Strengthening Capacity of Rural Primary Health Care Services to Address Adverse Impacts of Climate Change on Health

Sudan | United Nations Development Programme (UNDP)

30 April 2018
Concept Note

Project/Programme Title: Strengthening Capacity of Rural Primary Health Care Services to Address Adverse Impacts of Climate Change on Health

Country(ies): Sudan

National Designated Authority(ies) (NDA): The Higher Council for Environment and Natural Resources (HCENR)

Accredited Entity(ies) (AE): United Nations Development Programme (UNDP)

Date of first submission/version number: [2018-04-30] [V.1]

Date of current submission/version number: [2018-04-30] [V.1]
Notes

- The maximum number of pages should **not exceed 12 pages**, excluding annexes. Proposals exceeding the prescribed length will not be assessed within the indicative service standard time of 30 days.
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### A. Project/Programme Summary (max. 1 page)

<table>
<thead>
<tr>
<th>A.1. Project or programme</th>
<th>☒ Project</th>
<th>☐ Programme</th>
<th>A.2. Public or private sector</th>
<th>☒ Public sector</th>
<th>☐ Private sector</th>
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<tbody>
<tr>
<td>A.3. Is the CN submitted in response to an RFP?</td>
<td>Yes ☐</td>
<td>No ☒</td>
<td>If yes, specify the RFP:</td>
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<td>A.4. Confidentiality¹</td>
<td>☐ Confidential</td>
<td>☒ Not confidential</td>
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#### A.5. Indicate the result areas for the project/programme

- **Mitigation:** Reduced emissions from:
  - ☒ Energy access and power generation
  - ☐ Low emission transport
  - ☐ Buildings, cities and industries and appliances
  - ☐ Forestry and land use

- **Adaptation:** Increased resilience of:
  - ☐ Most vulnerable people and communities
  - ☒ Health and well-being, and food and water security
  - ☐ Infrastructure and built environment
  - ☐ Ecosystem and ecosystem services

#### A.6. Estimated mitigation impact (tCO2eq over lifespan)

- 108,360 tCO2 over 25 years

#### A.7. Estimated adaptation impact (number of direct beneficiaries and % of population)

- 1,500,000 people (750,000 women) in rural and remote communities

#### A.8. Indicative total project cost (GCF + co-finance)

- Amount: USD 72,873,000

#### A.9. Indicative GCF funding requested

- Amount: USD 25,742,000

#### A.10. Mark the type of financial instrument requested for the GCF funding

- ☐ Grant
- ☐ Reimbursable grant
- ☐ Guarantees
- ☐ Equity
- ☐ Subordinated loan
- ☐ Senior Loan
- ☐ Other: specify___________________

#### A.11. Estimated duration of project/programme:

- a) disbursement period: 5 years
- b) repayment period, if applicable: n/a

#### A.12. Estimated project/Programme lifespan

- 25 years

#### A.13. Is funding from the Project Preparation Facility requested?²

- Yes ☐ | No ☒ | Other support received ☐ If so, by who: |

#### A.14. ESS category³

- ☐ A or I-1
- ☒ B or I-2
- ☐ C or I-3

#### A.15. Is the CN aligned with your accreditation standard?

- Yes ☒ | No ☐ |

#### A.16. Has the CN been shared with the NDA?

- Yes ☒ | No ☐ |

#### A.17. AMA signed (if submitted by AE)

- Yes ☒ | No ☐ | If no, specify the status of AMA negotiations and expected date of signing: |

#### A.18. Is the CN included in the Entity Work Programme?

- Yes ☒ | No ☐ |

#### A.19. Project/Programme rationale, objectives and approach of programme/project (max 100 words)

- The World Health Organization (WHO) estimates that climate change will cause an additional 250,000 deaths each year between 2030 and 2050, considering risks from malnutrition, malaria, diarrhoea and heat stress alone. These impacts will be felt especially by vulnerable populations, including children, the elderly and low-income communities. In countries where health systems already struggle to manage existing health risks, and where capacity to adapt to additional climate change-related health risks is limited, the impacts could be devastating.

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¹ Concept notes (or sections of) not marked as confidential may be published in accordance with the Information Disclosure Policy ([Decision B.12/35](#)) and the Review of the Initial Proposal Approval Process ([Decision B.17/18](#)).

² See [here](#) for access to project preparation support request template and guidelines

³ Refer to the Fund’s environmental and social safeguards ([Decision B.07/02](#))
2. In Sudan, increasing temperatures and changing rainfall patterns are resulting in increased incidence of flood and drought, with impacts on health, including water and vector borne diseases and malnutrition. Reduced average rainfall and more frequent flood events are also resulting in a decline in the hydroelectric power on which Sudan relies – limiting options for the reliable energy access critical to health facilities.

3. Consistent with the health and energy priorities detailed in the Nationally Determined Contributions (NDC), the proposed project seeks to strengthen resilience of health systems to climate change impacts, through three complementary Outputs:
   - Integration of climate health information into national health and adaptation strategies;
   - Strengthened capacity for effective climate-health service delivery; and
   - Ensured reliable energy supply for health care facilities in the most climate vulnerable zones.

4. The proposed project focuses on seven climate vulnerable states of Sudan, namely: **North Kordofan, West Kordofan, South Kordofan, Blue Nile, White Nile, River Nile and Sennar.**
In Sudan, health risks are increasing due to climate change, particularly in relation to water and vector borne diseases. Flash floods have led to contamination of water supplies and increased cases of diarrhoea and cholera. Vector breeding zones have expanded in terms of coverage and intensity due to changes in precipitation and exposure-time linked to changes in seasonal patterns. In combination with water collecting in debris left after flood events, vector borne diseases such as malaria, dengue and chikungunya have increased. With communities increasingly exposed to risks, Sudan is considered a high burden and high risk country for vector borne disease, particularly malaria.

These risks are expected to worsen as climate change continues; rainfall patterns across seasons and across the country are changing as average temperatures are increasing. During the advancing rainy season (March through June), rainfall has been increasing between 20mm and 30mm per decade in the northernmost and southernmost areas of the territory, with no change in rainfall patterns evident in other areas. And during the rainy season (June through September), annual rainfall levels have been decreasing between 10mm and 30mm per decade. Temperatures have been steadily increasing in Sudan by 0.2°C - 0.4°C per decade, varying based on location within the country.

With annual rainfall distribution changing and temperatures increasing, there has been an observable increase in the frequency and intensity of extreme events, namely floods and droughts. Increased rainfall during the rainy season and increased incidence of flash floods are also creating an environment for higher rates of vector and water-borne diseases. If the disease rates increase as expected, the climate sensitive diseases would place a heavy toll on local communities and burden the health care system. Similarly, while drought is a recursive phenomenon and frequent drought cycles extending over 2-3 years are common, rainfall records from El Fashir, North Darfur show an increase in drought frequency, with 16 of the 20 driest years recorded since 1972. Drought has serious impacts on health, placing pressure on water and land resources, and therefore on water and food security.

The level of exposure to climate risks for the public health of communities in Sudan is high, largely because health systems are not orientated towards protection and management of climate sensitive health outcomes. Social and environmental factors along with weather and climate determine the level of vulnerability of populations, but these are not adequately considered in health planning and related preparedness. The health system is poorly prepared for the changes in demand expected, related to the geographical distribution, incidence or timing of climate-sensitive health outcomes. Strengthening of the existing health system preparedness and response is considered one of the top priorities of the country to tackle health emergencies.

The Government of Sudan has invested significantly in improving coverage of medical facilities, with a 3.1% increased number of hospitals from 309 in 2000, to 395 in 2008. Primary health care units have also increased from 3,719 units in 2000 to 6,220 units in 2008. With the exception of Khartoum, which has higher coverage, there is, on average, one medical care facility per 6,143 people, which is about 20% less coverage than required. The Federal Ministry of Health (MoH) has increased investment in the healthcare sector and total expenditure on health per capita increased between 2005 and 2013 from USD 34.5 to USD 115.0. This increase over the years has resulted in an increase in health workforce density, specifically for physicians.

While significant investments have been made in the health sector, these do not adequately include the needed analysis and integration of climate change impacts on health. Climate risks and related health impacts must be integrated into health planning to inform the necessary adaptation measures. These challenges were recognized in the National Adaptation Programme of Action (NAPA, 2003), then further highlighted in the National Adaptation Plan (NAP, 2014), with support to the health services featured as an objective and/or priority measure in the Central, Kordofan, and Nile States.
11. With the demand for health services expected to grow as a result of climate change, access to energy for health facilities becomes increasingly urgent. The energy supply in Sudan is currently provided by a mix of hydro and refined oil products, though increased temperatures and drought events are reducing Sudan’s hydroelectric power potential. The power sector in the country is already subject to poor infrastructure and frequent outages. As a backup option, or for off-grid health facilities, small diesel generators are used. Diesel generators however are subject to availability of diesel, as well as the high related costs of operations and maintenance. As a result, health facilities relying on generators are often forced to go without energy. Without reliable energy access, health facilities will struggle to operate – energy is needed for regular operations, as well as to maintain supplies, such as medicines, at the cool temperatures needed for safe storing (i.e. the vaccine cold chain). Vaccine cold chain and logistics systems are central to addressing the immunization efforts led by the government, therefore ensuring the safety and efficiency of the cold chain is critical. Challenges are related particularly to (a) the risks of reduced potency of vaccines administered (e.g. due to poor temperature control, non-functional equipment), and (b) poor availability of immunization supplies (due to inadequate storage capacity, disrupted service delivery, vaccine stock-outs, etc.). Improving cold chain systems is important in expanding effective immunization coverage and further reducing morbidity and mortality due to climate change. Key issues limiting cold chain performance are (1) insufficient cold chain capacity, (2) lack of optimal transport/storage equipment (including system to control temperature excursions), and (3) inadequate temperature monitoring and maintenance systems.

12. There is, however, great untapped potential to explore reliable energy access for health facilities through solar resources. Sudan has abundant solar resources, average solar insolation in the country is roughly 6.1 kWh/m²/day, indicating a high potential for solar energy use. Total potential over the course of a year has been estimated at 10.1 GJ/m². The Sudan Renewable Energy Master Plan, drafted in 2005 promotes the use of renewable energy sources, including priority projects such as PV installations and biomass co-generation, so as to avoid technological dependence on an oil-based market in energy sector development. Significant capacity additions have been made in recent years (1,980 MW from 2003–2011), however, reaching rural or off-grid communities remains a challenge, leaving health facilities dependent on unreliable energy sources.

13. Opportunities exist to upscale and replicate best practices, to improve preparedness and reliability of health services to respond to the increasing health burdens brought about by climate change.

14. UNDP, in partnership with the Global Environment Facility (GEF) and the World Health Organization (WHO), has supported integration of climate change into health planning in several countries. Activities included vulnerability assessment and mapping to highlight potential areas needing health services as a result of climate change, as well as support to early warning systems for climate-related health outcomes, developing software for forecasting risk, and collecting data to inform preparedness and longer-term health planning – linking climate data with epidemiological surveillance. This was complemented with community-level investments, tailored to particular development challenges and vulnerabilities, such as public awareness programmes for heat early warning, malaria and dengue control, safe wastewater practices, and epidemic control protocols to follow extreme events. Building on these successes, UNDP and WHO are developing similar programmes to support least developed countries (LDCs) in the Asia and Pacific regions.

15. There are also international best practices to support energy access in Sudan for the health sector in particular, namely the UNDP/Global Fund to fight AIDS, Tuberculosis and Malaria (Global Fund) Solar 4 Health Programme that focuses on supporting countries’ energy needs through solar photovoltaic power systems. In total, 62 health facilities have been installed in North Kordofan, South Kordofan, West Kordofan, Gazeera, Gadarif, Kasalla, Red Sea, Northern and North Darfur State. Related to cold chains, over the last decade, UNICEF with support from OFDA and Rotary International have contributed towards the improvement of the cold chain infrastructure in Sudan, including the introduction of new vaccines to the EPI programme, provision of cold rooms to two states, provision of vaccine refrigerators for both replacement new fixed immunization sites for 149 buildings, strengthening passive cold chain equipment in 8 states, among others. World Health Organization (WHO) has also supported EPI by constructing 2 cold rooms and provision of 15 vaccine refrigerators, expanding the national storage capacity to meet the current needs for both routine and supplementary immunization activities. The Government of Sudan has invested in the procurement of more than 400 cold chain equipment through PHC expansion and HSS2 funds. Despite all efforts from the Government of Sudan and partners to increase the storage capacity and strengthen vaccine management, key issues prevent the cold chain systems from being efficient in cooling medicines critical in addressing climate health-related disease.

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13 Ashvin Ashok, Michael Brison, Yann LeTallec Clinton Health Access Initiative, United States Improving cold chain systems: Challenges and solutions. Vaccine 35 (2017) 2217–2223
14 Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan
16. There are however a number of barriers that must be considered, to support Sudan in building resilience of health systems to the impacts of climate change.

17. Health policies and strategies do not fully consider potential climate change impact: The National Strategy and Framework for Action 2015–2019 was developed with wide representation of all related stakeholders. The strategy focuses on: air quality; environmental health in emergencies; chemical safety; and environmental health services in health care facilities amongst other sectors. While, climate change and sustainable development are identified as cross-cutting issues\(^{16}\), this has not yet been fully integrated into planning and budgeting.

18. Health system governance is led by the Federal Ministry of Health with oversight from a multi-sectoral National Health Sector Coordination Council (NHSCC) chaired by the President and including state governors. The National Health Sector Strategic Plan (NHSSP 2012-16) was developed and is fully aligned with the government’s national development plan, however there is limited consideration given to potential climate change impact on health sector. Similarly, at the national (ministry) level, planning for contingencies, adaptation costs and potential losses and damages from climate change do not fully integrate information related to climate health hazards and do not translate the health adaptation needs into investment plans in medium or long term.

19. Fragmented data, and limited capacity to analyze and monitor climate health hazards: There is limited monitoring capacity at the health facilities level to monitor/anticipate the possible climate change implications linked to health (e.g. water and vector borne diseases). An integrated climate sensitive health-risk monitoring-system that would link national health systems and climate monitoring systems is non-existent in Sudan. The Health Management Information System (HMIS) is largely fragmented, inconsistent and not inclusive, due to multiple, parallel vertical disease-based information sub-systems. District Health Information System (DHIS2) is rolled out up to the state and locality level in 17 states but did not reach all facilities.

20. Limited organizational capacity to respond to climate health hazards: Health facilities often lack the information needed and capacity that would enable informed planning to respond appropriately and in a timely manner to the projected health climate threats.

B.2. Project/Programme description (max. 3 pages)

21. This project will be designed to remove the aforementioned barriers in a single project framework in a coherent and comprehensive manner, with the objective to build health-climate adaptive management capacity to respond to the growing climate related health risks.

22. The planned outcomes of the project are: (i) the health care system has the capacity to anticipate increased climate change health risks with focus on water and vector borne diseases; (ii) an integrated information system about increased exposure to climate change hazards (vector and water borne diseases) is in place and reaches to the health care facilities in the most vulnerable areas in time; and (iii) the health care facilities energy supply and medicines/vaccination storage are set up to adequately respond to the health care needs that are likely to increase with climate change. All activities will be planned with a special attention given the most vulnerable groups of the society (women, children, elderly, disabled, internally displaced people (IDPs) and refugees).

23. The proposed project focuses on seven climate vulnerable states of Sudan, identified by the National Adaptation Plan (NAP) process as vulnerability “hotspots”\(^{17}\), namely: North Kordofan, West Kordofan, South Kordofan, Blue Nile, White Nile, River Nile and Sennar. Within these states, health facilities will be selected based on assessment and informed/validated by:

1. Zones most likely to be affected by the projected health-climate impact (in view of projections on rainfall patterns and increasing temperatures – preliminary findings indicate North Kordofan, West Kordofan, South Kordofan, Blue Nile, White Nile, River Nile and Sennar); and

2. With an already increasing operational burden due to diseases, which are climate change sensitive.

OUTPUT 1: Integration of climate health information into national health and adaptation strategies

24. The project will support integration of risks and remedial actions of climate change health effects into health policies (the National Health Policy and Health Strategic Plan 2017 – 2020) as well as into broader adaptation agenda.

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\(^{16}\) WHO Sudan 2015 EMROPUB_ Health profile 2015 WHO-EM/HST/231/E

\(^{17}\) The NAP process has developed a programme to identify vulnerability “hotspots” in Sudan that accounts for existing knowledge and understanding of vulnerability to spatially disaggregate vulnerabilities in order to identify priorities for adaptation. The NAP classifies North, West and South Kordofan States as the Kordofan States. It also classifies the Blue Nile, White Nile and Sennar States as part of the Central States, while the Rive Nile State is part of the Nile States. The only zonal characteristic that brings some of these states together is the geographical one, as these states have diverse climatic and climate change vulnerability and adaptation options. Hence, mitigation and adaptation actions would need to be addressed at the specific states levels.
The activities will also be designed to facilitate integration of adaptation solutions to the health care policies (integration both ways). A needs assessment will be conducted to identify training to health sector decision-makers and healthcare practitioner to build capacity related to preparedness and response to health impacts of climate change. GCF resources will be used to mainstream climate health information into national health and adaptation strategies, together with government co-financing of USD150,000 and WHO co-financing of USD250,000 related to technical capacity building. Under Output 1, the proposed project will:

- Mainstream climate health information into adaptation strategies and health policies, and ensure that an integrated cross-sectoral approach is taken to tackle the impacts of climate change on the health sector;
- Build capacity for climate health preparedness planning at the national and sub-national level;
- Develop standard operating procedures/protocols for managing climate-sensitive health outcomes at national and sub-national level (for the ministry as well as health facilities);
- Design and conduct trainings for the relevant Sudanese health institutions, policy makers and facilities of the risks and effects of climate change on health;
- Support assessment of the adequateness of the supply chain management capacity to respond to climate health threats in the short and longer term at the national and sub-national level; and
- Establish a climate change and health information management multi-stakeholder platform to ensure cross-sectoral collaboration and continuous dialogue.

OUTPUT 2: Strengthened capacity for effective climate-health service delivery

25. The barriers related to limited or fragmented health information systems and meteorological data will be addressed by building climate information network and the relevant capacity at the local and national levels. The strategy entails putting in place integrated climate-health information management system, including last mile communication mechanisms, and strengthening network of practitioners for climate change related disease surveillance. The proposed project will build capacity to manage and analyze temporal information and establish network to monitor and conduct integrated surveillance. The assessment of capacity gaps among health management information system (HMIS) stakeholders to analyze information on climate change related health risks issues will be conducted at the feasibility stage.

26. This Output will be designed and implemented in close partnership with WHO and the Global Fund. The GCF resources will be used for activities related to integrating climate change related health data with existing meteorological information, together with USD1.35 million of co-financing from Ministry of Water Resources Irrigation and Electricity (MWRIE), and USD250,000 co-financing from WHO to build capacity to generate and apply climate-health risk products. The Output aims to:

- Put in place national climate-sensitive disease surveillance system (including for vector and water borne diseases);
- Integrate climate change related health data into existing HMIS and early warning systems (EWS). Information provision agreements will be formalized between national and regional climate change and health information system. Climate sensitive indicators (gender disaggregated) will be incorporated into the current system and made accessible to users at various levels to address climate change and health risks issues;
- Build capacity to generate, and apply climate-health risk products at all levels, based on continuous climate monitoring and early warning; and
- Public awareness campaigns designed to alert communities of potential climate health risks, and what precautions to take (e.g. measures to avoid heat stress, water or vector borne illness, etc.).

OUTPUT 3: Reliable energy supply for health care facilities in the most climate vulnerable zones

27. This Output focuses on strengthening of the supply chain systems for health products and use of renewable energy to ensure uninterrupted energy supply for medicine and vaccines storage in the most disease affected areas. The Federal Ministry of Health will provide co-financing of USD 26,565,233 to ensure that health care facilities are sufficiently upgraded and to procure medicines. Additional co-financing from AfDB of USD 1 million will be used for solar system maintenance and training packages. The Global Fund and UNDP will provide co-financing of USD 18.06 million for health care establishments, equipment for diagnosis and testing for malaria, TB and HIV, training of community volunteers and healthcare workers in home-based management of malaria, TB and HIV, and provision of drugs, counselling, testing and treatment for TB parents, so that the GCF funds are able to address the adaptation costs related to responding to emerging risks, and a steady reliable supply of renewable electricity for health access. The project will consider off-grid
decentralized solutions as well as on-grid solutions for the facilities in the zones of grid connection. This Output will be funded by GCF (solar energy installation) and 72% by co-financing (training staff in operation and maintenance and enhancing the cold storage mobile clinics). GCF grant would be used to provide solar systems to approximately 386 health facilities (350 Health care Centre and 36 Rural State Hospitals). Under Output 2, the proposed project will:

- Provide adequate cold storage facilities and transport for medicine supply chain, including solar direct-drive refrigerators, temperature monitoring and control devices and build the ability of the facilities to procure, store, test, transport and install and maintain the equipment; and
- Ensure reliable solar PV based supply of electricity through installation of equipment is in principle composed of six major elements: solar panels, mounting structure (it is expected roof-mounted), batteries (either rechargeable, wet lead-acid batteries, or lithium batteries), inverters and charge regulators, network installation and grid connection.

Implementation arrangements

28. This project will be implemented following UNDP’s National Implementation Modality (NIM), according to the Standard Basic Assistance Agreement between UNDP and the Government of Sudan, the Country Programme Document, and as policies and procedures outlined in the UNDP Programme and Operations Policy and Procedures. The arrangements will be subject to a capacity assessment conducted before the submission of a funding proposal. The national executing entity - also referred to as the national Implementing Partner (IP) in UNDP terminology - is required to implement the project in compliance with UNDP rules and regulations, policies and procedures outlined in the UNDP Programme and Operations Policy and Procedures. These include relevant requirements on fiduciary, procurement, environmental and social safeguards, and other performance standards. In legal terms, this is ensured through the national government’s signature of the UNDP Standard Basic Assistance Agreement, together with a UNDP project document, which will be signed by the IP to govern the use of the funds. UNDP will seek collaboration with WHO, the Global Fund, African Development Bank and other relevant organizations at global or national level to ensure that the project is designed and implemented employing scientific and operational expertise and applying the latest related research.

29. The Implementing Partner and expected Responsible Parties for this project are the Ministry of Health, MWRIE and Ministry for Environment Natural Resources and Physical Development. The Federal Ministry of Health as the Implementing Partner is accountable to UNDP for managing the project, including the monitoring and evaluation of project interventions, achieving project outcomes, and for the effective use of UNDP resources. Responsible Parties will enter into agreements with MoH to assist in successfully delivering project outcomes and will be directly accountable to MoH.

30. UNDP has experience delivering health, adaptation and energy focused projects in Sudan. UNDP in partnership with Ministry of Health, the Global Fund in Sudan (2012-17), the Ministry of Water Resources Irrigation and Electricity, and the Ministry of Environment and Darfur Regional Authority, is implementing four projects aiming at supporting the realization in renewable energy, and climate change health risks: i) promoting access to clean energy services in Darfur Region (2015-2017) – promotion of PV for health care centres; ii) promoting utility-scale power generation from wind energy (2015-2019); and iii) promoting the use of electric water pumps for irrigation in Sudan (2015-2019). These projects have the way for the private sector involvement in power generation for health sector facilities, either through the national grid or via local grids or stand-alone solutions. In the past, UNDP’s Sudan’s country office has implemented a number of renewable energy projects in collaboration with Ministry of Water Resources Irrigation and Electricity and Ministry of Environment including: a. Barriers Removals for Commercial Dissemination of Solar Energy Technologies project (2003-2007); and b. Development of Low Carbon Strategy (2013-2015).

Key financial and operational risks

<table>
<thead>
<tr>
<th>Identified Risks</th>
<th>Risk Probability</th>
<th>Mitigation Measures</th>
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<tbody>
<tr>
<td>High staff turnover and limited number of government health staff prevents the retention of skills and knowledge in the relevant sectors/institutions.</td>
<td>Moderate</td>
<td>As activities will be focused on integration, and not on separating climate health interventions, existing capacities will be strengthened. All capacity building activities will employ a training-of-trainers approach, with related materials developed and made available for futher use (e.g.</td>
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Operations and maintenance (O&M) of renewable energy technology.

Moderate

O&M training will be provided as part of the proposed project, with long-term O&M for equipment provided by government (to be confirmed with a letter).

Insufficient data on the climate-sensitive health outcome of interest (too short time series, too few observations because outcomes were uncommon or because populations were small) and insufficient data on other drivers of the health outcome.

Moderate

Successful EWS and response systems to prevent climate-sensitive morbidity and mortality will depend on the combination of output 1 and 2. In addition to applying what is already known, health protection from climate change also involves modifying public health approaches to make sure that processes are established for iterative management as climate and development alter risks.

Existing weaknesses within the health sector prohibit achievement of project objective.

Low

The Government of Sudan is dedicated to making the necessary investments to improve the health sector. USD 28 million has been committed to improve the coverage of health centre service and address the dependence on critical community service, this includes needed staff and infrastructure costs, as well as loans and the social health insurance schemes targeting the 7 states covered by the proposed project.

B.3. Expected project results aligned with the GCF investment criteria (max. 3 pages)

Impact potential

31. The proposed GCF project will contribute to GCF fund-level adaptation impacts. Through its focus on health systems and the impacts of climate change on health, the proposed project will contribute to Increased resilience of health and well-being, and food and water security. In particular, indicator 2.3 will be targeted, which is climate induced disease incidence in areas where adaptation health measures have been introduced. Further, the proposed project will support energy access to health facilities, thereby contributing to Energy access and power generation.

32. The project will be implemented in seven states. The combined population of the target areas is 11,411,427, accounting for 29% of the total population in Sudan. The direct beneficiaries of the project are expected to be at least 10% of total population (1,411,427) or approximately 1.5 million people, representing community members with increased access to health services prepared to respond to climate health risks. It is estimated that at least 50% of the total direct beneficiaries in the regions are women. The integrated risk monitoring system will cover all States at the national level.

Paradigm shift potential

33. The approach this proposed project takes is to ensure that the health planning in Sudan is climate risk-informed and uses models and scenarios to better understand and adapt to the unfolding challenges of health in a changing climate. Through an improved national integrated climate, HMIS system and trained health staff to interpret it, improved prediction of potential outbreaks of climate sensitive infectious diseases is possible. This will enable preparation for health impacts of slow onset climate change, as well as the higher incidence of illness or disease during and after climate change-related events such as heavy or unseasonal rains which increase climate sensitive diseases. The proposed project would support the needed shift from a curative to a preventive approach.

34. Through improved surveillance, early warning and public awareness, the proposed project can employ preventative measures to the extent possible to reduce impacts, while preparing health facilities and staff for potential peaks in climate related health impacts.

35. By supporting reliable energy for health services, the proposed project supports health access for the expected increase in climate change related health impacts, without which those affected may opt to not get treatment. Health systems in Sudan are at particular high risk for future setbacks and losses in health achievements gained.

36. Combined, the Outputs reduce vulnerability through public awareness to reduce health impacts, while strengthening health systems to adapt to changing demand for health systems related to changing climatic conditions.

Needs of recipients

37. Population data for 2016 shows 39,578,830 persons, 50.7% are males while 49.3% are females. 64% live in rural areas. The life expectancy at birth in Sudan is 59 years (58 years for males and to 61 for females). Young people
and children represent the largest proportion of the population in Sudan, with 45% of the population under 15 years. An estimated 46.5% of the population lives below the poverty line in 2016. The Gross national income per capita is USD 2,415.04 (2016)\textsuperscript{21}. The challenges related to social development including high unemployment, poverty and unequal distribution of wealth and challenges of the country external-debt and normalisation of relations with creditors also persist\textsuperscript{22}.

38. Climate change impacts, including health impacts, are often felt by the most vulnerable. Infectious diseases like vector-borne diseases have wider socioeconomic impacts, by increasing health inequities and acting as a brake on socioeconomic development. This is illustrated also as the burden of climate-sensitive diseases is greatest for the poorest populations: the per capita mortality rate from vector-borne diseases is almost 300 times greater in developing nations than in developed regions\textsuperscript{23}. Vector and water-borne disease-risks are also typically much greater for poor individuals within any population. As such, infectious diseases have important impacts on individuals, households and have the capacity to overwhelm health systems, thereby impacting other sectors.

39. The proposed project would complement government investment in health services, contributing to health and wellness, by supporting health facilities in in hotspots for climate health outcomes and by strengthening the health services to adapt to climate change.

**Country ownership**

40. Guided by the overarching twenty-five year ‘National Strategy 2007-2031’, the Government of Sudan is embarking on an update of the National Development Plan, with the new plan covering the five-year period 2017-2021. Specific to the health care sector, the 25 Year Strategic Plan for Health Sector (2003-2027) envisions a nation of healthy individuals, families and communities, served by a health system that is equitable, accessible, affordable, efficient, technologically appropriate, environmentally appropriate and consumer friendly, with emphasis on quality, innovation, health promotion and in which the society participates actively. The vision is operationalized in the National Health Sector Strategic Plan (NHSSP)– waiting to be approved for the period 2017 - 2020. Its goal is the ‘Improved health status of the population of Sudan especially the poor, underserved, disadvantaged and vulnerable populations’. The latter plan will include a climate change response strategy, that will feed the current initiative.

41. The proposed project is fully aligned with Sudan's climate change adaptation commitments and priorities. The Government of Sudan ratified the UNFCCC on November 1993 and fulfilled its commitments under the UNFCCC by submitting its Initial and Second National Communications in 2003 and 2013, respectively. These processes led to an understanding that effective adaptation to climate will be critical for protecting the country's most vulnerable populations and for ensuring long-term sustainable national development. To this end, there was the submission in July 2007 of Sudan's National Adaptation Programme of Action in which thirty-two priority adaptation initiatives were identified across the agriculture, water and health sectors to build the resilience of rural communities to current and future climatic risks. Today, the continued emphasis on adapting to climate change is evidenced by the completion in 2014 of Sudan's National Adaptation Plan and the implementation of a series of pilot adaptation initiatives across the rural communities to explore the technical and socioeconomic viability of specific adaptation initiatives while putting in place enabling environment for implementing NDC. The health sector is one of the three priority sectors mentioned in the NAPA and the NAP. The sectors include water, agriculture (both livestock and crop production systems), coastal zone and human health. With regards to human health, communities in Sudan are exposed to significantly increased risk of ‘vector borne diseases’ such as malaria that are affected by climate change. The INDC recognizes these issues, and on basis of vulnerability assessments done under the NAP (2014), proposes activities for adaptation.

42. The proposed project has been designed in close consultation with relevant state/federal government agencies, NGO's, professional/trade organizations as well as local stakeholders near the target communities. These consultations and discussions are described in detail in the Technical Pre-Feasibility Report (state level stakeholder consultations). During implementation of project activities, there will be several types of stakeholders that will be engaged. State level technical committees will be assembled in each of the implementation sites to inform and respond to project activities. Members of the technical committees will be representatives of key stakeholders including the relevant state Ministries, locally operating INGOs and NGOs, as well as civil society organisations. Private sector will also be invited to participate. The technical committees will meet monthly basic and discuss about technical and coordination issues. Cross-visits for the technical committee members will take place in order to promote sharing of lessons learned.

**Sustainable Development Potential**

43. Renewable energy sources offer numerous benefits ranging from contributing to economic growth through the creation of new employment opportunities to mitigating the effects of climate change and providing electricity to rural areas.

\textsuperscript{21} https://data.worldbank.org/country/Sudan

\textsuperscript{22} African Economic outlook, 2016

Economic co-benefits:

- Indirectly supporting RE market development. Through knowledge management, the proposed project will share similar best practices from other countries with the private sector with the view of enhancing knowledge and capacity and also to support the local market in creating jobs related to the installation, maintenance and sale of renewable energy models.

- The fast-global growth of the renewable energy industry could foster economic growth mainly through investment and direct and indirect jobs creation. The proposed project would provide direct job opportunities for electrical engineers, electricians, industrial machinery mechanics, welders, metal workers, electrical equipment assemblers, construction equipment operators, installation technicians, labourers, construction managers. Indirectly, other economic activities may expand or change technology and productivity with wider access to electricity. These skills and expertise can be applied to the overall renewable energy ambitions of the government and related programmes in the country.

Environmental co-benefits:

- Climate change mitigation co-benefits through the deployment of renewable energy. The health care sector is well-positioned to “lead by example” in terms of reducing climate change pollutants and by demonstrating how climate change mitigation can yield tangible, immediate health benefits. Harmful carbon dioxide and methane emissions from fossil fuels are key contributors to global warming and decreased air quality. But generating electricity through solar energy produces no greenhouse gasses whatsoever leading to a reduction in air, water, and land pollution caused by the conventional fossil fuels.

- The project would facilitate the replacement and/or reduction of traditional fossil fuel energy: selected industries and vehicles. According to the United Nations Industrial Development Organization, 26% of the total reduction in carbon emissions worldwide in 2010 was on account of efficiency gains in renewable energy sources. Increasing the share of renewable energy as a source of power generation will likely accelerate further reductions in these emissions.

- In rural areas, the transmission and distribution of power generated from fossil fuels is very costly. The project would be an example to the private sector. Therefore, using off-grid renewable energy sources in rural areas will help increase access to basic services, including lighting, communications, and water pumping. The use of these increasingly affordable technologies would facilitate the integration and development of Sudanese rural populations.

Social co-benefits:

44. Climate change is posing additional stresses on poverty, thereby increasing the risks faced by already vulnerable populations. By sustainably increasing the resilience of the health sector, vulnerable populations will benefit from alleviated climate health outcomes to be able to contribute to society economically and socially.

45. Health facilities as energy providers: with better access to new technologies and financial models to ensure system sustainability, health facilities can become “anchors” for distributed energy generation in their communities, stimulating even wider development co-benefits. However, business models suitable for health facilities in resource-constrained settings need to be devised. Other benefits to a health facility becoming an anchor include better access to communications (important to workers, particularly farmers marketing products and services) and education.

46. Energy is an enabler of health care delivery. Even the most basic modern energy services are often unavailable in thousands of facilities across the developing world, including lighting for child delivery and emergency night-time care, refrigeration for blood and vaccines, sterilization facilities, and electricity for simple medical devices. Facilities that have access to electricity are better positioned to attract and retain skilled health workers, especially in rural areas. Electricity also enables mobile- and tele-health applications and facilitates public health education and information. Modern energy provision is therefore a critical enabler of universal access to health care and universal health coverage.

47. In Sudan, women play a critical role in family health. In cases where women already face limited access to natural resources or have limited access to health services, these will be exacerbated by climate change and the effects thereof. To better understand these implications on the different gender roles and responsibilities, gender-responsive approaches are needed, including strengthening women’s participation in decision-making in climate change actions and policies. Sudan has a long national experience in promoting gender policies and actions and formulating and establishing best practices such as in ensuring that activities and budgets engage both women and men in all levels of decision-making processes.

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48. The project directly contributes to three Sustainable Development Goals (SDGs) namely:
   - SDG 3 on Good Health and Well-being;
   - SDG 7 on Affordable and Clean Energy; and
   - SDG 13 on Climate Action.

49. In addition, the GCF project will provide indirect contribution to another four SDGs:
   - SDG 2 through contribution to the food security; and
   - SDG 5 through the contribution to gender equality and empowerment of women.

Efficiency and effectiveness

50. The proposed project would employ best practices established by UNDP/Global Fund’s Solar 4 Health programme and/or by WHO related to capacity support to health systems. The project requests solely grant finance from the GCF. Given the public nature of the goods produced by the project, there is no possibility for generating a revenue stream that could be used to repay a loan. Any cost-savings resulting from project interventions will apply to hospital facilities and would be used to sustain long-term O&M. A thorough analysis will be conducted at the proposal stage. Similarly, a cost-benefit analysis will be presented later by incorporating the costs of implementation and co-financing that will be provided by the Government of Sudan and partners. At this stage, co-financing account for 65% of the total project budget.

B.4. Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)

51. Several rounds of consultations, at Federal, State and rural health facility level have taken place. This includes several rounds of discussions with the NDA office, and with the Ministry of Environment, Ministry of Finance and National Planning, Ministry of Health, Ministry of International Cooperation, Ministry of Water Resources and Irrigation and Electricity, taken place in January – December 2017. Bilateral consultations with the embassy of Canada, Japan, India and Germany were held to discuss the scope of this project, and possibility of engagement. Finally, consultations with multilateral organizations and UN agencies, including AfDB and WHO, to discuss and agree upon areas of potential collaboration and coordination.

52. Development of the funding proposal will include further multi-stakeholder consultation and engagement. Following UNDP standard practice, consultations will include interest groups such as men, women, youth, indigenous peoples, refugees, IDPs, NGOs and religious groups and their concerns and adaptation needs will be captured during the preparation of the project.

C. Indicative Financing/Cost Information (max. 3 pages)

C.1. Financing by components (max ½ page)

53. Integral to this project, but not financially supported by GCF, the Government of the Republic of Sudan will: 1) supply the vaccines and storage equipment; 2) rebuild and develop the project-targeted health facilities in order to be able to ensure success of the facility improvements funded by GCF. The total GCF grant is estimated at USD 25.7 million. Co-financing of USD 47.6 million is estimated to be leveraged. More specifically, the co-financing of USD 28.0 million from the Government of Sudan will be used as grant support, primarily to staff costs and infrastructure costs to improve the coverage of health centre services and address the dependency on critical community services. MWRIE will procure medicine, HCENR will provide for staff salaries, AfDB will support solar system maintenance and training packages (approximately USD 1 million). WHO will provide solar system training to the technicians at the health facilities on operations and maintenance for USD 500,000. Further finances will be explored during the proposal stage. The table below shows the estimate of the total cost per component.

<table>
<thead>
<tr>
<th>Component/Output</th>
<th>Indicative cost (USD)</th>
<th>GCF financing</th>
<th>Co-financing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Amount (USD)</td>
<td>Financial Instrument</td>
</tr>
<tr>
<td>OUTPUT 1: Support integration of climate information into national health and adaptation strategies</td>
<td>1,770,000</td>
<td>1,270,000</td>
<td>Grant</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUTPUT 2: Strengthened capacity for effective climate-health service delivery.</td>
<td>6,098,000</td>
<td>4,723,000</td>
<td>Grant</td>
</tr>
<tr>
<td>Sub-total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OUTPUT 3: Ensured reliable energy supply for health care facilities in the most climate vulnerable zones</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C.2. Justification of GCF funding request (max. 1 page)

54. **Public good.** The GCF grant would be used for provision of a public good and target primarily public health facilities. Classified as a Least Developed Country (LDC), approximately 47% of its population lives below the national poverty line, with the poor disproportionately impacted by climate change, including impacts on health.

55. **Government of Sudan as well as the health facilities have limited financial resources** that prevent it from adequately addressing all climate change adaptation-health needs quickly.

56. **Country indebtedness:** Sudan remains a highly indebted country that has accumulated sizeable external arrears and has been in non-accrual status with the World Bank Group since 1994. Sudan’s external debt had accumulated to USD50 billion (61% of GDP) in nominal terms, about 84% of which was in arrears by the end of 2015.

57. **Needed investment at scale:** GCF resources will complement ongoing and significant investments in the health sector. GCF resources will focus on integration of climate change into health planning, improved capacity related to preparedness to the health impacts of climate change, and supporting health access through reliable energy. Other financiers will be sought at the funding proposal stage. Care will be taken that GCF funding will not finance health system improvements that can otherwise be financed by the market at commercial terms. Health facilities targeted are those in rural poor and/or off-grid areas. Only those health care facilities will be supported that can show no adequate means of cost recovery from the services; for those that can, mediation will be provided to get the same high quality basic services package from private sector sources at acceptable rates.

C.3. Sustainability and replicability of the project (exit strategy) (max. 1 page)

58. **Replicability of the project and exit strategy:** In the long term, the project sustainability will be ensured as follows:

   a) By integrating climate change into health sector policy and planning, and through inter-ministerial dialogue, the proposed project will support preparedness measures, and can result in cost-savings related to response. Documenting and sharing such achievements can enable replication within the health sector as well as other sectors.

   b) GCF resources will support building the institutional, regulatory or policy framework and capacity with which the Government of Sudan will ensure the sustainability and expansion of the results delivered in the project.

   c) A detailed O&M plan will be developed during project proposal formulation to define the exit strategy for hard infrastructures and ensure they are maintained beyond the project lifetime, involving a number of national stakeholders (Government agencies, NGOs, CBOs) that will be gradually involved in technical, institutional and financial investments for the operational and maintenance. All hardware relating to the EWS element for climate change and health within the HMIS will be handed over to the Federal Ministry of Health after project completion.

   d) The knowledge and learning platforms on climate change and health to be installed under the project will provide a continual upgrading of the HMIS on the topic.

D. Supporting documents submitted (OPTIONAL)

- ☒ Map indicating the location of the project/programme
- ☐ Diagram of the theory of change
- ☐ Economic and financial model with key assumptions and potential stressed scenarios
- ☒ Pre-feasibility study
- ☐ Evaluation report of previous project
- ☐ Results of environmental and social risk screening

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**Are you aware that the full Funding Proposal and Annexes will require these documents?**

Yes ☒  No ☐

- Feasibility Study
- Environmental and social impact assessment or environmental and social management framework
- Stakeholder consultations at national and project level implementation including with indigenous people if relevant
- Gender assessment and action plan
- Operations and maintenance plan if relevant
- Loan or grant operation manual as appropriate
- Co-financing commitment letters

**Are you aware that a funding proposal from an accredited entity without a signed AMA will be reviewed but not sent to the Board for consideration?**

Yes ☒  No ☐