level communication, yet they face major constraints. Structured training on climate-health risks is absent, access to quality-assured communication materials is limited, and multipliers are often unsupported in adapting messages for low-literacy or non-French-speaking audiences. Although interpersonal communication approaches such as home visits, peer education, clinic-based counselling, and community dialogues through CHWs, and other local community groups (*Tantines, Club de mères, and Papa Champions*) are well established and culturally trusted, they are inconsistently applied, underfunded, and poorly connected to climate-health topics. Multipliers frequently rely on generic or fragmented content, while institutional coordination remains weak, leading to duplication or contradictory messages. Without a systematic framework to train, equip, and coordinate them, communities continue to receive little actionable guidance on prevention and adaptation to climate-sensitive health risks.
Activity 4.2.2: Strengthen the capacities of multipliers at community level on the links between climate change and health	
Description	This activity will strengthen the capacities of trusted community actors to effectively communicate the links between climate change and health and to promote protective behaviours at household and community level. In Togo's northern regions, community multipliers play a crucial role as messengers of change, yet they often lack the training, tools, and coordination needed to convey climate–health information in clear, practical, and culturally resonant ways. Building on the validated SBC Climate and Health Toolkit and the monitoring and evaluation framework developed under Activity 4.2.1, this activity will establish a structured system to train, equip, and coordinate multipliers as key intermediaries between national strategies and community realities. Multipliers will acquire both the technical understanding of climate-sensitive health risks (such as malaria, diarrhoeal disease, including the promotion of exclusive breastfeeding as a key preventive measure, heat-related illness, and maternal and child health) and the interpersonal communication skills needed to engage diverse audiences through participatory, experience-based approaches such as storytelling, role-plays, and interactive drama. To support practical outreach, multipliers will be equipped with a modular communication toolkit that combines traditional and innovative formats, including flipcharts, posters, comic strips, audio storytelling, and radio scripts, translated into three local languages and validated for cultural relevance. Using these tools, multipliers will be able to tailor their communication to different audiences such as youth, women, farmers, and community leaders, ensuring accessibility and inclusivity in all outreach efforts. Coordinated interpersonal communication campaigns will then guide community-level implementation. Under the leadership of the MSHPCSUA and supported by municipalities and the TRC, multipliers will plan and conduct annual sensitisation campaigns based on localised Community SBCC Action Plans. These campaigns will use trusted communication channels such as home visits, school sessions, and community dialogues, and at least one campaign per year will be directly linked to the EWS (1.3.2), enabling rapid community mobilisation in response to climate- or health-related alerts. Regular field usability testing and structured feedback collection by regional universities will feed into annual monitoring and evaluation cycles, ensuring that

	messages, materials, and training modules remain relevant and evidence-based. Through this integrated approach, Activity 4.2.2 will establish a sustainable and scalable framework for community-level climate–health communication, empowering multipliers to serve as effective connectors between national strategies and the daily realities of vulnerable populations. Activity 4.2.2 will be supported by three sub-activities: • Sub-activity 4.2.2.1: Develop and deliver localised training programme for community-level multipliers on climate-health risks • Sub-activity 4.2.2.2: Develop and provide multipliers with tailored communication materials and tools to engage their communities • Sub-activity 4.2.2.3: Coordinate and implement interpersonal communication campaigns through multipliers
Sub-activity 4.2.2.1: Develop and deliver localised training programme for community-level multipliers on climate-health risks (EE: MSHPCSUA)	
Description	This sub-activity will design and implement localised, practice-oriented training programs that equip community-level multipliers with the knowledge and interpersonal skills needed to communicate climate-related health risks effectively and mobilise local action. Building on the validated SBC Climate and Health Toolkit (4.2.1) and the monitoring framework established under 4.2.1.3, the training curriculum will integrate both technical content (malaria, diarrhoeal disease, exclusive breastfeeding promotion, heat stress, maternal and child health) and SBCC techniques adapted to diverse community settings. Modules will focus on participatory and experiential learning approaches such as testimonial exchanges, role-plays, storytelling, and interactive drama, ensuring that multipliers can confidently apply these methods with low-literacy and rural audiences. To ensure a comprehensive approach, this training will also encompass the WASH actors identified under Activity 4.1.1 (such as school management committees and municipal staff responsible for infrastructure), ensuring that those managing water and sanitation facilities are equally equipped to promote hygiene, menstrual health, and climate resilience alongside health multipliers. The curriculum will be co-developed and validated with national and regional experts, then delivered through regional and district workshops that combine theory, practice, and peer learning. A dedicated ToT component will create a cadre of at least 20 qualified trainers capable of cascading the program and sustaining roll-out beyond the project period. Trainer and participant feedback will be systematically collected and used to refine the modules, ensuring that training content remains relevant and context specific. Through these efforts, the sub-activity will strengthen national and regional capacity to deliver coordinated, high-quality climate-health communication training and establish a scalable foundation for future integration into other public-health education initiatives.
Deliverables	• 20 trainers trained through ToT, ensuring an absolute target of ≥40% women (minimum 8 participants) (Q2/Year 2 – Q4/Year 3) • 500 multipliers trained in climate-health SBCC approaches and impact measuring, with recruitment ensuring a final pool of ≥125 women and ≥2 representatives per local community (Q2/Year 2 – Q4/Year 3)

Key institutions involved	TRC: Implement regional trainings, mobilise participants and community networks. CCU: Validate content consistency with the national SBC Strategy (4.2.1) and ensure coordination with 4.2.2.2 and 4.2.2.3. GIZ: Provide technical supervision, quality assurance, and coordination among partners.
Sub-activity 4.2.2.2: Develop and provide multipliers with tailored communication materials and tools to engage their communities (EE: GIZ)	
Description	This sub-activity will develop and provide a modular communication toolkit that enables multipliers to translate complex climate–health information into simple, actionable, and culturally resonant messages at community level. The toolkit will serve as the practical companion to the SBC Climate and Health Strategy (4.2.1) and will ensure that interpersonal communication efforts are consistent, evidence-based, and inclusive across all regions. The toolkit will contain at least four audience-specific communication formats, combining traditional and innovative approaches — such as flipcharts, posters, storytelling audio pieces, comic strips, and radio scripts. Formats will be tested and refined through feedback loops with users, ensuring clarity, engagement, and usability for different audiences including youth, farmers, caregivers, and community leaders. To ensure linguistic and cultural accessibility, all toolkit formats will be translated and localised into key local languages and validated through participatory workshops with community representatives. Where local terminology for climate–health concepts is missing, co-created metaphors and analogies developed under Sub-activity 4.2.1.2 will be integrated. Once finalised, trainers (trained under 4.2.2.1) will conduct orientation sessions in all three regions to familiarise multipliers with the toolkit's content, structure, and application. These sessions will emphasise practical use in real-life settings — helping multipliers choose the most suitable tools for their target groups and communication contexts. To ensure a holistic approach to disease prevention, these sessions will also integrate the WASH awareness materials and promotional strategies developed under Activity 4.1.1 (specifically Sub-activity 4.1.1.4), enabling multipliers to effectively disseminate information on climate-resilient WASH practices alongside broader climate-health messages. Through these efforts, the sub-activity will strengthen the ability of community actors to engage audiences through locally adapted, high-quality communication tools, and ensure consistent dissemination of messages that link climate change to health risks and protective actions.
Deliverables	• 1 toolkit containing at least 4 audience-specific communication formats developed (Q3/Year 2) • 3 toolkit translations in key local languages validated (Q4/Year 2) • 4,000 toolkits distributed (Q4/Year 3)
Key institutions involved	Regional universities: Support translation, localisation, and integration of cultural metaphors developed under 4.2.1.2. International university: Provide technical assistance in toolkit structure, accessibility, and visual storytelling. TRC: Distribute toolkits through its community networks, host regional orientation sessions, ensure inclusion of rural and vulnerable groups. CCU: Validate toolkit content for alignment with the SBC Climate and Health Strategy and cross-check coherence with activities 4.2.1 and 4.2.3. GIZ: Oversee production, ensure donor compliance, and guarantee quality and coordination between partners.
Sub-activity 4.2.2.3: Coordinate and implement interpersonal communication campaigns through multipliers (EE: MSHPCSUA)	

Description	This sub-activity will establish and coordinate interpersonal communication campaigns implemented through trained community multipliers, ensuring that local outreach is structured, evidence-based, and aligned with the national SBC Climate and Health Strategy (4.2.1). Working through regional coordination mechanisms Community SBCC Action Plans will be developed that define communication objectives, key messages, and delivery channels. Each year, four community sensitisation campaigns will be implemented across the eight target municipalities using trusted interpersonal communication formats such as home visits, school sessions, and community dialogues. Campaigns will integrate local media engagement (radio, SMS, influencers) to reinforce key messages and ensure broad reach. At least one campaign per year will be EWS-linked, enabling rapid community mobilisation in response to alerts on CSHO such as malaria, diarrhoea, or extreme heat. To ensure continuous learning and quality improvement, field usability testing and structured feedback collection will be carried out in all three target regions by regional universities (e.g., WASCAL). The findings will be consolidated into annual monitoring and evaluation reports, co-reviewed by GIZ and the MSHPCSUA, to inform strategic refinement of messages and materials across the 4.2.2 and 4.2.3 activities. Additionally, these insights will be linked to Activity 4.1.2 to ensure that communication strategies regarding health, sanitation, and vector control remain aligned with the evolving needs identified in the communal hygiene and sanitation plans developed under Sub-activity 4.1.2.2 and the community engagement efforts in Sub-activity 4.1.2.3. Through these coordinated efforts, this sub-activity will transform community multipliers into an active, organised network capable of delivering consistent, adaptive, and community-owned climate–health communication across Togo's most vulnerable regions.
Deliverables	• 8 Community SBCC Action Plans developed (Q3/Year 2) • 4 community sensitisation campaigns conducted annually across 8 target municipalities (Q5/Year 5)
Key institutions involved	Multipliers (CHWs, teachers, religious leaders, CSOs): Develop and implement SBCC Action Plans, conduct IPC campaigns, and collect community feedback. Regional universities (e.g., WASCAL-UoL): Conduct field data collection, usability testing, and contribute to M&E reporting. TRC: Support implementation and ensure inclusion of rural and vulnerable communities. Municipalities: Facilitate logistics and ensure campaign alignment with local governance structures. GIZ: Lead annual M&E synthesis and ensure cross-linkages with 4.2.1 and 4.2.2 outputs.

Baseline	Public awareness of climate-induced health risks remains low, particularly among rural and vulnerable populations in Togo's northern regions. Although an SBC Climate and Health Concept has been developed, it has not resulted in scaled, population-wide outreach or measurable behaviour change. The communication environment continues to be highly fragmented and largely top-down. Government bulletins are irregular, seldom localised, and rarely accessible to non-French speakers. Climate-health terms often lack direct equivalents in local languages, creating reliance on French terminology that undermines trust and perceived relevance. Feedback mechanisms to adapt campaigns in real time are absent. Past campaigns have frequently

	relied on overly technical or fear-based communication, reducing their effectiveness and resonance. Communication around outbreaks such as malaria, cholera, or diarrhoeal disease has tended to be delayed, reactive, and insufficiently linked to climate triggers or household-level solutions. While previous mass campaigns in Togo have demonstrated the potential for mobilisation, they have also depended on a limited set of channels, were inconsistently integrated with interpersonal communication, and were rarely evaluated for impact. As a result, mass communication on climate-health risks remains fragmented, inaccessible, and not sufficiently actionable.
Activity 4.2.3: Raise awareness through different communication channels to encourage behaviour change and strengthen ownership of community members	
Description	This activity will increase public awareness and understanding of the health impacts of climate change and promote the adoption of protective behaviours through multi-channel, inclusive, and adaptive national communication campaigns. Despite growing recognition of climate-related health risks, public awareness in Togo remains limited, particularly among rural and vulnerable populations. Previous campaigns have often been fragmented, overly technical, and reactive, with little linguistic adaptation or audience feedback. Building on the validated messages, translation guide, and SBC Climate and Health Toolkit developed under Activity 4.2.1, and on the community-level multiplier network established under Activity 4.2.2, this activity will translate technical content into engaging, hope-based narratives that inspire collective action and strengthen local ownership. Through a cross-channel campaigns, this sub-activity will reach diverse audiences, from rural low-literacy populations to digitally connected youth. Participatory storyboarding and co-creation workshops will ensure that campaign concepts reflect local realities, languages, and values. All materials will be pre-tested with target groups and translated into key local languages to guarantee inclusiveness and cultural resonance. Nationwide rollout will use a phased and recurrent approach to reinforce messages and sustain visibility over time, supported by structured feedback loops that capture community reactions. A rapid-response mechanism will link campaigns directly to the EWS (1.3.2) so that, whenever alerts are triggered, for instance, during malaria outbreak, pre-produced messages can be deployed immediately through radio, SMS, and digital channels. Continuous monitoring and evaluation will document reach and behavioural impact, feeding lessons learned back into the SBC Toolkit to ensure that communication remains evidence-based and adaptive. Through this activity, national institutions and communication partners will establish a coherent, data-driven communication ecosystem that connects national strategies with community realities, enabling timely, trusted, and action-oriented public information on climate-related health risks. Activity 4.2.3 will be supported by two sub-activities: • Sub-activity 4.2.3.1: Storyboarding, production, and pre-testing of campaigns • Sub-activity 4.2.3.2: Roll-out, monitoring, and adaptive feedback
Sub-activity 4.2.3.1: Storyboarding, production, and pre-testing of campaigns (EE: GIZ)	
Description	This sub-activity will design, produce, and pre-test an integrated, cross-channel communication campaign that promote climate–health awareness and protective behaviours across Togo. This sub-activity will design, produce,

	and pre-test an integrated, cross-channel communication campaign that promote climate–health awareness and protective behaviours across Togo. Using appropriate channels for the different audience groups, the campaigns will ensure wide population reach and resonance across different age, literacy, and media access groups. The campaign will also integrate best practices from WASH (4.1.1). Building on the validated SBC messages, translation guide, and visual standards developed under Activity 4.2.1, and the multiplier capacities strengthened under Activity 4.2.2, the campaigns will follow a structured four-phase production process: • Pre-production: Technical content will be translated into compelling, locally relevant narratives through creative storyboarding and co-creation workshops in three regions. These participatory design sessions will involve youth, community leaders, and multipliers to ensure cultural resonance and message clarity. • Production and post-production: Professional filming, recording, and editing will be carried out by creative agencies and media houses to deliver final media-ready products in multiple formats, including radio, print, and digital media. • Localisation: All campaign materials will be translated and adapted into relevant local languages. Voice actors and inclusive design techniques will ensure accessibility for low-literacy and rural audiences. • Quality review and client validation: Each campaign will undergo at least two rounds of pre-testing—one at concept level and one with final materials — conducted across three regions. Feedback will be analysed and integrated into the final versions before approval and rollout. Through this process, the sub-activity will ensure that all campaigns are professionally produced, audience-tested, and context-specific, balancing trusted traditional communication channels with innovative digital storytelling. The campaign will be set-up in a way that it is linked to the EWS (1.3.2).
Deliverables	• 1 integrated campaign produced in final media-ready formats (Q2/Year 3) • All campaign materials translated and adapted into relevant local languages for rollout (Q3/Year 3)
Key institutions involved	Multipliers (CHWs, teachers, religious leaders, CSOs from 4.2.2): Participate in pre-testing and feedback collection to ensure cultural and linguistic resonance. CCU: Validate technical accuracy, align campaign messages with the SBC strategy, and oversee feedback processes. MSHPCSUA: Provide content validation and ensure alignment with national health priorities and climate-sensitive heat outcome triggers. ANAMET: Supply data and seasonal triggers for integration into campaign messages.
Sub-activity 4.2.3.2: Roll-out, monitoring, and adaptive feedback (EE: GIZ)	
Description	This sub-activity will ensure the rollout and continuous adaptation of the integrated climate–health campaign produced under 4.2.3.1. Through a coordinated mix of traditional and digital channels and media outlets, the campaign will reach diverse population groups ranging from rural, low-literacy

	households to digitally connected youth while reinforcing consistent key messages across all media. Contracts for radio, TV, and digital advertising will secure broadcast airtime and digital placement packages to guarantee high-frequency exposure and sustained visibility. The campaign will be disseminated through a mix of channels such as for example radio, community theatre, printed materials, and online platforms, with local partners such as the Red Cross and municipal authorities supporting regional rollout and logistics (see 4.2 for more details). To ensure evidence-based adaptation, structured monitoring and evaluation cycles will be conducted annually using the monitoring tools developed under 4.2.1.3. Local research institutions will assess geographic and demographic reach, message recall, and behavioural impact. Their findings will feed into annual synthesis reports and lessons-learned reviews, ensuring that campaign content, formats, and delivery channels remain relevant and inclusive. In addition, a rapid-response communication mechanism will be maintained in coordination with the EWS (1.3.2). When alerts are issued for CSHO or extreme climate events, pre-produced radio and SMS packages will be activated immediately to deliver actionable messages at national scale. Through these combined efforts, this sub-activity will ensure that national climate-health communication remains continuous, adaptive, and responsive, bridging large-scale visibility with local resonance and behavioural impact.
Deliverables	• 1 integrated campaign in the targeted areas completed (Q3/Year 5)
Key institutions involved	Multipliers (CHWs, teachers, religious leaders, CSOs from 4.2.2): Act as community amplifiers and listening group facilitators, collect audience feedback. ANAMET & MSHPCSUA: Provide data on climate triggers and health alerts for integration into campaign updates and EWS responses. Local research institutions (e.g., WASCAL- UoL): Conduct annual impact evaluations and contribute to the lessons-learned report.

5.5 Eligibility Criteria

Table 36: Detailed eligibility criteria for interventions (Outputs 1–4)

Output	Activity	Sub-Activity	Eligibility Criteria
Output 1.1	1.1.1 Improve and expand coverage of the hydrometeorological network in underserved areas	1.1.1.1 Purchase and installation of automated weather stations and rain gauges	Criteria for sites: • Locations identified as low serviced areas in the targeted areas as identified by ANAMET • Sites meeting WMO standards • Secure land tenure, e.g. via an agreement (lease/ownership) from the public landowner • Positive result of FPIC process
		1.1.1.2 Repair and rehabilitation of existing AWS and rain gauges	Criteria for existing AWS: • Existing stations whose data are essential for the national grid • Repair costs must not exceed 60% of replacement value • Sites must be accessible for maintenance teams year-round Criteria for ANAMET maintenance teams: • Maintenance teams or contractors must demonstrate an absolute target of ≥40% female technicians in on-site technical repair protocols

	1.1.2 Enhance ANAMET's ability to manage automated meteorological data and maintain equipment	1.1.2.1 Establishment of decentralised unit in Kara	Criteria for ANAMET maintenance staff:
			• Selected ANAMET maintenance staff must have The ANAMET maintenance staff selected under this activity must have:
			  ◦ Proven technical competence in AWS and rain gauge installation, repair and calibration
			  ◦ Prior hands-on experience with preventive maintenance protocols
			  ◦ Availability for rapid deployment from the Kara hub to adjoining regions when needed

		1.1.2.2 Establishment of digital maintenance protocols and monitoring of hydrometeorological infrastructure	Criteria for ANAMET maintenance staff:
			• Selected ANAMET maintenance staff must have:
			  ◦ Direct involvement in routine or corrective maintenance of hydrometeorological equipment
			  ◦ Basic digital literacy (e.g. use of tablets/smartphones, data entry, photo upload)
			  ◦ Commitment to log 100% of interventions in the new digital system
			  ◦ Commitment to participate in >90% of training sessions

	1.1.3 Strengthen the capacities of ANAMET to provide	1.1.3.1 Capacity development and dissemination of climate and health bulletins	Criteria for trainees: • Technical staff from ANAMET and MSHPCSUA with demonstrated role in routine production, validation, or use of climate, health, or surveillance data • Personnel directly involved in data analysis, surveillance, or communication

	climate services for health		• At least five (⩾ 5) staff members only from ANAMET’ s technical divisions (Agrometeorological, Synoptic, Climatological, Forecasting, and Instrumentation) will be trained on climate and health nexus science, risk communication, and the development of health and climate bulletins. • Technical staff from ANAMET and MSHPCSUA commit to participate in >90% of digital tool training sessions
		1.1.3.2 Strengthening of managerial, organisational, and intersectoral coordination capacities	Criteria for trainees: • Senior management within ANAMET with institutional role linked to intersectoral coordination (e.g. health, climate, civil protection, disaster risk management) or decision-making (planning, budgeting, or human resource allocation)

Output 1.2	1.2.1 Strengthen governance structures to foster an enabling environment for surveillance	1.2.1.1 Conduct a data landscape analysis and institutional mapping	Criteria for trainees:
			• Trainees must be:
			  • Data managers from MSHPCSUA (2 persons), ANAMET (2 persons), ANPC and/or GIZ (2 persons)
			  • Personnel directly involved in data sharing, interoperability, or system integration processes (e.g. DHIS2, met data platforms, EWS)
			  • Committed to participate in >90% of training sessions

		1.2.1.2 Strengthening the institutional set up	Criteria for trainees:
			• 10 data managers and technical staff must have:
			  • Formal roles in implementation, oversight, or application of SOPs within the institution
			  • Direct involvement in data analysis and integration
			  • Commitment to participate in >90% of training sessions

		1.2.1.3 Strengthening collaboration mechanisms	Criteria for trainees:
			• 10 stakeholders from government institutions that have formal mandates to share, validate, or use data across institutions contributing to DHIS2. Stakeholders must have:
			  • Direct involvement in data analysis and integration
			  • Commitment to participate in >90% of training sessions

		1.2.1.4 Technical interoperability architecture and assurance	N/A

	1.2.2 Leverage integrated surveillance data to create CSHO-specific models	1.2.2.1 Establish academic exchanges and partnerships	Criteria for Universities:
			• Eligible Universities must have:
			  • Research capacity and demonstrated institutional mandate and experience in either climate science, public health, or climate–health research
			  • Institutional commitment to formal partnership agreements (MoUs) covering roles, data sharing, and outputs
			  • 6 faculty members of selected Universities with proven research record on the field
			  • Institutional commitment to contribute to joint publications, curricula, or training modules
			  • Faculty members must have commitment to participate in >90% of training sessions

		1.2.2.2 Strengthen weather-health modelling capacities	Criteria for trainees:
			• 5 professionals from MSHPCSUA and selected Universities must have:
			  ◦ Demonstrated hands-on experience with quantitative analysis, modelling, or advanced data analysis
			  ◦ Commitment to participate in >90% of training sessions

		1.2.2.3 Enhance interpretation and application of models in real-world settings	Criteria for trainees:
			• Health partners MSHPCSUA and selected Universities (4 persons) must have:
			  ◦ Training or experience to conduct model assessment and adaptation
			  ◦ Direct responsibility for using modelling outputs in policy, planning, or operational decision-making OR prior exposure to epidemiological, climate, or impact models (user or analyst level)
			  ◦ Commitment to participate in >90% of training sessions

		1.2.2.4 Strengthen AMR data integration into surveillance systems	N/A
		1.2.2.5 Develop scale-up roadmap for climate and weather-health modelling	N/A
Output 1.3	1.3.1 Strengthen operational arrangements to implement warning services delivery	1.3.1.1 Establishing the governance framework for Health Early Warnings	N/A
		1.3.1.2 Defining thresholds and integrating data for health alerts	N/A
		1.3.1.3 Developing the digital platform for health alerts	N/A

		1.3.1.4 Building capacity and ensuring sustainability of the health EWS	Criteria for trainees:
			• 120 staff of MSHPCSUA, ANAMET, ANPC and selected Universities at national and regional level must have:
			  ◦ Involvement in routine health surveillance, meteorological forecasting, or disaster risk management coordination
			  ◦ Commitment to participate in >90% of training sessions

	1.3.2 Deliver warning messages through multiple communication channels	1.3.2.1 Co-developing a practical communication approach for Togo's EWS	N/A
		1.3.2.2 Strengthening community capacity to understand and act on early health warnings	Criteria for trainees: • 500 CHWs, community leaders, teachers, local radio hosts and volunteers must have: ◦ Demonstrated experience in public awareness campaigns

			• Ability to disseminate information to at least 50 households each • Commitment to participate in >90% of training sessions
Output 2.1	2.1.1 Establish a CCU dedicated to health and climate change issues within the MSHPCSUA	2.1.1.1 Formal establishment of the CCU	Criteria for Climate Change Unit (CCU) staff: • Selection of newly appointed personnel must ensure ≥ 50% women • Institutional staffing decree must reflect ≥ 10% women in leadership positions

		2.1.1.2 Capacity strengthening of the CCU	Criteria for trainees:
			• 25 staff of MSHPCSUA must have:
			  • Current assignment to, or formal designation supporting, Climate Change Unit (CCU) mandates
			  • Commitment to remain in post for at least 2 years post-training
			  • Commitment to participate in >90% of training sessions
			• ≥50% of the trained CCU staff and 10% of those in decision-making/leadership positions must be women

		2.1.1.3 Operational and strategic partnerships	N/A
		2.1.1.4 Provision of equipment and material resources for the CCU	N/A
	2.1.2 Establish 5 CCUs in the Regional Directorates for Health	2.1.2.1 Institutional setup and operationalisation of Regional CCUs	Criteria for Regional Climate Change Units (RCCUs) staff: • 5 CCUs established through legal documents, with the formal assignment of personnel across these units comprising an absolute target of ⩾30% women • ⩾ 1 of the 5 regional CCUs will be headed by a woman from the assigned personnel, with the required technical, managerial, and leadership skills

		2.1.2.2 Capacity development and technical support	Criteria for trainees:
			• 15 staff of MSHPCSUA must have:
			  • Current assignment to, or formal designation supporting, RCCU mandates
			  • Commitment to remain in post for at least 2 years post-training
			  • Commitment to participate in >90% of training sessions

		2.1.2.3 Provision of operational tools and equipment	N/A

	2.1.3 Strengthen national and sub-regional coordination, knowledge, and	2.1.3.1: Strengthening MSHPCSUA and CCU's strategic engagement in national multi-sectoral platforms through institutional mapping, role clarification, and technical support	Criteria for trainees:
			• 15 staff of MSHPCSUA trained on technical and managerial topics must include:
			  • Designated CCU staff members, or active participants in the One Health Platform or in the National Adaptation Committee
			  • Commitment to participate in >90% of training sessions

	learning mechanisms	2.1.3.2: Organisation and/or participation in inclusive national, regional, and international conferences, negotiations and fora	Criteria for participants: • Official nomination by MSHPCSUA, CCU, or RCCU confirming relevance to institutional mandates • Gender-responsive selection ensuring equitable access to visibility and leadership opportunities
		2.1.3.3 Promotion of regional knowledge exchange and joint learning	Criteria for trainees: • Trainees much have official nomination by MSHPCSUA, CCU, or RCCU confirming relevance to institutional mandates • Trainees must commit to participate in >90% of training sessions
Output 2.2	2.2.1 Develop and implement climate and health training programmes	2.2.1.1 Develop a Climate and Health Master's programme	Criteria for Universities: • University with public health or climate change academic programmes • Commitment to accredit and continue programme after project end • Universities must implement an admission/retention strategy including ≥ 4 gender-responsive measures (e.g., mentoring, flexible admission, or financial aid)
		2.2.1.2: Adapt curricula by integrating climate change and health	Criteria for curricula: • Curricula in the School for Medical Assistants, National Schools for Medical Auxiliaries and National Schools for Midwives • Training sessions delivered to teaching personnel of the above selected schools with formal mandate to teach, revise, or coordinate pre-service or in-service curricula in the selected schools • Teaching personnel commit to participate in >90% of training sessions
		2.2.1.3: Promote intersectoral and participatory research on climate and health, encouraging collaboration between academic, governmental, and community actors.	N/A
		2.2.1.4 Support for research proposal submissions	Criteria for researchers: • 80 researchers in the climate and health nexus with formal affiliation with an eligible institution (Universities, training schools, or MSHPCSUA) • Researchers from Universities supported in Component 1 and 2 activities, School for Medical Assistants, National Schools for Medical Auxiliaries and National Schools for Midwives, MSHPCSUA • Basic skills in research design, methodology, and academic writing (or commitment to strengthen them) • Trainees commit to participate in >90% of training sessions
	2.2.2 Build technical capacities of key actors in the health sector	2.2.2.1 Developing innovative blended learning formats	Criteria for trainees: • 30 trainers of trainers with formal role as trainer, supervisor, or mentor • Previous experience or training in climate and health nexus, experience or training in training • Previous experience in adult learning, facilitation, or community-based training

			• Trainees commit to participate in >90% of training sessions • Selection of trainers must ensure an absolute target of ≥ 30% women (minimum 9 out of 30 trainers)
		2.2.2.2 Training national and regional health personnel	Criteria for trainees: • 150 national and regional health personnel of MSHPCSUA trained covering all targeted areas with current assignment to national, regional, or district health structures in targeted areas • National and regional health personnel of MSHPCSUA commit to participate in >90% of training sessions
		2.2.2.3 Training of community health workers	Criteria for trainees: • 150 community health workers covering all targeted areas • Active deployment as community health workers in the targeted areas • Regular interaction with households and vulnerable groups for health promotion or surveillance • Community health workers commit to participate in >90% of training sessions • Active recruitment and priority selection of female personnel must be applied to ensure equitable representation, aiming for an absolute target of ≥30% female participation in the cohort
Output 3.1	3.1.1 Improve health infrastructures to increase resilience (water-related, heat-related, vector-related health outcomes)	3.1.1.1: Consolidation of infrastructure norms and co-revision of health facilities master plans	Criteria for trainees: • Trainees must be technical personnel and Health Facility (HF) managers (15 persons) and technical personnel from the Regional Departments of the MSHPCSUA (10 persons) covering the targeted areas • Authority to contribute to or validate master plans and infrastructure investment decisions • Trainees must commit to participate in >90% of training sessions
		3.1.1.2 Assessment and selection of health facilities	Criteria for the HFs: • Service demand (number of expected and actual births, number of annual patients), • Regional coverage (up to ten centres in Savanes, Kara, and Centrale) • Climate vulnerability (extreme temperatures, flooding, malaria, diarrhoea, heat-related deaths) • Accessibility and security (excluding conflict-affected/ red zones as determined by GIZ Risk Management Office) • Absence of overlapping donor investments in infrastructure • Secure land tenure (lease/ownership) • Presence of schools and markets nearby with land-use and water-usage rights by the state or community (to maximise impact of WASH activities) • Sludge treatment availability (distance to existing sludge treatment plants, available public land for local sludge treatment facilities) • Availability of adjacent public land (minimum 200m² for extensions) • Facility size • Technical soundness of buildings and sites (e.g. uncontaminated, not flood-prone) • Condition and structural soundness of infrastructure • Positive result of FPIC process

		3.1.1.3 Capacity building on construction techniques and resilience measures	Criteria for trainees: • Trainees are local construction workers or inhabitants willing to integrate into the construction market (up to 15 persons per site) • Female workers and inhabitants are explicitly encouraged to participate. Trainees must commit to participate in >90% of training sessions
		3.1.1.4: Rehabilitation of health facilities and construction of resilient maternity blocks in USP-I and 2	N/A
		3.1.1.5 Procurement of health facility equipment	N/A
	3.1.2 Maintain health infrastructures to increase resilience	3.1.2.1 Strengthening gender transformative professional training and in-service training	Criteria for trainees: • Selection based on educational performance and residence in targeted areas • 50 HFs supported covering all three targeted areas • Biomedical technician students and HF staff commit to participate in >90% of training sessions • Active recruitment of female students, supported by target awareness-raising campaigns, aiming for an absolute target of ≥25% female participation
		3.1.2.2 Strengthening partnership engagement for maintenance	N/A
		3.1.2.3: Support gender transformative and climate-sensitive operationality of maintenance in the health facilities	Criteria for HFs: • HFs with maintenance plan and responsibilities for medical and non-medical equipment • Designated maintenance focal points (including female staff where available) formally assigned by facility management
		3.1.2.4: Support digitalisation of maintenance processes	Criteria for trainees: • 20 principal and 100 regional MSHPCSUA users • Priority in of users in the targeted areas • Basic digital literacy (use of tablets/smartphones, data entry, photo upload) • Principal and regional MSHPCSUA users commit to participate in >90% of training sessions
		3.1.2.5 Support financing for the Regional Maintenance Fund	Criteria for trainees: • 75 MSHPCSUA staff members trained (45 regional and 30 prefectures level) • Priority in of users in the targeted areas • MSHPCSUA staff commit to participate in >90% of training sessions
Output 3.2	3.2.1 Strengthen cold chains for vaccines, climate-	3.2.1.1 Survey and strengthen cold chain & energy infrastructure	Criteria for HFs: • HFs selected for support under activity 3.1.1 • HFs with high service demand based on MSHPCSUA records • No overlapping or recently completed donor-funded cold chain or energy investments

	sensitive medicines and diagnostics	3.2.1.2: Improving cold chain transport and distribution of medical products	Criteria for HFs: • HFs selected for support under activity 3.1.1 • HFs with high service demand based on MSHPCSUA records • No overlapping or recently completed donor-funded cold chain or energy investments
		3.2.1.3 Support to national e-LMIS roll-out	Criteria for trainees: • 75 MSHPCSUA staff members with functional responsibility for logistics, warehousing, stock management, or distribution of health commodities • Priority in of users in the targeted areas • Commitment to remain in post for at least 2 years post-training • MSHPCSUA staff commit to participate in >90% of training sessions
	3.2.2 Strengthen surveillance and monitoring of climate-sensitive health outcomes	3.2.2.1 Extension of epidemiological sentinel sites (Malaria)	Criteria for epidemiological sentinel sites: • 15 new epidemiological sentinel sites in the targeted areas that cover high-burden or climate-sensitive malaria transmission zones • Area selection based on demonstrated gap on surveillance data that lead to improvements in the epidemiological modelling • Sites contribute to a balanced spatial distribution within the three target regions • Ability to integrate data into existing national systems (e.g., DHIS2) Criteria for trainees: • 60 MSHPCSUA health professionals trained on malaria surveillance • Commitment to remain in post for at least 2 years post-training • MSHPCSUA health professionals commit to participate in >90% of training sessions • Active recruitment and priority selection of female personnel must be applied to ensure equitable representation, aiming for an absolute target of ≥30% female participation in the cohort
		3.2.2.2: Expansion towards entomological and parasitological sentinel sites for malaria	Criteria for entomological and parasitological sentinel sites for malaria: • 6 entomological and parasitological sites are selected based on demonstrated gap on surveillance data that leads to improvements in the epidemiological modelling • Sites are co-located with, or directly linked to, selected epidemiological sentinel sites to enable integrated analysis of epidemiological, entomological, parasitological, and climate data, thereby strengthening surveillance and early warning capacities. • Sites address critical gaps in entomological and parasitological data (e.g., vector density, species composition, insecticide resistance, parasite prevalence) • Availability of minimum infrastructure and trained personnel for entomological and parasitological sampling and analysis (e.g., mosquito collection, identification, resistance testing, parasite diagnostics.
		3.2.2.3: Expansion towards climatological sentinel sites for diarrhoeal diseases	Criteria for climatological sentinel sites for diarrhoeal diseases: • 6 climatological sentinel sites selected based on demonstrated gap on surveillance data that leads to improvements in the epidemiological modelling

			• Sites are co-located with, or directly linked to, selected epidemiological sentinel sites for diarrhoeal diseases to enable integrated analysis of health, climate, and environmental data. • Located in areas where climatic factors such as rainfall variability, flooding, temperature, and water availability are known to influence diarrhoeal disease incidence. Criteria for trainees: • 20 MSHPCSUA health personnel or ANAMET technical staff trained • Staff located in the selected areas or willing to be posted in these areas • Commitment to remain in post for at least 2 years post-training • MSHPCSUA health personnel or ANAMET technical staff commit to participate in >90% of training sessions • Active recruitment and priority selection of female personnel must be applied to ensure equitable representation, aiming for an absolute target of ≥30% female participation in the cohort
		3.2.2.4 Pilot of fever clinics in sentinel sites	Criteria for fever clinics: • 15 fever clinics established and equipped in sentinel sites selected based on demonstrated gaps in surveillance data that leads to improvements in the epidemiological modelling • Located in areas with high burden of febrile illnesses (including malaria and climate-sensitive diseases) and significant gaps in early case detection and reporting. • Availability of basic health facility infrastructure, trained staff (or potential for training), and capacity to implement standard case definitions, diagnostics, and reporting. • Ability to report data through national systems (e.g., DHIS2) Criteria for trainees: • 60 MSHPCSUA health personnel trained • Staff located in the selected areas or willing to be posted in these areas • Commitment to remain in post for at least 2 years post-training • MSHPCSUA health personnel commit to participate in >90% of training sessions • Active recruitment and priority selection of female personnel must be applied to ensure equitable representation, aiming for an absolute target of ≥30% female participation in the cohort
		3.2.2.5: Strengthening of monthly data quality reviews and reporting at district and regional levels	Criteria for health districts: • 6 health districts with sentinel sites supported in data improvement selected based on demonstrated gaps in surveillance data that leads to improvements in the epidemiological modelling • Not currently being supported by another donor for similar data improvement activities Criteria for trainees: • 30 MSHPCSUA and ANAMET data managers trained on Electronic Data Quality Review (eDQR) including focal point • Staff located in the selected areas or willing to be posted in these areas

			• Mandatory provision of one female-only training session for women staff of ministerial data units (DSNISI) to build leadership and confidence
	3.2.3 Strengthening diagnostics and treatment of climate-sensitive health outcomes	3.2.3.1: Institutionalise diagnostics and strengthen laboratory systems for climate-sensitive health outcomes	N/A
		3.2.3.2: Strengthening access to essential medicines and preventative services	N/A
		3.2.3.3 Regional access to essential climate-relevant medicines	Criteria for health facilities: • 10 HFs among intervention sites in 3.1.1 or 3.2.2 • Presence of trained or designated pharmacy / stock management personnel at facility level
	4.1.1 Improve community infrastructures to be more resilient	4.1.1.1 Rehabilitate water supply systems in schools	Criteria for schools: • 15 schools in communities selected for health infrastructure improvements under Activity 3.1.1 • Absence of overlapping donor investments in infrastructure • Secure land tenure (lease/ownership) • Facility size • Technical soundness of buildings and sites (e.g. uncontaminated, not flood-prone) • Condition and structural soundness of infrastructure • Positive result of FPIC process
		4.1.1.2 Implement improved sanitation facilities in schools	Criteria for schools: • same schools as in 4.1.1.1 Criteria for trainees (DEWATS) • Stakeholders involved in the construction and monitoring of the DEWATS facilities (contractors and relevant intuitional actors)
		4.1.1.3: Build capacity for WASH infrastructure management in schools	Criteria for schools: • Staff in the 15 schools supported in sub-activity 4.1.1.1 and 4.1.1.2 Criteria for school trainees: • Supported school staff and relevant maintenance personnel with formal designation as WASH focal points or members of school management / maintenance committees, who commit to participate in >90% of training sessions • Prioritization of women-led or women-managed enterprises/groups, where feasible
		4.1.1.4: Promote WASH innovations for community behaviour change	Criteria for Sanimarkets: • 15 distribution points in the communities selected for health infrastructure improvements under Activity 3.1.1 demonstrating potential for awareness-raising and marketing of sanitation and hygiene products

			Criteria for participants: • Local sellers directly linked to the selected distribution points. • Prioritization of women-led or women-managed enterprises/groups, where feasible
	4.1.2 Strengthening community engagement and local government capacity	4.1.2.1: Pilot innovative and environmentally safe anti-larval interventions	Criteria for trainees: • 30 local providers covering all targeted areas with demonstrated technical capacity to produce and install mosquito screens • Local providers involved in producing and installing mosquito screens commit to participate in >90% of training sessions Criteria for local HF committees: • Local HF committees must be composed of ≥20% women and ≥10% local community representatives
		4.1.2.2: Development or updating of communal hygiene and sanitation plans incorporating malaria prevention and control	Criteria for area targeted: • 8 municipalities currently supported by ProSanté III • Commitment of municipal leadership to formally adopt and implement revised plans Criteria for trainees: • 80 municipal staff (10 per municipality) trained in integrated planning • Municipal staff within hygiene and sanitation related positions • Municipal staff commit to participate in >90% of training sessions • Local HF committees must be composed of ≥20% women and ≥10% local community representatives
		4.1.2.3.: Strengthening communal coordination of health, sanitation, and vector control interventions	Criteria for local HF committees: • 15 local HF committees in the communities supported under Activity 3.1.1 Criteria for trainees: • Trainees from Community leaders, teachers, local radio hosts, and volunteers • Local HF committees must be composed of ≥20% women and ≥10% local community representatives • Trainees commit to participate in >90% of training sessions • Active recruitment and priority selection must be applied to ensure the training cohort reflects the committee composition, aiming for an absolute target of ≥20% female participation in the training workshops
Output 4.2	4.2.1 Develop communication messages, tools, and channels	4.2.1.1: Evaluate and refine the SBC Strategy and toolkit	N/A
		4.2.1.2: Develop a translation and Communication Guide for climate-health concepts	Criteria for working group participants: • Co-design working group must include ≥1 woman, 1 local community representative, and 1 representative of persons with disabilities

		4.2.1.3: Evaluate, monitor impact, and adapt the SBC Climate and Health Strategy	N/A

	4.2.2 Strengthen the capacities of multipliers at community level	4.2.2.1: Develop and deliver localised training programs for community-level multipliers on climate–health risks	Criteria for ToT trainees:
			• ToT participants have demonstrated capacity to facilitate adult learning and participatory community training and proven ability to adapt technical content to local contexts and languages
			• ToT participants must commit to participate in >90% of training sessions
			• ToT participants must ensure an absolute target of ≥40% women (minimum 8 participants)
			
			Criteria for multipliers:
			• Multipliers must be CHWs, Community leaders, teachers, volunteers (500 persons) and must have:
			    • Active engagement in community outreach, education, or health promotion
			    • Regular access to households, schools, or community groups
			    • Ability to disseminate verified climate–health risk messages in local languages
			• Recruitment must result in a final pool of ≥125 women and ≥2 representatives per local community

		4.2.2.2: Develop and provide multipliers with tailored communication materials and tools to engage their communities	Criteria for targeted areas: • Distribution covering all targeted areas • Priority in areas with project interventions Criteria for multipliers: • Multipliers must be CHWs, Community leaders, teachers, volunteers • Multipliers must commit to participate in >90% of training sessions • The cohort of 500 multipliers must include ≥125 women and ≥2 people from each local community
		4.2.2.3: Coordinate and implement interpersonal communication campaigns through multipliers	Criteria for targeted areas: • 8 municipalities currently supported by ProSanté III • Priority in municipalities with additional project interventions
	4.2.3 Raise awareness through different communication channels	4.2.3.1: Storyboarding, production, and pre-testing of campaigns	N/A
		4.2.3.2: Nationwide rollout, monitoring, and adaptive feedback	N/A

5.6 Options Analysis

The project will support several interventions in terms of equipment, infrastructure and adopted technology. The selection of the interventions and specific options have been informed by the climate rationale of the project, national and international norms and guidelines, and have been assessed based on their feasibility on installation, operation, and sustainability. The following table demonstrates that the interventions selected are based on credible analysis of alternatives, avoid maladaptation risks, and represent the best fit under the Togolese climate, sectoral needs, and institutional context.

Table 37: Options analysis

Infrastructure interventions	
Measures	Selection informed by:
Health facilities (HFs)	
Earthworks & rainwater drainage: • The objective: to eliminate stagnation and protect the underpinning. • Cleaning of the surroundings, minimal reprofiling of the slopes (≥ 2% outwards). • Temporary building foot ditches + cleanliness tiles at the entrances. • Installation of gutters + downspouts to masonry gutters or drainage trenches (gravel bed + geotextile). • Creation of peripheral protective sidewalks (≥ 60 cm, slope 1–2%). • Infiltration basin / vegetated valleys at the low points of the site. **Structural works & structure:** • The objective: stabilise, repair, and prevent structural issues. • Crack assessment (mapping, plaster monitoring). Seal non-structural cracks (mortar + resin). • Localised shoring in case of localised settlement (safety measure). • Repair structural cracks (epoxy/grout injection, stainless-steel stitching). • Repair sunken soils/floors (re-compaction / ground beams). • Local reinforcement (stiffeners, horizontal/vertical ties) based on the diagnostic assessment.to diagnosis. **Waterproofing & roofing:** • The objective: to eliminate infiltration and secure the roof. • Replacement of perforated sheets, fixing of ridges, and repair of visible leaks. • Anti-rust treatment of exposed steel joinery. • Revision of wooden frames (purging of rotten parts, wood-boring treatment, reinforcements). • If concrete slab: waterproofing (bituminous/polyurethane layer + lifts). • Standardisation of roofs (thick Alu/Alu-zinc sheet ≥ 0.5 mm) + under-roof insulation (reflective films). **Walls (types & pathologies):** • The objective: to restore the integrity and durability of the walls.	Desk research: • Togo Health Standards | Volume 1, 2013 • Health System Resilience to Climate Change (WHO, 2021) • Project relevant documents Diagnostic forms On-site data collection: • Field surveys • Collection of metric and ambient parameters • Digitalisation and compilation of field data • Focus groups Needs studies Please see Annex 2c. Construction report for more details.

- Stripping wetlands/saltpetre, local haircuts when possible.
- Filling of micro-cracks (hydraulic coating + water repellent).
- Water-repellent exterior coatings + mud flaps on the bare supports.
- Washable interior paints in maternity wards/MG (sanitary class).
- Occasional replacements of altered agglomerations + upgrading of chains.

Exterior joinery (doors/windows), mosquito nets:

- The objective: to secure, ventilate, and protect against vectors.
- Installation/retention of mosquito nets on all windows of the treatment/maternity rooms.
- Adjustment of hinges/locks, sealing of the days.
- Standardisation of installation: steel/aluminium windows with thermal break "with slats + mosquito net;" marine-varnished metal/hardwood doors.
- Integration of high/low ventilation grilles (mosquito net profile).
- Replacement of the dilapidated sash blocks; diffused lighting in the corridors.

Interior ceilings:

- Objective: cleanliness, safety, acoustic/thermal comfort.
- Immediate: purge of wet patches, antifungal treatment.
- Washable PVC/HPL false ceilings in maternity wards/treatment rooms; technical traps.
- Sound insulation in waiting areas, if required.

Coverings (floors & walls):

- Objective: hygiene, resistance, ease of maintenance.
- Immediate: repair of damaged joints, patching of dangerous areas.
- Non-slip floors (R10 min) in the maternity ward, sanitary facilities, patient circuits; Raised skirting boards.
- Earthenware wetland walls (≥1.2 m); PU resin in sensitive premises.

Ventilation & thermal comfort:

- The objective: to reduce heat and odours, and to improve patient comfort.
- Immediate: ceiling fans/foot in maternity ward & after childbirth.
- Cross ventilation (opposite openings), low consumption extractors in sanitary facilities; Silent air fans.
- Ventilated roof or double roof.
- Reflective films/clear roofing; Targeted air conditioning (delivery room) with maintenance protocol.

Accessibility for people with reduced mobility & patient pathways:

- The objective: universal accessibility and a step forward.
- Temporary ramps ≤ 5% on critical accesses; clear signage.
- Compliant ramps (slope ≤ 8%, landing/length, guardrails), PRM sanitary facilities (2 pilot sites first).

• Separation of GP/Maternity flows; Near women's toilets – suite of diapers (≤ 5 m). **Waterproofing (walls/slabs) & associated pathologies:** • The objective: to cut off rising humidity and infiltration. • Immediate: local rework (PU putty, mud flaps). • Waterproofing facades, anti-capillary barriers (injection if feasible). • Waterproofing of roof terrace slabs (membrane + lifts), annual checks. **Wastewater & waste management (WASH Top-Up):** • Objective: hygiene, control of infectious risks. • Sorting at source (3 color-coded bins), securing sharp objects. • Dirty/clean circuit materialised; ban on open burning; Pit/incinerator improvement (refractories). • Mini station (settling, filter), if volumes justify it. **Energy management:** • The objective: to improve energy efficiency and reduce the carbon footprint of USPs. • Installation of renewable energy systems (solar panels, solar water heaters) to power essential equipment. • Implementation of energy management systems to optimise electricity consumption. • Use of insulating materials in construction to reduce heating and cooling requirements. • Raising awareness of the rational use of energy for staff and users.	
Schools	
Water infrastructure: • Construction or rehabilitation of boreholes by integrating a solar submersible pump in each establishment, market, or USP concerned by the project. • Construction of the support (superstructure) in reinforced concrete or steel structure on which a polyethylene tank will be placed. • Provision a photovoltaic field for the energy supply of the pump to be installed above the tank to avoid acts of vandalism on the installations. • Installation of water piping from the tank to the WASH structures. **Sanitation:** • Demolition and replacement with planting of trees on the previously backfilled pit. • Construction of new sanitary blocks with septic tanks and drainable sump sized according to the size of the school and the market, considering their evolution over time. The sanitary block to be built will consider the gender and Persons with Reduced Mobility (PRM) aspect and will be set up so that teachers have a view of the entire structure, as far as the schools are concerned. • Installation of toilet bowls and toilet seats that offer a good, resilient option that is accepted by users. **Hygiene:** • Construction of masonry and the installation of handwashing devices near the toilets connected to the water from the borehole on the one hand, and in front of the classrooms on the other hand	

• Maintenance of handwashing facilities currently available in schools by strengthening the maintenance system. • Provision menstrual hygiene facilities in all girls' or women's booths in each school involved in the project.	
Faecal sludge management: • Decentralised faecal sludge treatment system (DEWATS) that will come from the built pits. The DEWATS system consists of a Decanter with Anaerobic Filter and Plantine Bed.	
Household vector control: • Identification of mosquito entry points • Installation of metal screens or screens on doors and windows to limit the intrusion of insects. Treat high openings and ventilation in particular. • Correction of construction defects: Interventions at the junctions between the roof and the walls to eliminate uncontrolled passages. • Installation of ceilings to reduce direct exposure to insects and, at the same time, improve indoor thermal comfort. • Improved ventilation: Optimisation of natural ventilation through well-oriented and protected openings (cross ventilation).	
Equipment interventions	
Hydromet installation: • Automated Weather Stations • Rain gauges	Desk research: • MIT, DGMN (2018): National action plan for the implementation of the NFCS in Togo. • MIT, DGMN (2022): Communication strategy accompanied by a DGMN action plan for the operationalisation of Togo's NFCS. • MTRAF, ANAMET (2023) Public-private engagement strategy of the National Meteorology Agency of Togo (2024-2028). • SAP048 Strengthening the resilience of vulnerable communities within high climatic and disaster risk areas in Togo. • WMO (2023). *Guide to instruments and methods of observation (WMO-No. 8).* Stakeholder Engagement: • ANAMET • ANPC • BOAD
Cold chain & logistics: • Deployment of solar direct-drive refrigerators/freezers and voltage stabilisers for vaccine storage. • Installation of hybrid solar-electric systems (PV + inverter-battery) in district cold chain rooms. • Provision of cold chain backpacks for community outreach and refrigerated vans for bulk transport. • Procurement of electric motorcycles for low-emission last-mile delivery.	Desk research: • Togo Health Standards | Volume 1 (2013). • WHO, (2021): Health System Resilience to Climate Change. • Project relevant documents. Stakeholder Engagement:

	• MSHPCSUA • HF staff • ProSanté III
Diagnostic & medical equipment: • Equipping peripheral laboratories with essential diagnostic instruments (microscopes, etc.) and reference laboratories with molecular testing equipment for surveillance.	Desk research • Togo Health Standards | Volume 1, 2013 • Health System Resilience to Climate Change (WHO, 2021) • Project relevant documents Stakeholder Engagement • MSHPCSUA • HF staff • ProSanté III

5.7 Exit Strategy and Sustainability

The project's exit strategy and long-term sustainability are grounded in robust institutional anchoring, strengthened national systems, and a phased transfer of responsibilities to national and regional authorities. Institutional ownership is firmly embedded through the project's support for the transition of the informal Climate-Health Task Force into a permanent CCU within the MSHPCSUA, complemented by the establishment of corresponding regional CCUs covering the entirety of the national territory. These units will receive formal legal status, permanent staffing and sustained budget allocations, ensuring durable technical and managerial capacity at both central and decentralised levels. Their mandate will include coordinating climate-health interventions, supporting evidence-based planning, and ensuring that national strategies are translated into locally appropriate actions.

In parallel, the H-EWS will be fully anchored within existing national institutions, with ANAMET responsible for climate data collection, analysis and the upkeep of hydrometeorological infrastructure; the MSHPCSUA managing data integration, platform hosting and epidemiological modelling; and the ANPC overseeing communication protocols and alignment with the national MHEWS architecture.

Financial sustainability is reinforced through the use of existing infrastructure and national systems. By building on the DHIS2 platform already operational in Togo, and on ANAMET's hydrometeorological network – whose long-term strategy is supported through complementary GCF investments – the project reduces the need for parallel systems and minimises recurrent costs. The integration of the new CCUs within MSHPCSUA's organisational structure ensures that their staffing and core functions are progressively incorporated into permanent budget lines, while the expansion of DHIS2 epidemiological forecasting capabilities strengthen the value of an already funded national asset.

To guarantee the continued functionality of physical investments, the project will establish an ANAMET maintenance centre in Kara with a digital maintenance management system and the tools necessary for timely inspection, servicing and repair of hydromet equipment. ANAMET will fully assume maintenance responsibilities for both physical and digital systems after a structured transfer process. HFs and community infrastructure will be supported under a twelve-month defects' liability period, after which responsibilities will shift to the relevant decentralised departments of the MSHPCSUA. The Ministry will likewise assume explicit responsibility for the upkeep of all equipment procured for the CCUs and HFs once implementation concludes. These arrangements ensure that maintenance is not dependent on temporary project structures but embedded within permanent institutional systems.

Long-term capacity strengthening is central to the sustainability strategy. A national scaling-up roadmap will draw on the evidence and operational insights generated during project implementation, providing a structured pathway for future investments such as the expansion of automated weather stations, the extension of sentinel surveillance networks, and the progressive integration of additional CSHO into predictive modelling. Technical and scientific capacity will be reinforced through targeted training of MSHPCSUA, ANAMET and WASCAL personnel in data management, integration, interpretation and epidemiological forecasting. Establishing a master's degree programme in Climate and Health at WASCAL will support the development of a domestic cadre of high-level specialists, reducing long-term dependence on external expertise. In parallel, training programmes in construction resilience, equipment maintenance and facility-level climate proofing will ensure that national professionals can implement and sustain climate-resilient norms for infrastructure and service delivery.

Sustainability at the community level is strengthened through the creation of a localised network of trained actors capable of sustaining behavioural and adaptive change. CHWs will be trained as climate-health multipliers, along with an expected 300 certified community-level agents who will support awareness raising, larval control measures, WASH promotion, and responsiveness to early warnings. This community-based structure will reinforce nationally led systems, ensuring that alerts translate into timely and appropriate action at household and village levels, long after the project concludes.

Through this combined approach — anchored institutions, sustained financing, durable maintenance systems, embedded technical capacity, and empowered communities — the project establishes the conditions for a long-term paradigm shift in how Togo anticipates, manages and responds to climate-sensitive health risks. The project is designed so that all investments have a clear institutional home, a credible financing pathway, and a defined mechanism for transfer, creating the conditions for the benefits of the intervention to endure well beyond the project's implementation period.

5.8 Project Logical Framework

For the detailed project logical framework, please refer to Section E.6 of the FP.

5.9 Project Budget and Source of Finance

Table 38: Budget breakdown

Component / Activity	**Total** (million EUR)	**GCF** (million EUR)	**BMZ** (million EUR)	**ANAMET** (million EUR)	**MSHPCSUA** (million EUR)
Component 1:					
Activity 1.1.	**4.082**	3.682	0.26	0.140	
Activity 1.2.	**1.568**	1.458	0.11		
Activity 1.3.	**1.435**	1.195	0.15		0.09
Component 2:					
Activity 2.1.	**4.146**	3.156	0.31		0.26
Activity 2.2.	**3.987**	2.637	1.03		0.08
Component 3:					
Activity 3.1.	**19.205**	12.375	2.52		4.31
Activity 3.2.	**4.602**	3.252	0.60		0.75
Component 4:					
Activity 4.1.	**5.051**	4.511	0.54		
Activity 4.2.	**3.454**	2.814	0.33		0.31
Project Monitoring	**0.943**	0.923	0.02		
PMC	**1.524**	0.994	0.53		
Contingencies	**0.603**	0.603			
Total	**50.6**			**13**	

5.10 Knowledge Management

5.10.1 Knowledge Strategy and Requirements

5.10.1.1 Foundational knowledge needs

The project requires a combination of cross-cutting and highly specific knowledge to support effective implementation and long-term impact.

Cross-cutting knowledge needs include data-related capacities covering weather, climate, and health data, including data collection methods; data quality checks (completeness, errors, inconsistencies); data integration across sectors and sources; data storage (servers, security, data protection, and access); data interoperability; data use for policy, decision-making, planning, and budgeting; and data dissemination. In parallel, strong communication-related knowledge is required, including IT software and hardware, communication technologies, and SBCC. Management, financial, and organisational knowledge is also needed to effectively steer processes within partner institutions.

More specific knowledge requirements relate to governance structures, including the establishment of a new entity on climate change and health within the MSHPCSUA and the management of partnerships across sectors and domains. Technical knowledge is required at multiple levels of the health system, including among health workers across the health pyramid and within academia. Infrastructure- and technology-related knowledge includes climate-resilient construction approaches, cold-chain tracking, supply and cold chain management, diagnostic capacities, mosquito screens for housing, and wastewater management. The project also requires expertise in maintenance and repair, including calibration and maintenance of weather and health infrastructure, as well as sustainable financing approaches for maintenance. Finally, community management knowledge is essential, including cooperation among community members, communal planning and coordination, and the integration of local and cultural knowledge.

5.10.1.2 Knowledge contributors and stakeholder roles

The project will collaborate with a wide range of stakeholders at local, regional, national, and sub-regional levels to generate, process, and disseminate knowledge. Health workers at community and facility levels, government partners, field technicians (including weather and maintenance specialists), NGOs, universities, and private sector actors will be capacitated with the necessary skills and knowledge. This approach enables these actors to communicate knowledge within their respective institutions and communities, creating a ripple effect of sustained knowledge-sharing beyond the project's direct interventions.

Key beneficiaries include CHWs, HFs staff, and district- and regional-level partner staff across the 16 target districts in the Centrale, Kara, and Savanes regions. National and regional government partners receiving capacity building include MSHPCSUA, ANAMET, ANPC, and other relevant ministries. Additional beneficiaries include NGOs and associations, academic institutions such as WASCAL and the UoL, and private sector partners operating in construction, WASH, supply chain, communication, transport, and other relevant fields.

5.10.2 Knowledge Products and Social Inclusion

5.10.2.1 Core knowledge products

The project will generate and support a diverse set of knowledge products. These include data products such as climate-health bulletins, EWS, risk maps, climate and vulnerability assessments, climate modelling applications, and visual guides. Governance-related products include a framework for the establishment and operation of a new government entity. Technical knowledge products include a master's programme, improved training programmes for health personnel, and e-learning modules. Infrastructure- and technology-related products include updated manuals integrating climate-resilient approaches, improved LMIS tools, pharmacovigilance guidelines, business models for wastewater management, WASH in Schools management frameworks, faecal sludge management concepts, and marketing strategies for innovative WASH products. Additional products include a financial framework for maintenance and community-level products such as communal hygiene plans, water quality reports, and integrated training manuals for CHWs. Products on communication include revised SBCC toolkits, glossaries, and translation guides.

5.10.2.2 Inclusive dissemination and local contextualisation

All outreach activities, trainings, workshops, and capacity-building events will be socially inclusive and tailored to local contexts, norms, and knowledge systems. To ensure relevance and accessibility, trainers will be selected from the target regions and will speak local languages. Community animators will also be required to speak local languages to strengthen community-level dissemination. Communication tools will be selected based on their effectiveness and appropriateness for the target audiences.

Special attention will be given to women of reproductive age, infants, children, people with disabilities, the elderly, and other vulnerable groups, as well as to local communities identified under the LCP. To reach these groups and leverage their knowledge, the project will collaborate with local actors and knowledge holders, including community leaders, established multipliers such as *Tantines, Club de mères, and Papa Champions*, village chiefs, local radios, religious and traditional authorities, traditional healers, and NGOs. Opportunities for collaboration with additional stakeholders, including CSOs, will be explored to enhance outreach. A participatory and inclusive approach will be applied, integrating local knowledge systems to strengthen community ownership and sustainability. Project staff and trainers will include both female and male representatives who will receive training on gender equality.

5.10.3 Integration and Sustainability

5.10.3.1 Mainstreaming through Multi-Level Platforms

The project's knowledge management approach will be linked to government-owned information systems, particularly within the health and communication/digitalisation sectors, at national, regional, and district levels. Where relevant, knowledge products will be disseminated through these systems. The project will also explore regional platforms, including those of ECOWAS and the AU (Output 2.1), and will use global platforms such as ATACH. Dissemination channels will be selected based on local ownership, with local partners actively involved in decision-making and capacitated to disseminate knowledge. Project progress will be closely monitored, documented, and disseminated through appropriate channels, including project descriptions, monitoring reports of adaptation activities, and knowledge products generated through implementation.

5.10.3.2 Long-term continuity of knowledge benefits

Knowledge sustainability will be ensured through strengthening the technical and institutional capacities of public partners at national and regional levels (Outputs 1.2, 1.3, 2.1, 4.1, 4.2). The project will build the capacity of private sector partners to enable continued collaboration with the health sector (Outputs 2.1, 3.1, 3.2, 4.1), and of decentralised NGOs to sustain local-level implementation (Outputs 2.1, 3.1, 3.2, 4.1). Continuous knowledge exchange between academia and other sectors will be facilitated (Output 2.2). Technical expertise among health workers and government officials will be strengthened, enabling them to act as long-term multipliers and advocates of CSHOs within their communities (Outputs 1.2, 2.1, 2.2, 3.1, 3.2, 4.1). Finally, the project will develop and disseminate durable knowledge products such as guidebooks, technical manuals, and training modules to ensure that CSHO approaches remain accessible and usable well beyond project completion (all Components).

6. Project Implementation

6.1 Organisational Structure and Implementation Arrangements

6.1.1 Legal and Contractual Agreements

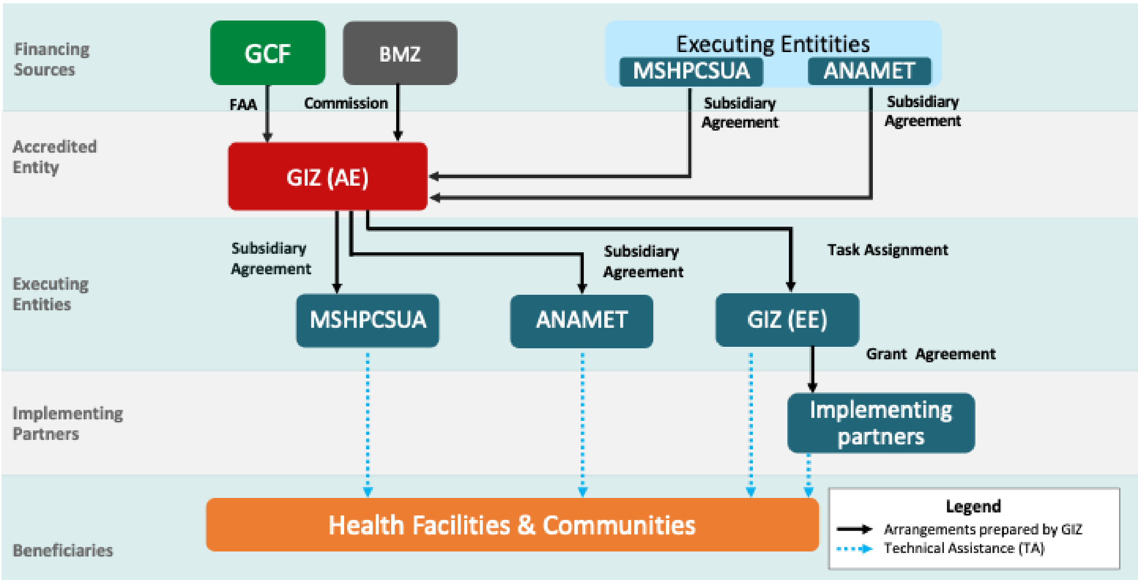
6.1.1.1 Role of GIZ as Accredited Entity (AE)

In its capacity as an AE, GIZ will assume oversight responsibility of the project, as defined in the Accreditation Master Agreement (AMA) between the GCF and GIZ. GIZ will administer project proceeds on behalf of the GCF and will provide oversight, guidance, and quality assurance of ANAMET and MSHPCSUA as EEs through its relevant head office units, as well as accompany monitoring and ensure regular reporting.

To implement the project, GIZ will enter the following legal arrangements (see *Figure 56*):

- The commission by the German Federal Ministry for Economic Cooperation and Development (BMZ) to implement the GCF project.
- The Funded Activity Agreement (FAA) between GCF and GIZ as the basis for the transfer of GCF proceeds to GIZ.
- Grant agreement (i.e. subsidiary agreement) with MSHPCSUA and ANAMET (as EEs) based on GIZ's standard operating procedures for grant agreements.
- The grant agreements will also secure the co-financing of the Government of the Togolese Republic channelled through MSHPCSUA and ANAMET.
- An internal task assignment from GIZ AE to GIZ EE for the implementation of the project.
- Cooperation and grant agreements with other partners as required for the implementation of the project activities.

Figure 56: Legal arrangements



6.1.1.2 Role of GIZ as an EE

GIZ has been operating in Togo since 2012 and currently employs approximately 286 staff members, most of them being Togolese nationals. GIZ technical assistance in the four sectors amounts to EUR 352 million (2012-2025). In its capacity as an EE, GIZ will lead and provide overall management of the TA to the Project at the national and sub-national levels. It will be responsible for:

- Managing the project budget of GIZ (EE);
- Liaising with the GIZ Togo Office based in Lomé regarding budget and finances, monitoring and reporting, staff and appraiser contracts;

- Reporting to BMZ regarding the Ministry's financial contributions to the project, as well as the overall progress of project implementation;
- Coordinating project implementation with the co-financing development partners and their projects and counterparts, as well as other donors and projects operating in the same technical and/or geographical area;
- Liaising with, and reporting to, line ministries involved in the Project and the GCF NDA in Togo, the Ministry of Environment, Forest Resources, Coastal Protection, and Climate Change (*Ministère de l'Environnement, des Ressources Forestières, de la Protection Côtière et du Changement Climatique* – MERFPCCC);
- Establishment and management of the national Project Management Unit (PMU), as well as the management of regional PMUs;
- Concluding cooperation and grant agreements with other partners as required.

6.1.1.3 Other Executing Entities

The following Ees have also been selected because of their comparative advantages and experience for implementing specific works relevant to responsible activities. GIZ, as the AE, conducted a thorough enhanced due diligence assessment with all EEs which will receive GCF proceeds. The enhanced due diligence also assessed and ensured the legal personality of the Ees to enter into a legally binding agreement with GIZ and their ability to receive and properly manage funds.

- **Ministère de la Santé, de l'Hygiène Publique, de la Couverture Sanitaire Universelle et des Assurances (MSHPCSUA)** will act as EE for activities for which it has the mandate and/or proved to have a comparative advantage. MSHPCSUA will co-chair the Project Steering Committee (PSC) and will be responsible for the overall multisectoral coordination between the relevant ministries. MSHPCSUA will play a leading role in project delivery and will act as the EE for some of the activities under all components of the project.
- **Agence Nationale de la Météorologie (ANAMET),** the national meteorology agency, will act as EE for activities for which it has the mandate and/or proved to have a comparative advantage. ANAMET will be a member of the PSC. ANAMET will play a leading role in project delivery and will act as the EE for some of the activities under Component 1.

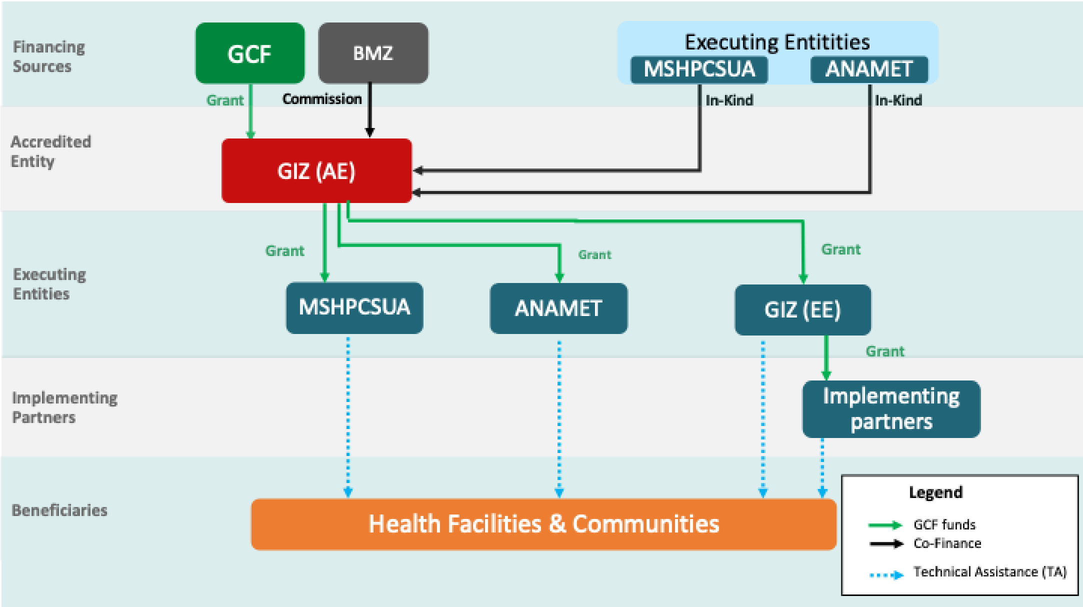
6.1.2 Flow of Funds

GCF–GIZ: GCF proceeds will be forwarded to GIZ as the AE, which will have legal and financial fiduciary responsibility for the implementation of the project. GIZ will lead the PMU and ensure the implementation of the transfer of funds to the EEs and the monitoring and evaluation of activities. The GCF and GIZ will enter a FAA, under which GIZ shall administer the relevant GCF proceeds to be used for the financing of the project, in accordance with the FAA and AMA. Accountability on the use of financial resources will be facilitated through the review of annual and bi-annual project reports, as well as through audit and monitoring reports.

GIZ–EE: EEs ensure the execution of the specific project activities and are therefore accountable for the delivery of the associated outputs. GIZ, as the AE, will sign Subsidiary Agreements with the other EEs defining their respective responsibilities.

Figure 57 below depicts the overall flow of funds of the project.

Figure 57: Preliminary flow structure



6.1.3 Governance and Management Structure

As visualised in *Figure 58,* project steering and management will be ensured by a PSC and a PMC, both assuming complementary roles.

Responsible mainly for political steering, members of the PSC will include relevant government institutions and key project partners (MERFPCCC, MSHPCSUA, ANAMET, the Ministry of Planning, Development and Cooperation (*Ministère de la Planification, du Développement et de la Coopération* – MPDC) along with the German Federal Ministry for Economic Cooperation and Development (BMZ) and GIZ in its role as an AE.

The MERFPCCC, both the climate change authority and the National Designated Authority (NDA) for the GCF, will chair the PSC and will be responsible for managing and overseeing the proposed project and continuation of interventions after the end of project duration, and GIZ will serve as the secretariat of the PSC.

Decisions of the PSC will be taken by consensus. Key responsibilities of the PSC will be to:

- Provide overall guidance for project implementation.
- Provide feedback and validation of annual work plans, in consideration of annual reports and project evaluations.
- Ensure project progress and coherence with the (evolving) international and national policy context.
- Stay informed of project adherence with Annex 6b. Environmental and Social Management Plan (ESMP); Annex 7b. Stakeholder Engagement Plan (SEP) and Annex 6c. Local Communities' Plan (LCP), and Annex 8b Gender Action Plan (GAP).
- Support the coordination of project activities across different line ministries and between the private and public sectors and civil society.

Based on the guidance and decisions of the PSC, the PMC will serve as the main body for management and implementation of the project. The PMC will serve as a bridge between the political orientation of the project provided by the PSC and ensure the day-to-day management of the project. It will further provide orientation to the three regional PMUs. The PMC will hold documented quarterly meetings where project progress and emerging issues will be discussed and addressed. If needed, TWG may be established to facilitate in-depth coordination of cross-cutting activities, such as those related to safeguards, gender, or interventions at the municipality level.

Additionally, the PMC will have the following responsibilities:

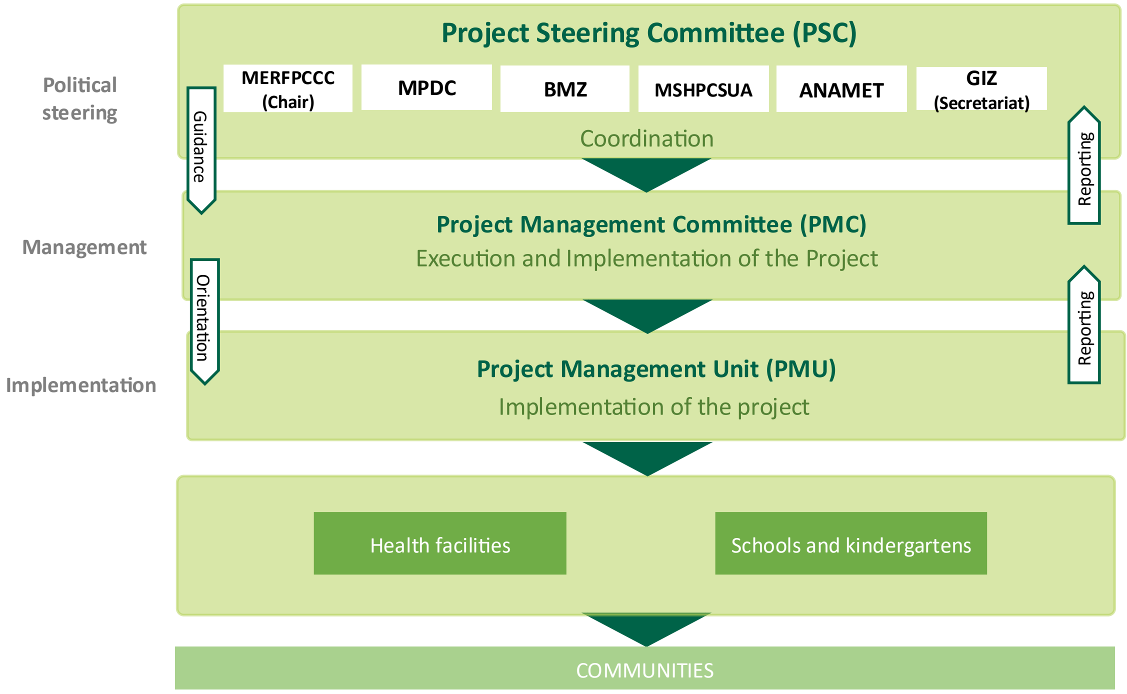
- Implementing the decisions and recommendations of the PSC.
- Providing oversight of the PMU.
- Coordinating and ensuring timely execution of activities by each EE as outlined in the Annual Operating Plan, regularly updating the PSC and fostering a common understanding between the two EEs regarding the ToC and its integration across all project activities.
- Supervising technical and budgetary project progress, and aligning with approved plans, budgets and indicators.
- Promptly mobilising technical expertise from EEs and other stakeholders upon identification of project implementation issues.
- Facilitating harmonious collaboration with stakeholders for each of the project components and identifying the tasks and additional requirements that must be addressed in relation to the project.
- Facilitating information flow from the project beneficiaries to the PSC.
- Monitoring the implementation of, and adherence to, the ESMP, GAP, SEP, and LCP.
- Overseeing the progress of indicators managed by each EE in the monitoring system.
- Assessing and consolidating insights and experiences from the project.

Member institutions of the PMC will include:
- GIZ, MSHPCSUA and ANAMET: EEs.
- MERFPCCC: a key national project partner, both as the authority responsible for climate change and in its role as NDA.

As and when necessary or desirable, extended PMC meetings can also be organised, involving PMC members and additional invitees – from the public and private sectors and from civil society – to address specific technical, geographical or sectoral issues.

The PMU will consist of a dedicated team of professionals led by a Project Leader and including (inter alia) a National Deputy Project Leader, a Finance Manager, a Gender, ESS and M&E (GEM) Specialist, a Communications Specialist and technical advisors.

Figure 58: Project governance and management



7. Project Funding Justification

7.1 Justification for GCF Funding Request

The proposed project is aligned with, and supportive of, Togo government policies (see *Section 3.2.1.2*) as well as GCF's USP2 2024-2027, notably Targeted Results 3 (CIEWS: 50 to 60 developing countries particularly vulnerable to the adverse effects of climate change protected by new or improved EWS), 6 (Infrastructure: 45 to 60 developing countries supported by GCF to develop or secure low-emission climate resilient infrastructure, through systemic and/or country-driven resilience planning, funding and/or de-risking of investments), 9 (Adaptation: 40-70 approved proposals for adaptation projects, including for locally-led adaptation action) (GCF, 2023).

The Government of Togo has identified the health sector as one of the most vulnerable to climate change and is committed to strengthen its resilience. However, key institutions including the MSHPCSUA, ANAMET (project EEs) and other relevant institutional stakeholders (ANPC, UoL, etc.) face significant gaps in terms of governance and interinstitutional cooperation, personal and institutional capacity, technical and climate resilient physical infrastructure, and availability of climate information. The project will support through a series of coordinated activities the institutionalisation of governance structures, support knowledge transfer to national bodies, acquisition of technical infrastructure and climate-proofing physical infrastructure and support the operational integration of climate and other relevant data for an improved climate informed health early warning system. Moreover, the government has a very limited fiscal place to support this kind of investments as highlighted in *Section 3.2.10.1*, leading to investments that are donor-driven, reactive, and therefore unable to bring about the transition needed for a paradigm shift in the sector.

The CR, which underpins the project design, provides robust evidence demonstrating the expected increase in the burden of disease from climate change in Togo. Through a comprehensive literature review of 179 scientific studies and national climate modelling, the CR identified malaria, diarrhoeal diseases, and heat-related health outcomes as the primary CSHOs, particularly affecting women and children. Evidence shows thar rising temperatures, changing rainfall patterns, and extreme climate events intensify exposure to these diseases. Regional climate models, specifically the NEX-GDDP-CMIP6 dataset, projects a robust and statistically significant warming signal across all regions, confirming that maximum, mean, and especially minimum temperature will increase nationwide. Projections show a clear temperature increase through to 2041-2060 mid-century period, with the Savanes region consistently exhibiting the highest absolute temperatures. Crucially, the northern target regions – Centrale, Kara, and Savanes – are projected to warm at an accelerated rate: under the high-emissions scenario (SSP-8.5), minimum temperatures are projected to rise by up to 0.57°C per decade. This severe and accelerating warming is accompanied by a significant rise in compound dry-hot days and extreme rainfall events, which is expected to alter the seasonality and redistribute the risk of vector- and water-borne disease transmission. These findings confirm the growing climate-related health burden in the northern regions and justify the project's focus on strengthening health system climate resilience.

Project activities supported by GCF proceeds are capitalising in existing infrastructure, developing synergies, while clearly supporting climate additionality. The project builds on the current institutional, physical and technical infrastructure of ANAMET, MSHPCSUA, and ANPC. The project will expand on the existing ANAMET hydrometeorological system (Output 1.1.); capitalise on the institutional coordination and technical infrastructure of the MHEWS under ANPC (Output 1.3) (including the utilisation of TogoAlert+); utilise the existing data and modelling capacities of the MSHPCSUA DHIS2 (Output 1.2); increase climate resilience of public health system facilities (Output 3.1); improve on the existing protocols, procedures and human resources capacity to strengthen climate-sensitive health outcome diagnosis and treatment (Output 3.2).

Moreover, it avoids overlaps and develops synergies with existing projects, more notably with GCF SAP 48. The project will strategically address existing infrastructure gaps in close cooperation with the BOAD, ANPC and ANAMET to enhance synergies both during the project development and the project implementation phase (see Annexes 7a and 7b). The project will also support institutional coordination within the MSHPCSUA (Output 2.1) and develop linkages with key stakeholders at a national, regional, and international level (Output 2.2.). Output 4.2 will support the fourth element of a MHEWS, ensuring community preparedness to respond to the warning received focusing on health.

Lastly, physical investments address climate-related risks and impacts across multiple levels – within the public healthcare system through measures enhancing resilience to heat, droughts, and cold chain disruptions (Outputs 3.1 and 3.2), and at the community level through flood- and drought-resilient WASH infrastructure and strengthened vector control for CSHO (Output 4.1).

Consequently, GCF support is required to systematically remove the identified barriers in *Section 5.2.1* and move towards an integrated proactive planning that mainstreams climate adaptation in the health sector through evidence-based decisions.

7.2 Economic needs of the recipient

Togo remains classified among the world's LDCs, with persistent challenges in human capital, poverty reduction, and resilience to climate change. The Human Capital Index (HCI) is 0.43, meaning a child born today will reach only 43% of their potential in health, education, and nutrition as an adult (WBG, 2024b). Poverty remains widespread, particularly in rural areas (58.8%), and is even high in the target regions of Centrale (59.9%), Kara (58.2%), and Savanes (65%), where women are disproportionately affected due to limited access to education, healthcare, and economic opportunities. With a current warming trajectory of 3°C, the costs occurring from the impacts of climate change could be 20% of Togo’s GDP by 2050 (Burke et al., n.d.).

Food insecurity remains a major concern, with Togo ranked 80th out of 127 in the 2024 Global Hunger Index (GHI), scoring 18.6 – classified as “moderate”, but showing slight signs of improvement compared to 2023. The Savanes and Kara regions are among the most food-insecure in the country (WFP, 2022).

Climate-sensitive health risks are also increasing: from 2008-2017, malaria cases rose by an average of 13.7% nationally, with high incidence in the target regions of Centrale (16.7%), Savanes (15.8%) and Kara (13.5%) (Bakai et al., 2020). Diarrhoeal cases also surged between 2018-2022, rising by 75% in Centrale and 74% in Kara (DHIS2, 2023; MSHP, Direction Générale des Études de la Planification et de l’Information Sanitaire, 2019). The maternal mortality rate remains high at 349 deaths per 100,000 live births (2023), well above the SDG 2030 target of 70 (WHO, 2025).

Estimates of the annual investment required for climate change adaptation in Togo range from 1.5% to 4.2% of GDP, underscoring both the significant financing needs and the constrained fiscal capacity of the Government to meet these needs (International Monetary Fund. African Dept., 2024). Moreover, according to the NDC, 35% of adaptation investments are required for the “human settlements and health” sector (see *Section* ***Error! Reference source not found.***).

The health sector financing is characterised by improved trends - the real budget tripled from in 2015 to 2023 - but the percentage of the total budget for the health sector remains below the 15% target of the Abuja Declaration (GIZ, 2022a). The latest estimation for the percentage is 9.0% (2023) with the latest verified figure at 7.3% (2019), both lower from the world average of 9.9% (2023) (GIZ, 2022a). Of the total budget of the health sector during the period 2017-2022, 40.7% came from the State’s own resources, 33.7% from technical and financial partners; and only 25.6% from revenue generated by HFs, highlighting the dependence on technical and financial partners (MSHP, 2022b). Moreover, a total of 37% of the budget needs to be allocated to reducing maternal, neonatal, infant and child mortality; family planning and adolescent health (23%) and fighting communicable diseases (14%), highlighting the importance of the project (GIZ, 2022a). Health direct payments borne by households account for 66% of healthcare expenditure in 2019, more than double to the WHO recommended standard of an average of 30% or less, showcasing the important burden that health poses to households (GIZ, 2022a). Therefore, there is minimal risk of crowding our public or private investments.

In terms of financial inclusion, 57% of adults in Togo own an account and 37% of adults had a mobile money account (2024) and based on the Global Findex Database, though significant gaps exist in terms of gender (45% of women vs 70% of men) and urban and rural population (53% vs 66%) (Klapper et al., 2025). Moreover, even though 78% mentioned that they have borrowed money, only 13% borrowed money from a formal bank or using a mobile money account, highlighting that access to financial products remain very low, with the majority of the population relying on informal sources, such as family, friends, and "tontines" (rotating savings and credit associations) (Klapper et al., 2025).

7.3 Choice of Instruments and Concessionality

Togo is an LDC with high economic vulnerability to climate change and persistent poverty. Fiscal space is limited, and access to financing at all levels remains inadequate. The following table summarises the assessment of suitability financial instruments considered.

Table 39: Comparative assessment of financial instruments and suitability

Financial instrument considered	Assessment
Domestic budget reallocation	Budget already operates within tight fiscal space ≈7–9%. Reallocation would still fall short of the ~49 million EUR climate-resilience CAPEX required. Domestic budget allocation contributes to project co-financing.
Commercial bank loans / PPP	Project activities are characterised by distributional goals and limited revenue profile that is not attractive to Commercial bank loans / PPP.
Social impact bonds / blended repayable instruments	Project investments are characterised by negative financial Net Present Value (NPVs) under all repayable scenarios. Instruments will shift affordability pressures into future outcome payments.
Insurance / contingency funds	The financial instrument is not suitable for supporting the project's upfront investments. It may, however, provide complementary support after the initial investment phase
Philanthropy / NGOs	Smaller, short-tenor, project-specific and donor-driven. Unable to support transformational change and lead to a paradigm shift.
Sovereign concessional loans (multilateral/bilateral)	Concessional sovereign loans for the specific activities would not produce revenues streams robust enough for the loans to be serviced (see Annexes 3a and 3b).
Grants	Grants offer the necessary concessionality without adding fiscal pressure or crowding our other sources. Grants are aligned with the public-good nature of the interventions and the absence of revenue streams.

Concessionality is fully passed to beneficiaries as there is no on-lending or repayment. Funds flow via Subsidiary Agreements from the AE to EEs and will be administered in accordance with the FAA and AMA. Accountability on the use of financial resources will be facilitated through the review of annual and bi-annual project reports, as well as through audit and monitoring reports. Procurement and construction additionally incorporate resilient standards and specifications further ensuring concessionality.

7.4 Financial and Economic Assessment

The GCF investment represents a cost-effective, efficient investment for the adaptation of the Togolese health sector to climate change. The toral project financing is 50.6 M EUR (GCF Requested amount 37.6 M EUR, Co-financing 13 M EUR) and the project will result in 2,798,805 direct and 5,296,693 indirect beneficiaries during the 5-year implementation period. The project has the following cost per direct and indirect beneficiaries:

- For the GCF proceeds 4.64 EUR/ beneficiary.
- For the overall project budget 6.25 EUR/ beneficiary.

The project cost is comparable to the average 10.5 USD/beneficiary ratio for other GCF projects in the health sector.

The Economic and Financial Analysis (EFA) corroborates the justification of the project. The project KPIs are an Economic Net Present Value of 70.1 million Euros, Economic Internal Rate 29.2% and a Benefit-Cost Ratio (BCR) of 2.7. The robustness of the results is further supported by the sensitivity analysis that includes ±20% cost/benefits scenarios and assesses social discount rates between 2,4,6,8,10 and 12%. The methodology and assumptions utilised for the analysis are detailed in the Annexes 3a and 3b and include: i) social discount rate of 6%, ii) analysis of EWS, improved HFs infrastructure, and community resilience investments iii) and economic benefits reduced morbidity and mortality, avoided loses from climate change induced disasters, avoided costs for water purchase, avoided electricity costs, avoided GHG emissions, avoided costs from vaccines losses.

The EFA compares a with-project scenario to a without-project (BAU) scenario, capturing avoided disease burden, avoided climate-related infrastructure damage, improved health outcomes, and strengthened WASH and cold chain systems. Economic performance metrics including Economic Net Present Value (ENPV), Economic Internal Rate of Return (EIRR) and BCR are based on a 6% social discount rate. The results are summarised in the table below.

Table 40: Summary of key economic and financial analysis results

Indicators	UNIT	Overall Project	Component 1	Component 2	Component 3	Component 4
Break even	Year	8	8	-	12	6
ENPV (6% Social discount rate)	EUR	62,671,403	15,016,899	-	8,151,525	46,013,267
EIRR	%	25.8%	29.1%	-	12.2%	90.1%
Total costs over 20 years	EUR	62,325,203	9,000,354	7,902,120	31,130,581	14,292,148
Total benefits over 20 years	EUR	143,284,919	45,059,038	-	38,687,556	76,027,838
B/C Ratio	Ratio	2.4	3.2	-	1.5	5.71

The robustness of the results is further supported by the sensitivity analysis that includes ±20% cost/benefits scenarios and assesses social discount rates between 2,4,6,8,10 and 12%. The sensitivity analysis shows that the project remains economically viable under a wide range of parameter variations, but performance weakens significantly when benefits are reduced or postponed.

Table 41: Sensitivity analysis results

Social discount rate	Key Performance Indicators for Different Discount Rates (DR)						EIRR
	2%	**4%**	**6%**	**8%**	**10%**	**12%**	
	ENPV (Millions of Euros)						%
Base Scenario	114	84	62.6	46	34	25	25.8%
Costs +10%	108	79	58.1	42	30	21	23.2%
Costs +20%	103	74	53.6	38	27	18	21.0%
Benefits +10%	130	98	73.2	55	41	31	28.5%
Benefits +20%	147	111	83.9	64	48	37	31.2%
Benefits -10%	97	71	51.8	38	27	19	23.0%
Benefits -20%	80	57	41.1	29	20	13	20.1%
Benefits delayed 1 Year	100	72	52.1	37	26	17	20.9%
Benefits delayed 2 Year	88	61	42.3	28	18	10	17.5%

8. Project Impacts and Benefits

8.1 Climate Change Adaptation Benefits

The proposed project significantly contributes to increased climate-resilient sustainable development by systematically addressing Togo's critical gaps in early warning, resilient infrastructure, and institutional capacity, directly aligning with the GCF's USP2 2024-2027 (GCF, 2023). The project's adaptation impact is achieved by embedding resilience into the national system thereby protecting human life, assets, and long-term development gains:

- **Enhancing protection through EWS (TR3):** The project directly supports the USP-2 Targeted Result 3 (CIEWS) by strengthening or establishing new and improved EWS in Togo. This contribution is essential for climate-resilient development as it allows vulnerable populations and key sectors to take anticipatory action against severe climate hazards while shifting national policy from costly, reactive disaster relief to proactive risk reduction, ensuring that climate shocks do not reverse progress made toward poverty reduction and other SDGs.

- **Securing essential resilient infrastructure (TR6):** By investing in climate-resilient infrastructure, the project supports the USP-2 Targeted Result 6 (Infrastructure), focusing on safeguarding crucial public services. This means Investing in low-emission, climate-resilient infrastructure (e.g., climate-smart HFs, resilient data management centres) ensures that essential societal functions, such as healthcare, water supply, and EWS, continue to operate during and immediately after climate shocks. This prevents the collapse of essential services that typically follows a disaster, thereby ensuring the socio-economic stability required for sustainable development.

- **Fostering locally-led and systemic adaptation (TR 9):** The project aligns with USP-2 TR9 (Adaptation) by ensuring adaptation measures are effective, lasting, and integrated into local governance. This supports resilient sustainable development by focusing on locally-led adaptation action and embedding services into institutional and community structures. This ensures that climate solutions are context-specific, owned, and sustained long after external funding concludes. The project's comprehensive approach strengthens planning and funding mechanisms, ensuring that climate resilience becomes a systemic consideration across relevant sectors, not just an isolated project activity.

8.1.1 Methodology for assessing the climate vulnerabilities and resilience impacts

The identification of project impacts is anchored on the GCF Integrated results management framework (GCF, 2021) and the GCF Draft results handbook (Version 11) (GCF, 2022a). All selected project impacts and indicators follow the proposed guidelines and were operationalised at the level of the activity. A supporting Excel file detailing the assumption, data sources and breakdown is also provided in the FP package (Annex 2d).

The project contributes to Adaptation Results Area (ARA) 1 Most vulnerable people and communities, ARA 2: Health, well-being, food, and water security and ARA 3: Infrastructure and built environment. The selected Core Indicators that the project contributes to are 2: Direct and indirect beneficiaries reached and 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions. Direct beneficiaries of an adaptation intervention are defined as individuals who receive i) targeted support from a GCF-funded intervention and ii) a measurable adaptation benefit from a GCF-funded intervention. The targeted support refers to the support provided or delivered by a GCF-funded intervention and can be tracked in the actual project/programme records as part of the regular project/ programme monitoring processes. Indirect beneficiaries are considered those who will receive measurable adaptation benefits without being targeted explicitly (GCF, 2022b).

The following table present the project level contributions.

Table 42: Project level contribution to Adaptation Results Areas and Core Indicators

IRMF Indicator	Beneficiaries / Targets
ARA 1: Most vulnerable people and communities	
Core 2: Direct and indirect beneficiaries reached	Direct: 716,669; Indirect: N/A, of whom 51% are women
ARA 2: Health, well-being, food and water security	
Core 2: Direct and indirect beneficiaries reached	Direct: 1,841,389; Indirect: 2,171,794, of whom 51% are women
ARA 3: Infrastructure and built environment	
Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	10,177,501.05 USD
Core 2: Direct and indirect beneficiaries reached	Direct: 4,635; Indirect: N/A, of whom 51% are women
Project Total	
Core 2: Direct and indirect beneficiaries reached	Direct: 1,841,389; Indirect: 2,171,794, of whom 51% are women 4,013,183 Total
Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	10,177,501 EUR

8.1.2 Number of Direct and Indirect Beneficiaries per Component

8.1.2.1 Direct beneficiaries

Based on the definition and taking into consideration the project interventions, direct beneficiaries are calculated based on Outcomes 1, 3 and 4. Interventions considered under these components provide targeted support that offer measurable adaptation benefits.

Direct beneficiaries are those residing in the target regions who are reached by the improved EWS and directly benefit from the project-financed health infrastructure, response tools and training.

The overarching formula for direct beneficiaries (B_{Direct}) is:

$$B_{Direct} = P_{Target\_Regions} \times R_{EWS\ effectiveness}$$

For the total population of the target regions (Savanes, Kara, and Centrale) ($P_{Target\_Regions}$), the regional EWS Effectiveness ($R_{EWS\ effectiveness}$) assumptions are presented below:

$R_{EWS\ effectiveness}$ = Access to mobile phone x Actual enrolment/subscription x Message receipt x Comprehension, language and literacy constraints x Response

- Access to mobile phone based on ARCEP Data
- Actual enrolment/subscription based on Togo Alert+ compatibility with Cell Broadcast and Location-Based SMS
- Message receipt = (CBC/LB-SMS success rate for compatible devices x Percentage with CBC/LB-SMS compatible devices)+(CBC/LB-SMS success rate for partially compatible devices x Percentage with partially CBC/LB-SMS compatible devices) based on Esteban Bopp, Johnny Douvinet. Spatial performance of location-based alerts in France. International Journal of Disaster Risk Reduction, 2020, 50, pp.101909 and context concerning CBC/LB-SMS compatibility
- Comprehension, language and literacy constraints based on : World Bank, Literacy rate, adult total (% of people ages 15 and above) – Togo
- Response based on project response supporting activities in Outputs 3.1, 3.2, 4.1, 4.2

Based on above B_{Direct} = 2,924,561 x 63% = 1,841,389

Regarding institutional actors (such as health professionals, CCU members, and decision makers) it should be clarified that in the context of improved CSHO care, they are considered as mediators rather than direct beneficiaries, as they facilitate the delivery of adaptation benefits to the population and therefore are not accounted for in the calculation. However, they are included as beneficiaries in the case of the EWS, as they benefit directly from timely, high-quality information that allows for proactive clinical and operational preparedness.

For **ARA 1** targeted support refers to:

- an improved and operational EWS (Output 1.3)
- improved health infrastructure (Output 3.1)

Measurable adaptation benefits are:

- Reduced absenteeism from work due to improved diagnosis and treatment of CSHO.

The number of direct beneficiaries is equal to the number of economically active population (population 15 – 64 yrs old both sexes) residing in communities that are covered by supported health facilities or improved community infrastructure.

The formula applied is :

$$B_{Direct,\ ARA1} = B_{Direct} \times R_{Active\_Pop}$$

Based on INSEED data, with an active population ratio (R_{Active_Pop}) of 38.92%, the total number of direct beneficiaries is 709,735 (345,816 men, 363,918 women)

For **ARA 2** targeted support refers to:

- An improved and operational EWS (Output 1.3)
- Improved health infrastructure (Output 3.1)

Measurable adaptation benefits are:

- Direct access to health-related alerts through the EWS
- Access to HF with improved climate resilience, improved diagnosis and treatment of CSHO.

The number of direct beneficiaries is equal to the number of people receiving warnings from a functional and improved[20] EWS, with alerts received through the ANPC TogoAlert+ System.

The calculations for ARA 2 beneficiaries are the same as those for total direct beneficiaries as ARA 1 and ARA 3 beneficiaries are a subset of ARA 2 beneficiaries, i.e. total direct beneficiaries are equal to ARA 2 direct beneficiaries.

For **ARA 3** targeted support refers to:

- Improved school climate resilient WASH infrastructure (Output 4.1)
- Improved house infrastructure against vectors (Output 4.1)

Measurable adaptation benefits are:

- Access to climate-resilient WASH infrastructure at school
- Living in a house with improved climate resilience

The number of direct beneficiaries is equal to the number of people:

- Having access to climate-resilient WASH infrastructure at school is estimated as the number of students per school multiplied by the number of schools receiving support.
- Living in a house with improved climate resilience estimates as the number of houses supported, multiplied by the average size of household.

The formula applied is:

$$B_{Direct,\ ARA3} = (N_{schools} \times S_{avg}) + (N_{Houses} \times H_{avg})$$

[20] *Functional: 1. Health risk knowledge based on the systematic collection of data (Output 1.1 for meteorological data, 3.2.2 for health data) and risk assessments, 2. Detection, monitoring, analysis and forecasting of the hazards and possible consequences (Output 1.2), 3. Dissemination and communication, by an official source, of authoritative, timely, accurate and actionable warnings and associated information on likelihood and impact (Output 1.3), 4. Preparedness at all levels to respond to the warnings received (Outputs 2.1 and 4.2)*
Improved: Improved weather and climate data integration (Output 1.1), improved modelling (Output 1.2), improved notification (Output 1.3), and response (Outputs 2.1 and 4.2)".

Where the number of schools ($N_{schools}$) is 15, the student average (S_{avg}) is 203, the number of houses (N_{Houses}) is 300, and the household average (H_{avg}) is 5.3. The total number of direct beneficiaries for **ARA 3** based on INSEED and the Ministry of Education data is 4,635 (2,258 men, 2,377 women).

The project's total number of direct beneficiaries equals the number of **ARA 2** direct beneficiaries, as there is an overlap between the different ARAs. ARA 1 and ARA 3 are considered subsets of this overarching calculation.

8.1.2.2 Indirect beneficiaries

Based on the definition and taking into consideration the project interventions, direct beneficiaries are calculated based on Outcomes 1, 2, 3 and 4. Interventions considered under these components provide measurable adaptation benefits without targeted support.

Indirect beneficiaries ($B\_{Indirect}$) are the remainder of the national population who benefit from the project's improved institutional health coordination (Outcome 2), but do not receive localised technical support or service upgrades.

The formula applied is:

$$B\_{Indirect} = (P_{Total\_Togo} - B_{Direct}) * R_{Effectiveness}$$

To assess the health system's performance ($R_{Effectiveness}$), the project adopts the effective coverage framework established by Jannati et al., (2018), applying this model to Togo's total population of 8,095,498 (P_{Total_Togo}).

We consider that the effectiveness of the policy measures will be constrained by the level of access to Health Coverage. Therefore, we are using as an effective coverage proxy the UHC service coverage index for Togo, which is 42% (WBG, n.d.-b).

For **ARA 1,** no indirect beneficiaries are considered.

For **ARA 2,** indirect beneficiaries are those who are not direct beneficiaries and receive the following measurable adaptation benefits:

- Access to EWS health-related alerts through word of mouth or other informal ways
- People receiving improved healthcare concerning the targeted CSHO through improved coordination by the climate change units

For **ARA 3,** no indirect beneficiaries are considered.

8.1.3 ARA 3 core indicator

The project also contributes to Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions through investments in Outputs 3.1 and 4.1.

Based on the project budget, the contribution of the project to **ARA 3** is 10,177,501.05 EUR, with 30% of the sum by mid-term.

8.2 Project Co-Benefits

8.2.1 Gender Co-Benefits: Improved Women's Conditions, i.e. Pregnant Women, due to Heat-Related Interventions

8.2.1.1 Methodology for assessing improved women's conditions

The project will contribute to Improved access to sexual and reproductive health for all women in reproductive age in the catchment area of the supported HFs. The estimation of the population utilising data from the ProSanté project for the catchment considers only the percentage of the population in the reproductive age.

8.2.1.2 Indicators and targets for project co-benefits

Based on the above, the project will contribute to Co-benefit 1: Improved access to sexual and reproductive health, supporting a total of 658,387 beneficiaries.

8.2.2 Climate Change Mitigation Co-benefits

8.2.2.1 Methodology GHG emissions reduction calculations

The project contributes to reduced GHG emissions through the following interventions:

- Installation and operation of PVs in HFs (Output 3.1)
- Utilisation of low-carbon cement in construction (Output 3.1 and 4.1)
- Utilisation of e-bikes in the cold chain (Output 3.2)

8.2.2.2 Overall GHG mitigation impacts of the project

Based on the provided calculation the estimated contribution to Co-benefit 2: GHG emissions avoided is 986.4 tCO2eq for the duration of the project.

9. Project Risk and Mitigation Approaches

The following table summarises the identified key financial, technical, operational, macroeconomic/political, money laundering/terrorist financing (ML/TF), sanctions, prohibited practices risk for the project.

Table 43: Overview of project risks

Selected risk factor 1: Security situation in the Savanes Region		
Category	**Probability**	**Impact**
Other	Medium	High
Description		
The security situation in the Northern Savanes region has been volatile since 2021, when armed jihadist organisations from Burkina Faso and Benin started sporadic cross-border attacks on Togolese security forces. Implementation preparation will take the fragile security situation into consideration. In very high-risk areas, no project implementation is planned.		
Mitigation Measure(s)		
Potential delays or adjustments to implementation modalities may be required in case the security situation deteriorates. Continuous monitoring of the security situation by the Safety and Risk Mitigation Office (SRMO), including prior travel clearance. Regular coordination with the local GIZ antenna. Strengthened coordination with local authorities and security forces (e.g., the Emergency Plan for Strengthening Resilience in the Savanes Regions (*Programme d'Urgence de Renforcement de la Résilience dans la Région des Savanes* - PURS). Regular updating of contingency plans for potential security incidents. Continuous monitoring and adjustment of the project timeline based on security assessments.		
Selected risk factor 2: Gaps in coordination between key ministries and agencies		
Category	**Probability**	**Impact**
Governance	Low	Medium
Description		
Misaligned coordination or conflicting agendas among ministries and agencies could severely limit project effectiveness, creating administrative bottlenecks and resource fragmentation. The project's approach requires precise cross-sectoral coordination and clear delineation of roles and responsibilities.		
Mitigation Measure(s)		
The project supports inter-sectoral coordination through its cooperation between ministries and agencies to promote alignment in agendas and priorities and maximise synergies. The project was developed through extensive consultations with all relevant national and international stakeholders that informed the project design.		

A robust stakeholder engagement strategy will further ensure that the project will engage with all key stakeholders throughout project implementation.		
Selected risk factor 3: Lack of managerial and financial capacity of national EE ANAMET and double-counting and double-dipping risk		
Category	**Probability**	**Impact**
Technical and operational	Low	Medium
Description		
ANAMET has a current lack of managerial and financial capacity. While the institution disposes of an independent legal structure since 2022 (secured by decree) and its highest governance body, the Board of Directors, has been nominated in December 2025, improved internal processes remain in draft form, but largely unimplemented. Consequently, ANAMET still lacks robust capacity with regards to budget allocations, financial management and auditing functions. Moreover, ANAMET will be a beneficiary institution (though not an EE) under the GCF-funded project (SAP048), this creates a double-counting and double-dipping risk if clear segregation of financial records, budgets, and expenditures between the two projects is not in place.		
Mitigation Measure(s)		
Exchanges with the German side in November 2025 and later follow up indicate that the Togo government actors (including Ministry of Transport and Presidency) are currently addressing the issue of the Board of Directors. Preparatory internal steps are under way to plan the support and mitigation measures (e.g. audit of progress before conclusion of Grant Agreement with ANAMET). The AE and ANAMET will apply strengthened financial management and internal control measures and will ensure clear coordination with SAP048.The AE to ensure clear segregation of financial records, budgets, and expenditures between the two projects will support the acquisition and deployment of dedicated financial and administrative management software, which will be used to generate separate financial reports, as this is not currently supported by the utilised software provided by Togo's Ministry of Economy and Finance. The AE will maintain close fiduciary oversight throughout implementation (see section G.3.1).		
Selected risk factor 4: Intervention complexity		
Category	**Probability**	**Impact**
Technical and operational	Low	Medium
Description		
The planned project activities and especially the infrastructure construction and rehabilitation measures are complex, since they include a variety of types of interventions, a wide geographically area, different types of resilience measures, engagement with local availability service providers and ESS risks.		
Mitigation Measure(s)		
Project interventions and construction activity planning in the FP development phase was done in close cooperation with EEs, GIZ's construction unit (HQ) and the project development team. It entailed a careful analysis of intervention sites during a mission on the ground, while continuous assessment of eventual implementation, reputation and liability risks was and is ensured. ESS documents include appropriate consideration of E&S risks and fit-for-purpose mitigation measures. Furthermore the project will sensitise construction contractors and suppliers on human rights and gender issues, and enforce change find procedures for cultural heritage.		
Selected risk factor 5: Risk of money laundering, terrorist financing, prohibited practices and sanctions		
Category	**Probability**	**Impact**
Prohibited practices	Low	Medium
Description		
Without strict oversight, project proceeds can be diverted for illicit purposes. This may include money laundering, terrorist financing, or other prohibited practices or other misuse of funds.		
Mitigation Measure(s)		
The UN sanction list will be screened to ensure that no EE, implementation partner or subcontractor is listed. GIZ as AE will determine the Procurement and Consultant Guidelines, which have been reviewed and accepted by GCF during the accreditation process. GIZ´s guidelines will ensure high standards to mitigate potential risks. Project procurement will be transparently documented, as per the Procurement Plan in Annex 10a to the FP. Moreover, EEs have been assessed, and they have processes and personnel capacity for the transparent financial management, project monitoring and reporting, which will be supported and strengthened to ensure compliance with GCE policies requirements. Monitoring of the use of funding will be regularly conducted according to the rigorous GIZ international financial management rules and regulations.		

Selected risk factor 6: Risk of social conflicts due to discrimination of certain groups (e.g. gender inequality/exclusion of LCs)		
Category	**Probability**	**Impact**
Reputational	Low	Medium
Description		
The project may create social conflicts if certain groups of society do not have equal opportunities to benefit from project activities, for example due to gender inequality the access of women could be limited, or LCs with semi-nomadic livelihoods (e.g., Fulani pastoralists) are not adequately integrated.		
Mitigation Measure(s)		
The project has been designed through participatory practices, including with feedback from women local communities with traditional livelihoods, including distinct community women (see Annex 7a). Participatory processes will continue to be implemented throughout the project implementation (e.g. see Annex 7b) ensuring that feedback will be provided to reflect on project implementation. Project activities are gender-sensitive and specific targeted activities to strengthen gender equality and social inclusion, while safeguarding the rights of women and LCs, are included within the ESMP (Annex 6b), GAP (Annex 8b) and the LCP (Annex 6c). The project has set specific LC targets and will proactively involve women and LC, including applying the humanised childbirth approach and training traditional healers as multipliers (see Annex 6c). The project has developed a GRM that will be communicated to all beneficiaries in culturally appropriate ways, in local languages and through preferred mediums (see Annex 6b). The GRM mechanisms will be available to all those that have a grievance or complaint to file, including beneficiaries and project implementation staff. Specific SEAH guidelines will be implemented and all personnel that will be involved in the implementation process will follow a SEAH training.		
Environmental and social risks are considered in the Environmental and Social Impact Assessment (ESIA, Annex 6a), and Environmental and Social Management Plan (ESMP, Annex 6b). Gender-specific risks are considered in the Gender Assessment and Gender Action Plan (Annexes 8a and 8b, respectively).		

10. References

Abdel Ozih. (2025). Togo, the first African country to roll out the R21 malaria vaccine nationwide. *Santé Éducation*. https://sante-education.tg/en/article/2001/le-togo-premier-pays-africain-d-ployer-l-chelle-nationale-le-vaccin-antipaludique-r21?utm_source=chatgpt.com

Abrams, A. L., Carden, K., Teta, C., & Wågsæther, K. (2021). Water, Sanitation, and Hygiene Vulnerability among Rural Areas and Small Towns in South Africa: Exploring the Role of Climate Change, Marginalization, and Inequality. *Water*, *13*(20), 2810. https://doi.org/10.3390/w13202810

Abu, M., & Codjoe, S. N. A. (2018). Experience and Future Perceived Risk of Floods and Diarrheal Disease in Urban Poor Communities in Accra, Ghana. *International Journal of Environmental Research and Public Health*, *15*(12), 2830. https://doi.org/10.3390/ijerph15122830

AfDB. (n.d.). *Togo Economic Outlook* (African Development Bank Group) [Data set]. Retrieved https://www.afdb.org/en/countries-west-africa-togolese-republic/togo-economic-outlook

AfDB. (2019). *Rapport final: Project d'électrification rurale CIZO- Résumé CGES*. African Bank of Development.

AfDB. (2021). *Togo—Country Strategy Paper 2021-2026*. African Development Bank Group. https://www.afdb.org/en/documents/togo-country-strategy-paper-2021-2026

Against Malaria Foundation. (2023). *Togo*. https://www.againstmalaria.com/Distribution1.aspx?ProposalID=263

Agbere, S., Melila, M., Dorkenoo, A., Kpemissi, M., Ouro-Sama, K., Tanouayi, G., Solitoke, D. H., & Gnandi, K. (2021). State of the art of the management of medical and biological laboratory solid wastes in Togo. *Heliyon*, *7*(2), e06197. https://doi.org/10.1016/j.heliyon.2021.e06197

Ahmed, M. S., Abubakar, M. L., Lawal, A. I., & Richifa, K. I. (2024). Influence of extreme temperature on adverse pregnancy outcomes in Kaduna State, Nigeria. *Science World Journal*, *19*(2), 409–417. https://doi.org/10.4314/swj.v19i2.17

Aiken, E. L., Thakur, V., & Blumenstock, J. E. (2021). *Phone Sharing and Cash Transfers in Togo: Quantitative Evidence from Mobile Phone Data* (Version 1). arXiv. https://doi.org/10.48550/ARXIV.2111.00175

ANAMET. (2022). *Stratégie de Communication Assortie d'un Plan d'Action de la DGMN pour l'Opérationnalisation du Cadre National pour les Services Climatologiques (CNSC) du Togo 2022-2026.*

ANAMET. (2023). *Plan national stratégique (PNS) de la météorologie du Togo 2024-2028*. Ministère des Transports Routiers, Aériens, Férroviaires.

ANAMET. (2025). *Rapport annuel des activités de l'Agence Nationale de la Météorologie (ANAMET): Année 2024*.

Asare, E. O., Warren, J. L., & Pitzer, V. E. (2022). Spatiotemporal Patterns of Diarrhea Incidence in Ghana and the Impact of Meteorological and Socio-Demographic Factors. *Frontiers in Epidemiology*, *2*, 871232. https://doi.org/10.3389/fepid.2022.871232

Ayenigbara, I. O., Adegboro, J. S., Ayenigbara, G. O., Adeleke, O. R., & Olofintuyi, O. O. (2021). He challenges to a successful COVID-19 vaccination programme in Africa. *Germs*, *11*(3), 427–440. https://doi.org/10.18683/germs.2021.1280

Badjana, M.H. (2021). *État des connaissances des risques et catastrophe, les processus de décision d'alerte, la diffusion, la préparation et l'intervention pour les principaux aléas au Togo* [Évaluation des systèmes d'alerte multirisques (MHEWS)].

Badjedke, M, Mahé, G, Kontongabe, H, Pokam, W, Ba, S, Dioup, C, Bossa, A, & Amoussou, E. (2022). *Évaluation des Capacités et Besoins en Systèmes d'Alerte Multirisques au Togo.* WBG, WMO, CREWS.

Bakai, T. A., Thomas, A., Iwaz, J., Atcha-Oubou, T., Tchadjobo, T., Khanafer, N., Rabilloud, M., & Voirin, N. (2020). Changes in registered malaria cases and deaths in Togo from 2008 to 2017. *International Journal of Infectious Diseases: IJID: Official Publication of the International Society for Infectious Diseases*, *101*, 298–305. https://doi.org/10.1016/j.ijid.2020.10.006

Baril, C., Pilling, B. G., Mikkelsen, M. J., Sparrow, J. M., Duncan, C. A. M., Koloski, C. W., LaZerte, S. E., & Cassone, B. J. (2023). The influence of weather on the population dynamics of common mosquito vector species in the Canadian Prairies. *Parasites & Vectors*, *16*(1), 153. https://doi.org/10.1186/s13071-023-05760-x

Baskett, W. I., Qureshi, A. I., Shyu, D., Armer, J. M., & Shyu, C.-R. (2023). COVID-Specific Long-term Sequelae in Comparison to Common Viral Respiratory Infections: An Analysis of 17 487 Infected Adult Patients. *Open Forum Infectious Diseases*, *10*(1), ofac683. https://doi.org/10.1093/ofid/ofac683

Beck, H. E., McVicar, T. R., Vergopolan, N., Berg, A., Lutsko, N. J., Dufour, A., Zeng, Z., Jiang, X., Van Dijk, A. I. J. M., & Miralles, D. G. (2023). High-resolution (1 km) Köppen-Geiger maps for 1901–2099 based on constrained CMIP6 projections. *Scientific Data*, *10*(1), 724. https://doi.org/10.1038/s41597-023-02549-6

Beck, H. E., Wood, E. F., Pan, M., Fisher, C. K., Miralles, D. G., Van Dijk, A. I. J. M., McVicar, T. R., & Adler, R. F. (2019). MSWEP V2 Global 3-Hourly 0.1° Precipitation: Methodology and Quantitative Assessment. *Bulletin of the American Meteorological Society*, *100*(3), 473–500. https://doi.org/10.1175/BAMS-D-17-0138.1

Bellone, R., & Failloux, A.-B. (2020). The Role of Temperature in Shaping Mosquito-Borne Viruses Transmission. *Frontiers in Microbiology*, *11*, 584846. https://doi.org/10.3389/fmicb.2020.584846

Benedum, C. M., Seidahmed, O. M. E., Eltahir, E. A. B., & Markuzon, N. (2018). Statistical modeling of the effect of rainfall flushing on dengue transmission in Singapore. *PLOS Neglected Tropical Diseases*, *12*(12), e0006935. https://doi.org/10.1371/journal.pntd.0006935

Blencowe, H., Cousens, S., Oestergaard, M. Z., Chou, D., Moller, A.-B., Narwal, R., Adler, A., Vera Garcia, C., Rohde, S., Say, L., & Lawn, J. E. (2012). National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: A systematic analysis and implications. *The Lancet*, *379*(9832), 2162–2172. https://doi.org/10.1016/S0140-6736(12)60820-4

Burke et al. (n.d.). Large potential reduction in economic damages under UN mitigation targets. *Nature*, (557), 549–553.

Calvin, K., Dasgupta, D., Krinner, G., Mukherji, A., Thorne, P. W., Trisos, C., Romero, J., Aldunce, P., Barrett, K., Blanco, G., Cheung, W. W. L., Connors, S., Denton, F., Diongue-Niang, A., Dodman, D., Garschagen, M., Geden, O., Hayward, B., Jones, C., … Péan, C. (with Lee, H.). (2023). *IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland.* (First). Intergovernmental Panel on Climate Change (IPCC). https://doi.org/10.59327/IPCC/AR6-9789291691647

Carlton, E. J., Woster, A. P., DeWitt, P., Goldstein, R. S., & Levy, K. (2016). A systematic review and meta-analysis of ambient temperature and diarrhoeal diseases. *International Journal of Epidemiology*, *45*(1), 117–130. https://doi.org/10.1093/ije/dyv296

CBM. (2022). *Towards disability-inclusive early warning systems in Cameroon and Niger.* (Early Warning Systems in Cameroon and Niger). Christian Blind Mission. https://www.cbm.org/dam/jcr%3A94f6279f-d8fc-4a4a-970f-86ef4551afff/Early_Action_Saves_Lives.pdf?utm_source=chatgpt.com

CCAC. (2021). *Supporting Togo's national plan to reduce air pollution and short-lived climate pollutants.* Climate and Clean Air Coalition. https://www.ccacoalition.org/partners/togo

CFRSP. (2025). *Le Centre de Formation et de Recherche en Santé Publique forme des professionels dans plusieurs domaines de la santé publique*. https://cfrsptogo.com/?utm_source=chatgpt.com

Chersich, M. F., Pham, M. D., Areal, A., Haghighi, M. M., Manyuchi, A., Swift, C. P., Wernecke, B., Robinson, M., Hetem, R., Boeckmann, M., Hajat, S., & Climate Change and Heat-Health Study Group. (2020). Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: Systematic review and meta-analysis. *BMJ (Clinical Research Ed.)*, *371*, m3811. https://doi.org/10.1136/bmj.m3811

Cissé, G. (2019). Food-borne and water-borne diseases under climate change in low- and middle-income countries: Further efforts needed for reducing environmental health exposure risks. *Acta Tropica*, *194*, 181–188. https://doi.org/10.1016/j.actatropica.2019.03.012

Climate Analytics. (n.d.). *The economic damages of 3°C warming for SIDS and LDCS* [Data set]. Retrieved 12 March 2025, from https://costs-of-inaction.climateanalytics.org/

Climate Hazard Group. (2018). *CHIRPS: Quasi-global daily satellite and observation based precipitation estimates over land* [Data set]. https://catalogue.ceda.ac.uk/uuid/4e53c2aee3fe44e7aa107c163696d2e7

Colón-González, F. J., Sewe, M. O., Tompkins, A. M., Sjödin, H., Casallas, A., Rocklöv, J., Caminade, C., & Lowe, R. (2021). Projecting the risk of mosquito-borne diseases in a warmer and more populated world: A multi-model, multi-scenario intercomparison modelling study. *The Lancet. Planetary Health*, *5*(7), e404–e414. https://doi.org/10.1016/S2542-5196(21)00132-7

Colston, J. M., Fang, B., Nong, M. K., Chernyavskiy, P., Annapareddy, N., Lakshmi, V., & Kosek, M. N. (2024). Spatial variation in housing construction material in low- and middle-income countries: A Bayesian spatial prediction model of a key infectious diseases risk factor and social determinant of health. *PLOS Global Public Health*, *4*(12), e0003338. https://doi.org/10.1371/journal.pgph.0003338

Commission Économique des Nations Unies pour l'Afrique. (2015). *Rapport d'évaluation sur l'intégration et la mise en oeuvre des mesures de réduction des risques de catastrophe au Togo*. https://repository.uneca.org/bitstream/handle/10855/24003/b11869458.pdf?sequence=1

Connor, S., Velagic, M., Zhang, X., Johura, F.-T., Chowdhury, G., Mukhopadhyay, A. K., Dutta, S., Alam, M., Sack, D. A., Wierzba, T. F., & Chakraborty, S. (2022). Evaluation of a simple, rapid and field-adapted diagnostic assay for enterotoxigenic E. coli and Shigella. *PLoS Neglected Tropical Diseases*, *16*(2), e0010192. https://doi.org/10.1371/journal.pntd.0010192

Copernicus Climate Change Service. (2019). *ERA5-Land monthly averaged data from 1950 to present* [Data set]. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). https://doi.org/10.24381/CDS.68D2BB30

Demissie, G. D., Yeshaw, Y., Aleminew, W., & Akalu, Y. (2021). Diarrhea and associated factors among under five children in sub-Saharan Africa: Evidence from demographic and health surveys of 34 sub-Saharan countries. *PloS One*, *16*(9), e0257522. https://doi.org/10.1371/journal.pone.0257522

DGMN. (2019). *Arrêté portant sur la création, attribution et fonctionnement du Cadre National des Services Climatiques (CNSC) au Togo*. Direction Générale de la Météorologie Nationale du Togo.

DHIS2. (2023). *DHIS2 In Action* [Data set]. https://dhis2.org/in-action/

DHIS2. (2025). *Integrating climate data in DHIS2 to optimize seasonal malaria chemoprevention in Togo*. https://dhis2.org/climate-malaria-dashboard-togo/

DHS Program. (2017). *Togo: MIS, 2017. Survey Summary* [Data set]. Demographic and Health Surveys. https://dhsprogram.com/methodology/survey/survey-display-497.cfm

Dimitrova, A., Gershunov, A., Levy, M. C., & Benmarhnia, T. (2023). Uncovering social and environmental factors that increase the burden of climate-sensitive diarrheal infections on

children. *Proceedings of the National Academy of Sciences*, *120*(3), e2119409120. https://doi.org/10.1073/pnas.2119409120
Direction Générale du Trésor. (2024). *Togo: Indicateurs et conjoncture*. https://www.tresor.economie.gouv.fr/Pays/TG/conjoncture
Djaman, K. (2017). Spatial and Temporal Variation in Precipitation in Togo. *International Journal of Hydrology*, *1*(4). https://doi.org/10.15406/ijh.2017.01.00019
Douaguibe, B., Ajavon, D. R., Koffi, W., Tongou, P., Kambote, Y., Bararmna-Bagou, F., Mawougbe, R., & Aboubakari, S. (2023). Review of Maternal Deaths in Two Health Regions of Togo: About 69 Cases (Epidemiological and Sociodemographic Aspects). *Open Journal of Obstetrics and Gynecology*, *13*(10), 1722–1729. https://doi.org/10.4236/ojog.2023.1310145
Dunn, G., & Johnson, G. D. (2018). The geo-spatial distribution of childhood diarrheal disease in West Africa, 2008–2013: A covariate-adjusted cluster analysis. *Spatial and Spatio-Temporal Epidemiology*, *26*, 127–141. https://doi.org/10.1016/j.sste.2018.06.005
Edoh, E. (2025). Le Togo prépare une stratégie nationale de maintenance sanitaire 2026-2030 [Togo First]. *Santé*. https://www.togofirst.com/fr/sante/1709-17102-le-togo-prepare-une-strategie-nationale-de-maintenance-sanitaire-2026-2030
EESI. (2013). *Fact Sheet: Short-Lived Climate Pollutants: Why Are They Important?* Environmental and Energy Study Institute. www.eesi.org/files/FactSheet_SLCP_020113.pdf?utm_source=chatgpt.com
Ekwa Bébé, E. (2025). AD1055: Au Togo, la radio résiste encore à la croissance des médias sociaux comme source d'information. *AFR Barometer*. https://www.afrobarometer.org/publication/ad1055-au-togo-la-radio-resiste-encore-a-la-croissance-des-medias-sociaux-comme-source-dinformation/?utm_source=chatgpt.com
ESI Africa. (2025). *Togo: Solar energy powering healthcare, farming communities*. https://www.esi-africa.com/renewable-energy/togo-solar-powering-healthcare-farming/?utm_source=chatgpt.com
Ethan Soe. (2023). *Africa and its Struggle in the Quest for Vaccination*. GRC. https://grc.studentorg.berkeley.edu/africa-and-its-struggle-in-the-quest-for-vaccination/
EVM. (2021). *Gestion efficace des vaccins (GEV)—Togo*.
Fall, P., Diouf, I., Deme, A., Diouf, S., Sene, D., Sultan, B., & Janicot, S. (2023). Enhancing Understanding of the Impact of Climate Change on Malaria in West Africa Using the Vector-Borne Disease Community Model of the International Center for Theoretical Physics (VECTRI) and the Bias-Corrected Phase 6 Coupled Model Intercomparison Project Data (CMIP6). *Microbiology Research*, *14*(4), 2148–2180. https://doi.org/10.3390/microbiolres14040145
Flückiger, M., & Ludwig, M. (2022). Temperature and risk of diarrhoea among children in Sub-Saharan Africa. *World Development*, *160*, 106070. https://doi.org/10.1016/j.worlddev.2022.106070
Friedrich Ebert Stiftung. (2021). *African Media Barometer: Togo*. https://library.fes.de/pdf-files/bueros/africa-media/19290.pdf?utm_source=chatgpt.com
GAVI. (2025). *Togo introduces the malaria vaccine: A health milestone*. https://www.gavi.org/vaccineswork/togo-introduces-malaria-vaccine-health-milestone#:~:text=,several%20severe%20cases%20of%20malaria
GCF. (2021). *Integrated result management framework*. Green Climate Fund. https://www.greenclimate.fund/sites/default/files/document/irmf-policy.pdf
GCF. (2022a). *Integrated Results Management Framework: Results Handbook*. Green Climate Fund. https://www.greenclimate.fund/sites/default/files/document/draft-results-handbook-v11-01092023.pdf
GCF. (2022b). *Integrated Results Management Framework: Results Handbook*. https://www.greenclimate.fund/sites/default/files/document/draft-results-handbook-v11-01092023.pdf

GCF. (2023). *Strategic Plan for the Green Climate Fund 2024-2027*. https://www.greenclimate.fund/sites/default/files/document/strategic-plan-gcf-2024-2027.pdf
Geremew, G., Cumming, O., Haddis, A., Freeman, M. C., & Ambelu, A. (2024). Rainfall and Temperature Influences on Childhood Diarrhea and the Effect Modification Role of Water and Sanitation Conditions: A Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health*, *21*(7), 823. https://doi.org/10.3390/ijerph21070823
GFCS. (2025). *Current Status of the Implementation of National Frameworks for Climate Services (NFCS)*. Global Framework for Climate Services. https://gfcs.wmo.int/site/global-framework-climate-services-gfcs/components-of-gfcs/current-status-of-implementation-of-national-frameworks-climate-services-nfcs
GIZ. (2020). *Plan National d'Adaptation du Secteur de la Santé aux Effets des Changements Climatiques (PNAS)*. https://faolex.fao.org/docs/pdf/tog225814.pdf
GIZ. (2021a). *COVID-19 and how to establish a sustainable and climate resilient vaccine cold chain*. https://www.international-climate-initiative.com/en/iki-media/publication/covid_19_and_how_to_establish_a_sustainable_and_climate_resilient_vaccine_cold_chain/
GIZ. (2021b). *État des lieux de Connaissances des Risques Climatiques au Togo*.
GIZ. (2021c). *Impacts aux Infrastructures Sanitaires dûs aux Changements Climatiques au Togo* (Rapport ProSanté).
GIZ. (2021d). *Le rôle du Ministère de la Santé dans la Gestion des Risques et Catastrophes Liées aux Changements Climatiques au Togo* (Rapport ProSanté).
GIZ. (2021e). *Les besoins émergents des prestations du système de la santé dû aux changements climatiques au Togo* (Rapport ProSanté).
GIZ. (2022a). *ProSanté II: Project Progress Report*.
GIZ. (2022b). *Togo: Health System Strengthening—Sexual and Reproductive Health and Rights (ProSanté)*. https://www.giz.de/en/downloads/giz2022-en-factsheet-ProSanté.pdf
Glanz, K., & Bishop, D. B. (2010). The Role of Behavioral Science Theory in Development and Implementation of Public Health Interventions. *Annual Review of Public Health*, *31*(1), 399–418. https://doi.org/10.1146/annurev.publhealth.012809.103604
GloH20. (n.d.). *MSWX Multi-Source Weather* [Data set]. Retrieved https://www.gloh2o.org/mswx/
Gnaro, T., Ali, A., Adom, A., Abiassi, E. S., Degbey, C., Douti, Y., Messan, D. K., Sopoh, G. E., & Ekouevi, D. K. (2022). Assessing Biomedical Solid and Liquid Waste Management in University Hospital Centers (CHU) in Togo, 2021. *Open Journal of Epidemiology*, *12*(04), 401–420. https://doi.org/10.4236/ojepi.2022.124033
Gobena, T., & Mengistu, D. A. (2025). Impact of Climate Variability on Foodborne Diarrheal Disease: Systematic Review and Meta-Analysis. *Public Health Reviews*, *46*, 1607859. https://doi.org/10.3389/phrs.2025.1607859
GOGLA. (2024). *Togo: The Voice of the Off-Grid Solar Energy Industry*. https://gogla.org/wp-content/uploads/2024/11/Togo-Country-Brief.pdf?utm_source=chatgpt.com
Gonah, L., & Nomatshila, S. C. (2024). Social and Behavioural Change Communication Challenges, Opportunities and Lessons from Past Public Health Emergencies and Disease Outbreaks: A Scoping Review. *Annals of Global Health*, *90*(1), 62. https://doi.org/10.5334/aogh.4418
GPMB. (2019). *Annual report on global preparedness for health emergencies* (A World at Risk). Global Preparedness Monitoring Board. https://www.gpmb.org/docs/librariesprovider17/default-document-library/annual-reports/gpmb-2019-annualreport-en.pdf?sfvrsn=bd1b8933_36
Guerra, J., Davi, K. M., Rafael, F. C., Assane, H., Imboua, L., Diallo, F. B. T., Tamekloe, T. A., Kuassi, A. K., Ouro-kavalah, F., Tchaniley, G., Ouro-Nile, N., & Nabeth, P. (2020). Case

study of Argus in Togo: An SMS and web-based application to support public health surveillance, results from 2016 to 2019. *PLOS ONE*, *15*(12), e0243131. https://doi.org/10.1371/journal.pone.0243131

Handebo, S., Sharma, R., Simireta, T., Addissie, H., Endalew, G. B., Girma, E., & Mossa, K. A. (2024). Social and behavior change communication competency among front-line healthcare system actors in Ethiopia: A cross-sectional study. *BMC Public Health*, *24*(1), 663. https://doi.org/10.1186/s12889-024-18084-x

Henley, P., Igihozo, G., & Wotton, L. (2021). One Health approaches require community engagement, education, and international collaborations—A lesson from Rwanda. *Nature Medicine*, *27*(6), 947–948. https://doi.org/10.1038/s41591-021-01350-5

Howard, G., Calow, R., Macdonald, A., & Bartram, J. (2016). Climate Change and Water and Sanitation: Likely Impacts and Emerging Trends for Action. *Annual Review of Environment and Resources*, *41*(1), 253–276. https://doi.org/10.1146/annurev-environ-110615-085856

IAS. (2025). *La réponse au VIH au Togo en 2025*. International Aids Society. https://www.iasociety.org/sites/default/files/EduFund/meeting-material/togo/La-réponse-au-VIH-au-Togo-en-2025---Abalo-LIMAZIE.pdf

IHME. (2023). *Global Burden of Disease Study 2023 (GBD 2023) Data Resources* (Institute for Health Metrics and Evaluation) [Data set]. GHDx. https://ghdx.healthdata.org/gbd-2023

IMF. (2025). *Digital Payment Innovations in Sub-Saharan Africa* (African Department). International Monetary Fund. https://www.imf.org/-/media/files/publications/dp/2025/english/dpdpiea.pdf?utm_source=chatgpt.com

INSEED. (2017). *Togo MICS6: Rapport des résultats de l'enquête* (Enquête Par Grappes à Indicateurs Multiples). Ministère de la Santé et de l'Hygiène Publique. https://mics-surveys-prod.s3.amazonaws.com/MICS6/West%20and%20Central%20Africa/Togo/2017/Survey%20findings/Togo%202017%20MICS%20SFR-v2_French.pdf

INSEED. (2021). *Togo—Enquête Harmonisée sur les Conditions de Vie des Ménages* ((TGO EHCVM-2)). Institut National de la Statistique et des Etudes Economiques et Demographiques.

INSEED. (2022). *Résultats définitifs du RGPH-5 de Novembre 2022*. Institut National de la Statistique et des Etudes Economiques et Demographiques. https://inseed.tg/resultats-definitifs-du-rgph-5-novembre-2022/

INSEED. (2023). *Annuaire Statistique National 2023*. Institut National de la Statistique et des Etudes Economiques et Demographiques. https://inseed.tg/download/7009/?tmstv=1763127098

International Monetary Fund. (2025). *Togo: First Review Under the Extended Credit Facility Arrangement-Press Release; Staff Report; and Statement by the Executive Director for Togo*. International Monetary Fund. https://doi.org/10.5089/9798400298240.002

International Monetary Fund. African Dept. (2024). Togo. *IMF Staff Country Reports*, *2024*(300), 1. https://doi.org/10.5089/9798400291227.002

IPCC. (2019). *Climate Change and Land: IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems* (1st edn). Cambridge University Press. https://doi.org/10.1017/9781009157988

IPCC. (2023a). *Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (1st edn). Cambridge University Press. https://doi.org/10.1017/9781009325844

IPCC. (2023b). *Climate Change 2022 – Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (1st edn). Cambridge University Press. https://doi.org/10.1017/9781009325844

ITU. (n.d.). *DataHub: Togo* [Data set]. Retrieved https://datahub.itu.int/data/?e=TGO&utm

ITU. (2022). *Togo* [Data set]. Internet Pulse Society. https://pulse.internetsociety.org/en/reports/TG/

Jannati, A., Sadeghi, V., Imani, A., & Saadati, M. (2018). Effective coverage as a new approach to health system performance assessment: A scoping review. *BMC Health Services Research*, *18*(1), 886. https://doi.org/10.1186/s12913-018-3692-7
John Hopkins. (2025). *Climate Impact on MNCH, Malaria, and Diarrheal Disease: Improving health resilience to climate change in Togo*. John Hopkins Center for Communication Programs. https://ccp.jhu.edu/projects/climate-impact-on-mhch-malaria-and-diarrheal-disease/#:~:text=The%20Johns%20Hopkins%20Center%20for,the%20northern%20regions%20of%20Togo
Joint SDG Fund. (2020). *Togo Joint Programme Document*. https://mptf.undp.org/sites/default/files/documents/2022-12/prodoc-togo_fc1_2020_joint_sdg_fund_redacted.pdf
Kaglan, E. (2024). Authorities in Togo are cracking down on media and the opposition, report says ahead of election. *AP News*. https://apnews.com/article/togo-election-constitution-protests-arrests-freedom-1816c11e1562c630f05daf800c850354
Kaglan, E. (2025). Togo suspends French state-owned broadcasters RFI and France 24 for alleged biased reporting. *AP News*. https://apnews.com/article/togo-suspension-rfi-france-24-reporting-38db0a35046c106b02c3fe51359be71c
Kemp, S. (2025). *Digital 2025: Togo* (Data Reportal) [Data set]. https://datareportal.com/reports/digital-2025-togo?
Klapper, L., Singer, D., Starita, L., & Norris, A. (2025). *The Global Findex Database 2025: Connectivity and Financial Inclusion in the Digital Economy*. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-2204-9
Komba, E. B., Balan, R. T., & Ismail, Dr. A. (2024). Contributions of time, temperature and humidity on the biting behaviour of anopheles funestus at Lupiro village in Morogoro, Tanzania. *Acta Entomology and Zoology*, *5*(2), 47–53. https://doi.org/10.33545/27080013.2024.v5.i2a.155
Kombate, G., Kone, I., Douti, B., Soubeiga, K. A.-M., Grobbee, D. E., & Van Der Sande, M. A. B. (2024). Malaria risk mapping among children under five in Togo. *Scientific Reports*, *14*(1), 8213. https://doi.org/10.1038/s41598-024-58287-1
Kyu, H. H., Vongpradith, A., Dominguez, R.-M. V., Ma, J., Albertson, S. B., Novotney, A., Khalil, I. A., Troeger, C. E., Doxey, M. C., Ledesma, J. R., Sirota, S. B., Bender, R. G., Swetschinski, L. R., Cunningham, M., Spearman, S., Abate, Y. H., Abd Al Magied, A. H. A., Abd ElHafeez, S., Abdoun, M., … Murray, C. J. L. (2025). Global, regional, and national age-sex-specific burden of diarrhoeal diseases, their risk factors, and aetiologies, 1990–2021, for 204 countries and territories: A systematic analysis for the Global Burden of Disease Study 2021. *The Lancet Infectious Diseases*, *25*(5), 519–536. https://doi.org/10.1016/S1473-3099(24)00691-1
Lakhoo, D. P., Blake, H. A., Chersich, M. F., Nakstad, B., & Kovats, S. (2022). The Effect of High and Low Ambient Temperature on Infant Health: A Systematic Review. *International Journal of Environmental Research and Public Health*, *19*(15), 9109. https://doi.org/10.3390/ijerph19159109
Lakhoo, D. P., Brink, N., Radebe, L., Craig, M. H., Pham, M. D., Haghighi, M. M., Wise, A., Solarin, I., Luchters, S., Maimela, G., Chersich, M. F., Heat-Health Study Group, Chikandiwa, A., Nakstad, B., Wright, C. Y., Brimicombe, C., Technau, K.-G., Harden, L., Boeckmann, M., … Brink, N. (2025). A systematic review and meta-analysis of heat exposure impacts on maternal, fetal and neonatal health. *Nature Medicine*, *31*(2), 684–694. https://doi.org/10.1038/s41591-024-03395-8
Levy, K., Smith, S. M., & Carlton, E. J. (2018). Climate Change Impacts on Waterborne Diseases: Moving Toward Designing Interventions. *Current Environmental Health Reports*, *5*(2), 272–282. https://doi.org/10.1007/s40572-018-0199-7

Levy, K., Woster, A. P., Goldstein, R. S., & Carlton, E. J. (2016). Untangling the Impacts of Climate Change on Waterborne Diseases: A Systematic Review of Relationships between Diarrheal Diseases and Temperature, Rainfall, Flooding, and Drought. *Environmental Science & Technology*, *50*(10), 4905–4922. https://doi.org/10.1021/acs.est.5b06186
MAEDR. (2021). *Programme de Résilience du Système Alimentaire d'Afrique de l'Ouest pour le Togo (FSRP) (P172769): Cadre de Gestion Environnementale et Sociale (CGES)—Togo.* Ministère de l'Agriculture, de l'Élevage et du Développement Rural (MAEDR). https://agriculture.gouv.tg/wp-content/uploads/2021/07/Togo_CGES_P172769_FSRP_19July2021.pdf
MAEH. (2017). *Programme National d'investissement Agricole, de Sécurité Alimentaire et Nutritionnelle—(PNIASAN 2017-2026)* (2ième Génération Du PNIA). Ministère de l'Agriculture, de l'Élevage et de l'Hydraulique. https://faolex.fao.org/docs/pdf/tog211300.pdf
McElroy, S., Ilango, S., Dimitrova, A., Gershunov, A., & Benmarhnia, T. (2022). Extreme heat, preterm birth, and stillbirth: A global analysis across 14 lower-middle income countries. *Environment International*, *158*, 106902. https://doi.org/10.1016/j.envint.2021.106902
MEF. (2024). *Budget Vert 2024 Togo*. Ministère de l'Économie et des Finances, Direction Générale du Budget et des Finances. https://finances.gouv.tg/wp-content/uploads/2024/03/BUDGET-VERT-EXCERCICE-2024-TOGO.pdf?utm_source=chatgpt.com
Megersa, D. M., & Luo, X.-S. (2025). Effects of Climate Change on Malaria Risk to Human Health: A Review. *Atmosphere*, *16*(1), 71. https://doi.org/10.3390/atmos16010071
MENTD. (2022). *Togo Digital 2025*. Ministère de l'Économie Numérique et de la Transformation Digitale. https://numerique.gouv.tg/wp-content/uploads/2024/05/FR-Strategie-Togo-Digital-2025.pdf
MERF. (2013). *Stratégie Nationale de Réduction des Risques et des Catastrophes Naturelle (2013-2017)*. Ministère de l'Environnement et des Ressources Forestières. https://disasterlaw.ifrc.org/sites/default/files/media/disaster_law/2022-02/National%20Strategy%20for%20Disaster%20Risk%20reduction%202013-2017-French.pdf
MERF. (2018a). *Plan National d'Adaptation aux Changements Climatiques du Togo*. https://faolex.fao.org/docs/pdf/Tog192045.pdf
MERF. (2018b). *Plan National d'Adaptation aux Changements Climatiques du Togo (PNACC)*. Ministère de l'Environnement et des Ressources Forestières. https://faolex.fao.org/docs/pdf/Tog192045.pdf
MERF. (2021a). *Contributions déterminées au niveau national (CDN) révisées*. République Togolaise. https://unfccc.int/sites/default/files/NDC/2022-06/CDN%20Revisées_Togo_Document%20intérimaire_rv_11%2010%2021.pdf
MERF. (2021b). *Plan national de réduction des polluants atmosphériques et climatiques de courte durée de vie au Togo*. https://www.ccacoalition.org/fr/policy-database/plan-national-de-reduction-des-polluants-atmospheriques-et-climatiques-de-courte-duree-de-vie-de-togo
MERF. (2022). *Quatrième Communication Nationale sur les Changements Climatiques au CCNUCC*. Ministère de l'Environnement et des Ressources Forestières.
MERF. (2025). *Stratégie Nationale de Mobilité Électrique Sensible au Genre 2026-2030*. GEF, UNEP.
MERF, Direction de l'Environnement. (2018). *Programme-Pays Fonds Vert du Climat au Togo*. GCF. https://www.greenclimate.fund/document/togo-country-programme
MERF, WBG. (2017). *Plan d'Actions pour le Développement et l'Adaptation aux Changements Climatiques du Littoral Togolais* (West Africa Coastal Areas Management Program (WACA)). https://documents1.worldbank.org/curated/en/490631516737612568/pdf/Plan-dActions-pour-le-Developpement-et-lAdaptation-aux-Changements-Climatiques-du-Littoral-Togolais.pdf

MERFPCCC. (2025). *La qualité de l'air désormais surveillée au Togo* [Ministère de l'Environnement, des Ressources Forestières, de la Protection Côtière et du Changement Climatique]. https://environnement.gouv.tg/la-qualite-de-lair-desormais-surveillee-au-togo/
MESPTN. (2021). *Le Togo lance son application 'PassCovidTG' pour faciliter la vérification des Pass COVID-19 dans la vie quotidienne* [Online post]. https://numerique.gouv.tg/le-togo-lance-son-application-passcovidtg-pour-faciliter-la-verification-des-pass-covid-19-dans-la-vie-quotidienne/
MFWA. (2021). Three Journalists Arrested, Critical Local Chief Summoned. *Media Foundation for West Africa*. https://mfwa.org/three-journalists-arrested-critical-local-chief-summoned/
Microsave Consulting. (2023). *Final report: Indigenous Financial Service research in Kenya, Ghana, and Togo*. https://www.microsave.net/wp-content/uploads/2024/03/240321-Indigenous-Financial-Services-Research-in-Kenya-Ghana-and-Togo-final-report_PA_VP-RGnm.pdf
Miller, A. G., Miller-Petrie, M. K., Williams, R. B., Klohmann, C., O'Neill, B., Hess, J., & Levy, K. (2025). Projections of climate change-attributable diarrhea burden: A systematic review. *Environmental Research Letters*, *20*(5), 053008. https://doi.org/10.1088/1748-9326/adccd8
MIT. (2018). *Plan d'action national pour la mise en place du cadre national pour les services climatologiques (CNSC) au Togo*. Ministère des Infrastructures et du Transport, Direction Générale de la Météorologie Nationale. https://faolex.fao.org/docs/pdf/tog224604.pdf
MPDAT. (2015). *Troisième Enquête Démographique et de Santé (EDST-III 2013-2014)* (Enquête Démographique et de Santé 2013-2014). Ministère de la Planification, du Développement et de l'Aménagement du Territoire, Direction Générale de la Statistique et de la Comptabilité Nationale. https://www.dhsprogram.com/pubs/pdf/FR301/FR301.pdf
MSHP. (2013). *Normes sanitaires du Togo*. Ministère de la Santé et de l'Hygiène Publique.
MSHP. (2014). *Plan Stratégique de Lutte Contre le Cholera 2015-2017*. Ministère de la Santé. https://plateformecholera.info/sites/default/files/2022-11/Plan%20Strategique%20de%20lutte%20contre%20le%20cholera%20Togo%202015-2017_vf.pdf
MSHP. (2020a). *Dialogue Multipartite de 2020: Togo, Additional Financing to the COVID-19 Emergency Response and System Preparedness Strengthening Project. Rapport Final*. Ministère de la Santé, de l'Hygiène Publique et de l'Accès Universel aux Soins. https://www.gavi.org/sites/default/files/document/2020/Togo-Joint-Appraisal-2020_FR.pdf
MSHP. (2020b). *Plan National d'Adaptation pour le Secteur de la Santé aux Effets des Changements Climatiques (PNAS) 2020-2025*. https://www.fao.org/faolex/results/details/en/c/LEX-FAOC225814/#:~:text=Le%20pr%C3%A9sent%20Plan%20National%20d,de%20sant%C3%A9%20face%20aux%20changements
MSHP. (2022a). *Annuaire des Statistiques Sanitaires*. Ministère de la Santé et de l'Hygiène Publique, Direction du Système National d'information Sanitaire et de l'Information. https://sante.gouv.tg/wp-content/uploads/2024/04/Annuaire_Statistique_2022.pdf
MSHP. (2022b). *Plan National de Développement Sanitaire (PNDS) 2023-2027*. Ministère de la Santé, de l'Hygiène Publique et de l'Accès Universel aux Soins. https://sante.gouv.tg/wp-content/uploads/2024/09/Finalise_OKTogo_PNDS_version-validee-ce-06-05-2023-du14-10-2023-3.pdf
MSHP. (2023a). *Politique National de Santé Horizon 2030*. Ministère de la Santé, de l'Hygiène Publique et de l'Accès Universel aux Soins. https://sante.gouv.tg/wp-content/uploads/2024/09/Final_PNS_Togo_Horizon_2030_version-du-12-03-2023.pdf

MSHP. (2023b). *Programme National de Lutte Contre le Paludisme 2023-2026*. Ministère de la Santé et de l'Hygiène Publique - Direction Générale de l'Action Sanitaire et Direction de la Lutte contre la Maladie et des Programmes de Santé Publique.
MSHP, Direction Générale des Études de la Planification et de l'Information Sanitaire. (2019). *Annuaire des Statistiques Sanitaire du Togo*. https://sante.gouv.tg/wp-content/uploads/2021/06/Annuaire-2019_final_V2.pdf
MSHPAUS. (2021). *Projet des services de santé essentiels de qualité pour une couverture sanitaire universelles (P174266)—Plan de gestion des déchets dangereux 2021-2025*. https://documents1.worldbank.org/curated/en/754281612302130123/pdf/Hazardous-non-Hazardous-Waste-Management-Plan-Togo-Essential-Quality-Health-Services-For-Universal-Health-Coverage-Project-P174266.pdf
MSHPAUS. (2022). Le projet SURGE entre dans sa phase opérationelle au Togo. *News*. https://sante.gouv.tg/le-projet-surge-entre-dans-sa-phase-operationnelle-au-togo/
MSHPAUS. (2023). *Note de service portant nomination des membres de la Task Force relative aux changement climatiques*. Secrétariat Général.
MSHPAUS. (2024a). *Le Togo construit un centre national de santé digitale, une révolution numérique au service du développement humain*. https://sante.gouv.tg/le-togo-construit-un-centre-national-de-sante-digitale-une-revolution-numerique-au-service-du-developpement-humain/
MSHPAUS. (2024b). *Rapport annuel de performance 2023*. https://sante.gouv.tg/wp-content/uploads/2025/05/Rapport-annuel-de-performance-2023_MSHP_VF.pdf
MSHPAUS. (2025). *Rapport Annuel de Performance du Secteur de la Santé 2024*. https://sante.gouv.tg/wp-content/uploads/2025/10/Rapport-annuel-de-performance-2024_MSHP_VF_07072025_Okok.pdf
MSPC. (2016). *La Politique Nationale de la Protection Civile Horizon 2030* (Document de Politique Pour La Période 2017-2030). Ministère de la Sécurité et de la Protection Civile. https://anpctogo.tg/wp-content/uploads/2019/12/LA-POLITIQUE-NATIONALE-DE-LA-PROTECTION-CIVILE-HORIZON-2030.pdf
MSPC. (2020). *Plan National de Contingence Multirisques du Togo*. Ministère de la Sécurité et de la Protection Civile. https://disasterlaw.ifrc.org/sites/default/files/media/disaster_law/2022-02/National%20Multi-Risk%20Contingecy%20Plan%202020-2021%20-%20French.pdf
Nakoro, A., Komi Koukoura, K., Titone, B., & Tchacondo, T. (2022). Biomedical Waste Management in Public Health Centers in Lome, Togo. *African Journal of Biomedical Research*, *25*(2), 181–184. https://doi.org/10.4314/ajbr.v25i2.10
Nakstad, B., Filippi, V., Lusambili, A., Roos, N., Scorgie, F., Chersich, M. F., Luchters, S., & Kovats, S. (2022a). How Climate Change May Threaten Progress in Neonatal Health in the African Region. *Neonatology*, *119*(5), 644–651. https://doi.org/10.1159/000525573
Nakstad, B., Filippi, V., Lusambili, A., Roos, N., Scorgie, F., Chersich, M. F., Luchters, S., & Kovats, S. (2022b). How Climate Change May Threaten Progress in Neonatal Health in the African Region. *Neonatology*, *119*(5), 644–651. https://doi.org/10.1159/000525573
NASA. (n.d.). *Downscaled Climate Projections (NEX-GDDP-CMIP6)* (National Aeronautics and Space Administration) [Data set]. https://doi.org/10.7917/OFSG3345
Niman, S. A., Koledzi, E. K., & Krou, N. M. (2025). Analysis of the Correlation Between the Governance and Quality of Biomedical Waste Management in Public Health Facilities in Togo, 2024. *International Journal of Environmental Research and Public Health*, *22*(7), 1089. https://doi.org/10.3390/ijerph22071089
Notre Dame Global Adaptation Initiative. (2023). *Country Rankings: Togo*. ND-Gain Country Index. https://gain.nd.edu/our-work/country-index/rankings/
Ohuma, E. O., Moller, A.-B., Bradley, E., Chakwera, S., Hussain-Alkhateeb, L., Lewin, A., Okwaraji, Y. B., Mahanani, W. R., Johansson, E. W., Lavin, T., Fernandez, D. E., Domínguez,

G. G., De Costa, A., Cresswell, J. A., Krasevec, J., Lawn, J. E., Blencowe, H., Requejo, J., & Moran, A. C. (2023). National, regional, and global estimates of preterm birth in 2020, with trends from 2010: A systematic analysis. *The Lancet*, *402*(10409), 1261–1271. https://doi.org/10.1016/S0140-6736(23)00878-4
OMS. (2022a). *Assurer la sécurité sanitaire dans la Région africaine: Projets phares en matière de préparation et de riposte aux situations d'urgence*. Organisation mondiale de la santé.
OMS. (2022b). Gestion des urgences sanitaires en Afrique: 50 experts du Togo formés dans le cadre de la mise en oeuvre du projet SURGE. *News*. https://www.afro.who.int/fr/countries/togo/news/gestion-des-urgences-sanitaires-en-afrique-50-experts-du-togo-formes-dans-le-cadre-de-la-mise-en
Orabank Togo. (2020). *Conditions Générales de Banque*. https://www.orabank.net/sites/default/files/condition_de_banque_otg_interactif_edition_2020_v2.pdf
Passike Pokona, E., Boko, E., Yaka, P., & Kone, B. (2024a). Healthcare Professionals' Perception of the Link Between Climate Variability and Respiratory Diseases in Northern and Southern Togo: A Case Study of Asthma in Savanah Region and Grand-Lome. *American Journal of Public Health Research*, *12*(2), 33–39. https://doi.org/10.12691/ajphr-12-2-3
Passike Pokona, E., Boko, E., Yaka, P., & Kone, B. (2024b). Impacts of Climate Change on Respiratory Health, Case of Asthma: A Comprehensive 24-Year Review (2000 To 2023) of Current Trends and Future Perspectives. *American Journal of Public Health Research*, *12*(1), 1–7. https://doi.org/10.12691/ajphr-12-1-1
Passike Pokona, E., Boko, E., Yaka, P., & Kone, B. (2025). Climate Variability and Asthma Attacks in Two Climatic Zones in Togo: The Case of the Savanes Region in a Unimodal Sahelian Area and the Case of the Grand-Lome Region in a Bimodal Coastal Area. In W. Leal Filho, M. Kovaleva, M. A. P. Dinis, J. M. Luetz, F. Alves, G. J. Nagy, S. Yaffa, D. Yayeh Ayal, & J. Kalungu (Eds), *Climate Change Mitigation and Adaptation in Practice* (pp. 269–296). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-85217-6_15
Perez-Saez, J., Lessler, J., Lee, E. C., Luquero, F. J., Malembaka, E. B., Finger, F., Langa, J. P., Yennan, S., Zaitchik, B., & Azman, A. S. (2022). The seasonality of cholera in sub-Saharan Africa: A statistical modelling study. *The Lancet Global Health*, *10*(6), e831–e839. https://doi.org/10.1016/S2214-109X(22)00007-9
Philipsborn, R., Ahmed, S. M., Brosi, B. J., & Levy, K. (2016). Climatic Drivers of Diarrheagenic *Escherichia coli* Incidence: A Systematic Review and Meta-analysis. *Journal of Infectious Diseases*, *214*(1), 6–15. https://doi.org/10.1093/infdis/jiw081
PMI. (2023). *Togo Malaria Profile*. USAID, President's Malaria Initiative. https://mesamalaria.org/wp-content/uploads/2025/04/TOGO-Malaria-Profile-PMI-FY-2024.pdf?utm_source=chatgpt.com
PMI. (2024). *Togo Malaria Operational Plan*. USAID, President's Malaria Initiative. https://files.givewell.org/files/DWDA%202009/SMC/US_President%27s_Malaria_Initiative_Togo_Malaria_Operational_Plan_2024.pdf
Powers, J. E., Mureithi, M., Mboya, J., Campolo, J., Swarthout, J. M., Pajka, J., Null, C., & Pickering, A. J. (2023). Effects of High Temperature and Heavy Precipitation on Drinking Water Quality and Child Hand Contamination Levels in Rural Kenya. *Environmental Science & Technology*, *57*(17), 6975–6988. https://doi.org/10.1021/acs.est.2c07284
Reddam, A., Mujtaba, M. N., Tuholske, C., Kaali, S., Ae-Ngibise, K. A., Wylie, B. J., Medgyesi, D. N., Boamah-Kaali, E., Baccarelli, A. A., Agyei, O., Chillrud, S. N., Asante, K. P., Jack, D. W., Lee, A. G., & Abubakari, S. W. (2025). Prenatal exposure to heat and humidity and infant birth size in Ghana. *Environmental Research*, *266*, 120557. https://doi.org/10.1016/j.envres.2024.120557

République Togolaise. (2018). *Plan National de Développement (PND) 2018-2022*. https://www.togofirst.com/media/attachments/2019/04/02/-pnd-2018-2022.pdf
République Togolaise. (2020). *Feuille de Route Gouvernmentale—Togo 2025*. https://www.ctc-n.org/sites/www.ctc-n.org/files/2022-09/Feuille%20de%20Route%20gouvernementale%20du%20Togo%202025_1.pdf
Reuters. (2025). *Togo suspends RFI and France 24 for three months, communications authority says*. https://www.reuters.com/business/media-telecom/togo-suspends-rfi-france-24-three-months-communications-authority-says-2025-06-16/?utm_source=chatgpt.com
Romanello, M., Di Napoli, C., Drummond, P., Green, C., Kennard, H., Lampard, P., Scamman, D., Arnell, N., Ayeb-Karlsson, S., Ford, L. B., Belesova, K., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., Van Daalen, K. R., Dalin, C., Dasandi, N., … Costello, A. (2022a). The 2022 report of the Lancet Countdown on health and climate change: Health at the mercy of fossil fuels. *The Lancet*, *400*(10363), 1619–1654. https://doi.org/10.1016/S0140-6736(22)01540-9
Romanello, M., Di Napoli, C., Drummond, P., Green, C., Kennard, H., Lampard, P., Scamman, D., Arnell, N., Ayeb-Karlsson, S., Ford, L. B., Belesova, K., Bowen, K., Cai, W., Callaghan, M., Campbell-Lendrum, D., Chambers, J., Van Daalen, K. R., Dalin, C., Dasandi, N., … Costello, A. (2022b). The 2022 report of the Lancet Countdown on health and climate change: Health at the mercy of fossil fuels. *The Lancet*, *400*(10363), 1619–1654. https://doi.org/10.1016/S0140-6736(22)01540-9
Romanello, M., Walawender, M., Hsu, S.-C., Moskeland, A., Palmeiro-Silva, Y., Scamman, D., Smallcombe, J. W., Abdullah, S., Ades, M., Al-Maruf, A., Ameli, N., Angelova, D., Ayeb-Karlsson, S., Ballester, J., Basagaña, X., Bechara, H., Beggs, P. J., Cai, W., Campbell-Lendrum, D., … Costello, A. (2025). The 2025 report of the Lancet Countdown on health and climate change. *The Lancet*, S0140673625019191. https://doi.org/10.1016/S0140-6736(25)01919-1
RSF. (2023). *Togo 2023: Media landscape*. Reporters Without Borders. https://rsf.org/en/analyse_regionale/933?utm_source=chatgpt.com
Schmuck, H., Kienberger, S., Belluard, C., & Bassong, O. (2019). *Rapport final: Étude des risques et vulnérabilités liés au changement climatique dans le secteur de la santé au Togo.* EPOS/ Adelphi sur mandat de la GIZ (2022).
Smith, A. (2019). *UNDRR/ ISC Sendai Hazard Definition and Classification Review*. https://www.researchgate.net/publication/338124450_UNDRR_ISC_Sendai_Hazard_Definition_and_Classification_Review/citation/download
S&P Global Ratings. (2025). *Togo Upgraded to 'B+' On Solid Economic Prospects; Oulook Stable*. https://www.spglobal.com/ratings/es/regulatory/article/-/view/type/HTML/id/3355783
Spatial and demographic patterns of climate related diseases among hospitalised children in parts of Southwest Nigeria. (2020). *HUMAN GEOGRAPHIES – JOURNAL OF STUDIES AND RESEARCH IN HUMAN GEOGRAPHY*, *14*(1). https://doi.org/10.5719/hgeo.2020.141.4
Suhr, F., & Steinert, J. I. (2022a). Epidemiology of floods in sub-Saharan Africa: A systematic review of health outcomes. *BMC Public Health*, *22*(1), 268. https://doi.org/10.1186/s12889-022-12584-4
Suhr, F., & Steinert, J. I. (2022b). Epidemiology of floods in sub-Saharan Africa: A systematic review of health outcomes. *BMC Public Health*, *22*(1), 268. https://doi.org/10.1186/s12889-022-12584-4
Symons, T. L., Moran, A., Balzarolo, A., Vargas, C., Robertson, M., Lubinda, J., Saddler, A., McPhail, M., Harris, J., Rozier, J., Browne, A., Amratia, P., Bertozzi-Villa, A., Bhatt, S., Cameron, E., Golding, N., Smith, D. L., Noor, A. M., Rumisha, S. F., … Gething, P. W. (2025). *Projected ecological and disruptive impacts of climate change on malaria in Africa*. Infectious Diseases (except HIV/AIDS). https://doi.org/10.1101/2025.02.11.25322113
Techniques and Methods (Techniques and Methods). (2020). [Techniques and Methods].

Thomas, A., Bakai, T. A., Atcha-Oubou, T., Tchadjobo, T., Bossard, N., Rabilloud, M., & Voirin, N. (2021). Seasonality of confirmed malaria cases from 2008 to 2017 in Togo: A time series analysis by health district and target group. *BMC Infectious Diseases*, *21*(1), 1189. https://doi.org/10.1186/s12879-021-06893-z

Thomas, A., Bakai, T. A., Atcha-Oubou, T., Tchadjobo, T., Rabilloud, M., & Voirin, N. (2024). Exploring malaria prediction models in Togo: A time series forecasting by health district and target group. *BMJ Open*, *14*(1), e066547. https://doi.org/10.1136/bmjopen-2022-066547

TogoCheck. (2024). *COAWEB/TOGOCHECK lance RadioCheck Togo pour lutter contre la désinformation dans la région septentrionale du pays*. https://www.togocheck.com/coaweb-togocheck-lance-radiocheck-togo-pour-lutter-contre-la-desinformation-dans-la-region-septentrionale-du-pays/?utm_source=chatgpt.com

TRC. (2023). *The Common Alerting Protocol to support Early Action: The CRT's journey from early warning to impact-based forecasting in Togo* [Togo: Early Warning Early Action. Case Study]. IFRC- Togolese Red Cross. https://preparecenter.org/wp-content/uploads/2024/03/IFRC_Togo-EWEA_Case-study_EN_incl_add-on.pdf?utm_source=chatgpt.com

Tsolenyanu, E., Djadou, K. E., Fiawoo, M., Akolly, D. A. E., Mwenda, J. M., Leshem, E., Tate, J. E., Aliabadi, N., Koudema, W., Guedenon, K. M., Godonou, M., Dagnra, A., Gbadoe, A. D., Boko, A., Landoh, D., Atakouma, Y., & Parashar, U. D. (2018). Evidence of the impact of monovalent rotavirus vaccine on childhood acute gastroenteritis hospitalization in Togo. *Vaccine*, *36*(47), 7185–7191. https://doi.org/10.1016/j.vaccine.2018.01.058

Tsolenyanu, E., Seheri, M., Dagnra, A., Djadou, E., Tigossou, S., Nyaga, M., Adjeoda, E., Armah, G., Mwenda, J. M., & Atakouma, Y. (2014). Surveillance for Rotavirus Gastroenteritis in Children Less Than 5 Years of Age in Togo. *Pediatric Infectious Disease Journal*, *33*(Supplement 1), S14–S18. https://doi.org/10.1097/INF.0000000000000046

UN Department of Economic and Social Affairs. (n.d.). *Least Developed Country Category: Togo Profile* (UNDESA) [Data set]. Retrieved 25 March 2025, from https://www.un.org/development/desa/dpad/least-developed-country-category-togo.html

UN IGME. (2025). *Stillbirth data* [Data set]. https://data.unicef.org/topic/child-survival/stillbirths/#data

UNDP. (2021). *Human development surmmary capturing achievements in the HDI and complementarity metrics that take into account gender gaps, inequality, planetary pressures and multidimensional poverty*. Human Development Reports. https://hdr.undp.org/data-center/specific-country-data#/countries/TGO

UNDRR. (2023). *Inclusive early warning early action: Checklist and implementation guide*. United Nations Office for Disaster Risk Reduction. https://www.undrr.org/publication/inclusive-early-warning-early-action-checklist-and-implementation-guide

UNICEF. (2018). *Togo: Maternal and Newborn Health Disparities*. https://data.unicef.org/wp-content/uploads/cp/maternal-newborn-health/maternal-and-newborn-health_TGO.pdf

UNICEF. (2019). *Cross-sector indicators* [Data set]. https://data.unicef.org/resources/data_explorer/unicef_f/?ag=UNICEF&df=GLOBAL_DATAFLOW&ver=1.0&dq=TGO.CME_SB+CME_ARR_10T19+CME_ARR_SBR+CME_ARR_U5MR+CME_MRM0+CME_PND+CME_SBR+CME_TMM0+CME_TMY0._T.&startPeriod=2009&endPeriod=2019&lastnobservations=1

UNSDG. (2021). In Togo, authorities bet on digital tools to fight COVID-19 and protect the most vulnerable. *Action 2030 Blog*. https://unsdg.un.org/latest/blog/togo-authorities-bet-digital-tools-fight-covid-19-and-protect-most-vulnerable?utm_source=chatgpt.com

URCLEC Togo. (n.d.). *Produits et services*. Retrieved https://urclectogo.com/produits-services/

USAID. (2023). *Evaluation of the Confiance Totale Campaign in Togo*. Breakthrough Action, United States Agency for International Development. https://breakthroughactionandresearch.org/wp-content/uploads/2023/03/Evaluation-of-the-Confiance-Totale-Campaign-in-Togo.pdf
Van Der Deure, T., Nogués-Bravo, D., Njotto, L. L., & Stensgaard, A. (2025). Climate Change Favors African Malaria Vector Mosquitoes. *Global Change Biology*, *31*(11), e70610. https://doi.org/10.1111/gcb.70610
WACA. (2024). *Eight broadcasts in 2023: A satisfactory assessment of WACA Togo's radio du littoral* [West Africa Coastal Areas Management Program]. https://www.wacaprogram.org/article/eight-broadcasts-2023-satisfactory-assessment-waca-togos-radio-du-littoral?utm_source=chatgpt.com
Wang, Y.-Y., Li, Q., Guo, Y., Zhou, H., Wang, Q.-M., Shen, H.-P., Zhang, Y.-P., Yan, D.-H., Li, S., Chen, G., Zhou, S., He, Y., Yang, Y., Peng, Z.-Q., Wang, H.-J., & Ma, X. (2020). Ambient temperature and the risk of preterm birth: A national birth cohort study in the mainland China. *Environment International*, *142*, 105851. https://doi.org/10.1016/j.envint.2020.105851
WASCAL. (2014). *Combating Climaet Change and Improving Livelihoods: The WASCAL Master Programme on Climate Change and Human Security*. https://wascal.org/v3/the-wascal-master-programme-on-climate-change-and-human-security/#:~:text=The%20WASCAL%20Master%20programme%20supports,economics%2C%20institutions%2C%20law%20and%20policy
WaterAid. (2023). *Water, sanitation and hygiene in healthcare facilities: An investment that will save lives*. https://washmatters.wateraid.org/publications/water-sanitation-hygiene-healthcare-facilities-an-investment-that-will-save-lives
WBG. (n.d.-a). *Togo: Featured Indicators* [Data set]. Gender Data Portal. Retrieved https://genderdata.worldbank.org/en/economies/togo?utm_source=chatgpt.com
WBG. (n.d.-b). *Universal Health Coverage (UHC) service coverage index* (World Bank) [Data set]. Global Health Observatory (GHO), World Health Organisation. Retrieved https://data360.worldbank.org/en/indicator/UHC_SCI?view=datatable
WBG. (2017). *Togo—Integrated Disaster and Land Management Project: Implementation support mission—February 13 to 24, 2017*. https://documents.banquemondiale.org/fr/publication/documents-reports/documentdetail/452951492519286994/togo-projet-gestion-int%C3%A9gr%C3%A9e-des-catastrophes-et-des-terres-pgict-mission-dappui-%C3%A0-la-mise-en-oeuvre-du-13-au-24-f%C3%A9vrier-2017
WBG. (2018a). *Regional Disease Surveillance Systems Enhancement (REDISSE) Phase III*. World Bank Group. https://projects.worldbank.org/en/projects-operations/project-detail/P161163
WBG. (2018b). *Togo—Integrated Disaster and Land Management Project: Implementation support mission—February 13 to 24, 2017*. World Bank Group. https://documents.banquemondiale.org/fr/publication/documents-reports/documentdetail/452951492519286994/togo-projet-gestion-int%C3%A9gr%C3%A9e-des-catastrophes-et-des-terres-pgict-mission-dappui-%C3%A0-la-mise-en-oeuvre-du-13-au-24-f%C3%A9vrier-2017
WBG. (2019). *Togo Digital Economy Diagnostic Report*. https://thedocs.worldbank.org/en/doc/61714f214ed04bcd6e9623ad0e215897-0400012021/related/Togo-Digital-Economy-Diagnostic-Report.pdf
WBG. (2020). *Togo Hydromet and Early Warning Services project proposal*. https://crews-initiative.org/sites/default/files/ckeditor/files/workdoc6_8th_Steering_Committee_CREWS_Togo_0.pdf?QlfsWG2iye51LDwHWzijnL1VZ4Own__n

WBG. (2021a). *Climate Risk Profile: Togo*. https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15859-WB_Togo%20Country%20Profile-WEB.pdf
WBG. (2021b). *Togo—Essential Quality Health Services for Universal Health Coverage Project*. World Bank Group. http://documents.worldbank.org/curated/en/885551615773690404
WBG. (2022a). *Prevalence of severe food insecurity in the population (%)—Togo* (World Bank Group) [Data set]. https://data.worldbank.org/indicator/SN.ITK.SVFI.ZS?locations=TG
WBG. (2022b). *School enrolment, secondary (gross), gender parity index (GPI)* [Data set]. https://databank.worldbank.org/source/world-development-indicators/Series/SE.ENR.SECO.FM.ZS
WBG. (2024a). *Togo: $100 Million in Funding to Accelerate Digital Transformation*. https://www.worldbank.org/en/news/press-release/2024/12/19/togo-100-million-in-funding-to-accelerate-digital-transformation?utm_source=chatgpt.com
WBG. (2024b). *Togo- Vue d'ensemble*. https://www.banquemondiale.org/fr/country/togo/overview
WBG. (2025). *Togo Economic Update: Boosting growth and restoring fiscal space in uncertain times*. World Bank Group. https://www.worldbank.org/en/country/togo/publication/togo-economic-update-boosting-growth-and-restoring-fiscal-space-in-uncertain-times
Weiss, D. J., Nelson, A., Vargas-Ruiz, C. A., Gligorić, K., Bavadekar, S., Gabrilovich, E., Bertozzi-Villa, A., Rozier, J., Gibson, H. S., Shekel, T., Kamath, C., Lieber, A., Schulman, K., Shao, Y., Qarkaxhija, V., Nandi, A. K., Keddie, S. H., Rumisha, S., Amratia, P., … Gething, P. W. (2020). Global maps of travel time to healthcare facilities. *Nature Medicine*, *26*(12), 1835–1838. https://doi.org/10.1038/s41591-020-1059-1
Wellcome. (2023). *Climate Impacts Awards: Unlocking urgent climate action by making the health effects of climate change visible*. https://wellcome.org/research-funding/schemes/climate-impacts-awards-unlocking-urgent-climate-action-making-health
WFP. (2022). *Annual Country Report: Togo*. https://www.wfp.org/operations/annual-country-report?operation_id=TG03&year=2022#/25351
WHO. (2010). *Normes essentielles en matière de santé environnementale dans les structures de soins*.
WHO. (2014). *Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s*. World Health Organization. https://iris.who.int/handle/10665/134014
WHO. (2017). *The double burden of malnutrition: Policy brief*. World Health Orgnanization. https://www.who.int/publications/i/item/WHO-NMH-NHD-17.3
WHO. (2018a). *Climate Change and Health in Mozambique: Impact on Diarrhoeal Disease and Malaria*. https://files.aho.afro.who.int/afahobckpcontainer/production/files/20180226_USAID-ATLAS_Mozambique-Health-and-Climate-Change.pdf
WHO. (2018b). *WHO guideline on health policy and system support to optimize community health worker programmes*. World Health Organization.
WHO. (2021). *Global health estimates: Leading causes of DALYs: Disease burden, 2000-2021* (The Global Health Observatory) [Data set]. https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/global-health-estimates-leading-causes-of-dalys
WHO. (2022). *Domestic private health expenditure (% of current health expenditure)—Togo* [Data set]. Global Health Expenditure database. https://data.worldbank.org/indicator/SH.XPD.PVTD.CH.ZS?locations=TG
WHO. (2023a). *Operational framework for building climate resilient and low carbon health systems*. https://www.who.int/publications/i/item/9789240081888

WHO. (2023b). *Rotavirus: Immunization coverage estimates by country* [Data set]. https://apps.who.int/gho/data/node.main.ROTACn
WHO. (2024a). *Communicating on climate change and health: Toolkit for health professionals*. Wold Health Organisation. https://www.who.int/publications/i/item/9789240090224
WHO. (2024b). *Diarrhoeal disease*. https://www.who.int/en/news-room/fact-sheets/detail/diarrhoeal-disease
WHO. (2024c). *Diarrhoeal diseases*. World Health Organisation. https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease
WHO. (2024d). *Health-care waste*. https://www.who.int/news-room/fact-sheets/detail/health-care-waste?utm_source=chatgpt.com
WHO. (2024e). *Togo Country Profile* (Wold Health Organisation) [Data set]. Progress on the triple billion targets. https://www.who.int/about/accountability/results/who-results-report-2024-2025/country-profile/2024/togo?utm
WHO. (2024f). *World malaria report 2024* [Global Malaria Programme]. World Health Orgnanisation. https://www.who.int/publications/i/item/9789240104440
WHO. (2025). *Maternal motality ratio (modeled estimate, per 100,000 live births): Trends in maternal mortality estimates 2000 to 2023* [Data set]. https://genderdata.worldbank.org/en/economies/togo
WHO-Togo. (2024). *Rapport annuel 2024*. World Health Orgnanization. https://www.afro.who.int/sites/default/files/2025-07/RAPPORT%20ANNUEL%20OMS%20TOGO%202024%20FINAL%20%20-%20OK.pdf#:~:text=Le%20nombre%20de%20laboratoires%20ayant,des%20services%20de%20biologie%20médicale
WHO-UNICEF Joint Monitoring Programme. (2025). *Progress on household drinking water, sanitation and hygiene 2020-2024: Special focus on inequalities*. https://washdata.org/reports/jmp-2025-wash-households
WMO. (2018). *Global Framework for Climate Services model*. World Meteorological Organisation.
WMO. (2024). *OSCAR/Surface user manual (Release 1.10.2)*. World Meteorological Organisation. https://library.wmo.int/records/item/56451-oscar-surface-user-manual#.XaRg0a6Wapq
Xalam Analytics. (2025). *Togo: Data Center Market Briefing. A strategic overview of the data center investment opportunity in Togo* [Data Governance in Africa]. Global Gateway, African Union. https://cms.d4dhub.eu/assets/Initiatives/Data-Governance-in-Africa/Digital-Investment-Facility/2507_Country-Market-Briefs/Data-Center-Market-Brief-Togo.pdf?utm_source=chatgpt.com
Yang, D., He, Y., Wu, B., Deng, Y., Li, M., Yang, Q., Huang, L., Cao, Y., & Liu, Y. (2020). Drinking water and sanitation conditions are associated with the risk of malaria among children under five years old in sub-Saharan Africa: A logistic regression model analysis of national survey data. *Journal of Advanced Research*, *21*, 1–13. https://doi.org/10.1016/j.jare.2019.09.001
Zebish, M. et al. (2023). *Climate Risk Sourcebook*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. https://www.adaptationcommunity.net/wp-content/uploads/2023/10/giz_2023_Climate_Risk_Sourcebook.pdf