



Strengthening Climate Resilience of the Lao People's Democratic Republic (PDR) Health System

Annex 14: Health Facility Infrastructure Action Plan

Accredited Entity: Save the Children Australia
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Overview:

1. This annex describes the project's standardized approach to identifying, designing, implementing, and monitoring climate-resilient and energy efficient upgrades for health facility infrastructure, electrical services and WASH services in the 79 target health facilities where upgrades will take place as part of *Output 3.2: Rural health facility infrastructure is climate resilient and energy efficient.*

Summary Results from Health Facility Infrastructure, electrical service and WASH service Site Assessments:

2. To inform the project design, a three-part assessment was conducted by certified civil and environmental engineers, including:
 - a. Desk review of national building standards
 - b. Site assessments of nine representative target health facilities
 - c. Supply chain and labor assessment

Review of Building standards:

3. Unfortunately, Lao PDR lacks approved national construction standards. There are draft national construction standards (yet to be approved), but they do not cover health facility design. Occasionally, there are obligations to submit architectural drawings and technical notes of a proposed new construction project or sizable renovation works in order to obtain the Construction Permit. In the absence of national standards, the project will apply global construction quality standards and suggested site designs from WHO and existing World Bank guidelines for health facility design and construction. Certified engineers (civil, construction, environmental) will be used to design and oversee infrastructure and WASH upgrades, while certified electricians will be contracted to implement electrical service upgrades.

Site assessment methods and findings:

4. In November 2022, the project design team conducted infrastructure, electrical service and WASH service improvements of a sample of nine target health facilities within three target provinces of * *locations of assessed health facilities have been redacted in accordance with the GCF Information Disclosure Policy, as the portion is confidential under the disclosure policy of the Accredited Entity.**

These health facility assessments had three objectives:

- a. Identify the breadth of infrastructure, electrical services and WASH needs within assessed health facilities.
 - b. Identify common needs across targeted health facilities and generate a list of common infrastructure, electrical service and WASH needs
 - c. Prioritize upgrade needs at sample sites using four criteria:
 - i. Which upgrades were related to climate impacts and climate resilience
 - ii. Which upgrades are strongly linked to the outputs and objectives within the project TOC
 - iii. Which upgrades are feasible given AE accreditation status
 - iv. Which upgrades are prioritized by MoH stakeholders
5. As shown in Table 1, health facility locations were selected to obtain a representative sample of each target region and geographic location by type of climate vulnerability.

*Table 1: Location and type of health facilities assessed *has been redacted in accordance with the GCF Information Disclosure Policy, as the portion is confidential under the disclosure policy of the Accredited Entity.**

6. The assessment methods were based on the WHO Healthcare Facility Resilience to Climate Change methodology and available sector-wide infrastructure, electrical service and WASH assessment tools (e.g. UN assessment tools).^{1,2}

Assessment Findings:

7. While each site had some unique challenges, a summary of common infrastructure, electrical service, and WASH service deficiencies across assessed sites included:

8. Building Structure Exterior

- *Roofing and Tiles:* Damaged and missing roof tiles, leaking roofs. Deteriorating structural roof timbers (supporting tiles) due to the lack of pressure treated timber and wet, humid climatic conditions
- *Roof drainage systems:* Roof drainage systems missing or blocked with debris, poor quality connections and leaking. Downpipes not logically placed to allow runoff away from health facilities to mitigate water damage during rain events
- *Walls:* Many exterior walls are subject to rising damp and mold requiring painting and waterproofing
- *Patient & staff access:* Cracked or broken stairs and walkways. Restricted access for patients with limited mobility
- *Ground drainage:* uncovered, blocked with debris, creating habitat for mosquito breeding. Illogical or incomplete drain design - often leading nowhere and resulting in undrained courtyards which are sometimes cross-contaminated with leaking septic systems
- *Little to no shaded space:* No natural or artificial shade provided to the building for cooling or to patient populations waiting outside the facility for screening and admission

9. Building Structure Interior

- *Window Damage:* Majority of window frames damaged by termites or climatic conditions. Many glass window panes missing or broken. Windows are not treated with weather-proofing (paint or lacquer), perish in the sun, resulting in glass falling out or weather/rain ingress into patient rooms.
- *Deficient Budget for Maintenance:* Overall absence of basic clinical equipment and preventative maintenance. Broken equipment is not getting repaired. Equipment and supplies sometimes damaged from weather events.
- *Interior doors and frames damaged by termites and climatic conditions:* Some doors have missing or damaged locks, hinges and handles. Internal doors damaged by flooding
- *Many toilet fixtures not usable:* Little or no water pressure in pipes. Many sink taps broken or missing. Intermittent water supply.
- *Malfunctioning Septic Water Systems:* blocking the functioning of internal toilets. Effluent from broken toilets mixes with blocked storm drains, resulting in environmental hazards.
- *Ceiling damaged by leaks from roof:* Rain leak damage of hospital records, patient staff bedding and sensitive equipment.
- *Termites:* Infestations are very common due to cheaper building materials with the local supply of wood is a major contributor. Window frames and doors are commonly attacked and there is little evidence of pest treatment, spraying to separation of wooden infrastructure from soil (a preventative measure).
- *Poor ventilation and natural cooling system:* Building design, shading and window placement are sub-optimal to produce natural ventilation and relieve pressure on energy sources for cooling

10. Electrical Services

- *Poor Electrical Wiring:* Most electrical wiring was overloaded. Thermal burns evident at breakers and distribution boards. Earth grounding wires damaged or missing on many devices. Risk of electrocution during heavy rain or shorted wiring.

1 WHO & UNICEF (2022). WASH Facility Improvement Tool 2.0: Assessment form. Available at: <https://www.washinhcf.org/resource/wash-fit-assessment-form-excel/>

2 WHO (2023). Energizing health: accelerating electricity access in health-care facilities: Web Annexes: Available at: <https://apps.who.int/iris/bitstream/handle/10665/365587/9789240067080-eng.pdf?sequence=1&isAllowed=y>

- *Poor air conditioner installation Poor equipment sourcing:* Use of substandard thermal foam on refrigerant pipes crumbles resulting in ineffective thermal insulation. Many ceiling / cooking fans are defective resulting in sub-optimal cooling.
- *Emergency Generator set inoperative:* due to lack of maintenance / operational knowledge. Manual starting of generator major problem. Low operator capability to activate manual lighting. Unit vulnerable to fuel theft during energy crisis.
- *Underground cable trenches:* Wiring is run overhead. Use of utilities trenches for electrical wiring, resulting in risk of electrocution when the trenches block up or have no outfall.
- *External Lighting:* Insufficient number of outside light fixtures. Many not working.
- *Lightning protection:* systems not installed or not maintained. Earth grounded electrical outlets not found throughout the building.
- *Air conditioner Wiring:* of many AC units is defective and poses a fire and safety hazard. Condensate drainage pipes are often blocked or broken, resulting in slip and fall hazard due to leakage.

11. Inbound Water

- Calcium deposition: causes clogging of pipes and freezing of valves. Water loss due to leaking pumps and storage tanks. Calcification of internal piping requiring frequent replacement.
- Storm water and toilet waste: Access hole covers are missing. Access holes filled with debris
- Water supply: No water supply pumps installed or installed but not maintained
- Calcium from Boreholes: Pipes blocked by calcium deposits (see above). Many broken or leaky pipes.

12. Outbound Water

- Septic Piping & Standby water Tanks: Buffer storage tanks not found or not fitted with pumps.
- Concrete sewer pipe blocked. Wastewater unable to flow to treatment pond. Blocked sewer pipe to septic system causing backlog to hospital toilet drainage

13. Waste Management

- Disused equipment and furniture: visible throughout the site, sometimes mixed with health care waste.
- Poor segregation of general waste from infectious waste, sharps and other hazardous waste. Waste collection bins intended for segregation not properly used.
- Staff lacks capacity to operate autoclave: Continued use of shredders selected and installed in 12 sites not recommended by WHO due to design shortcomings
- Incinerator not in use: One site reported the high temperature burn incinerator was not safe to operate, another source advised the fuel cost to operate was too high. None of the health facilities are using their incinerators due to a legacy Ministerial instruction prior to covid and prior to the realization that alternate non-burn technology implementation was not successful.

Key findings from supply labour assessments

14. A labor assessment was conducted in all three provinces to assess the quality and availability of infrastructure sector labor in Lao PDR. Key findings from the labor assessment include:
- There is an overall labor imbalance in Lao PDR for many skilled and unskilled trades involved in civil construction, facility construction and repair fields. The construction industry in Lao PDR is suffering from a shortage of Lao workers.
 - A report by GIZ in 2018³ found that ca. 200,000 people are engaged in the construction industry, but to a large extent in low-skilled roles and only on a semi-permanent basis. Only a small proportion of the workforce was considered semi-skilled and able to operate heavy machinery. While plans are in place to create national qualifications, these were only launched in the period just prior to the pandemic, and while more recent data is not available, it is unlikely that they will have added substantial numbers of qualified workers in the sector.
 - The Ministry of Labor and Social Welfare advised the shortage for workers in the construction industry has become more acute since the restrictions imposed during the Covid19-pandemic

³ World Bank (2018): Labour Market Analysis - Lao PDR Literature Review and Qualitative Insights. <https://eccil.org/euro-lao-business/doing-business-in-lao-pdr/labour-market-analysis-lao-pdr/>

changed the labor force dynamics, reducing the ability of the industry and contractors to draw on skilled foreign workers. The continuation of large-scale infrastructure developments such as hydropower plants and railways has therefore triggered a high demand for Lao nationals who are skilled construction and trade qualified workers, to cover the shortfall of foreign workers.

- The construction industry throughout the country, especially in rural area, continues to depend on foreign workers.

Prioritized, illustrative upgrade activities by health facility level and category:

15. Considering the type and breadth of infrastructure, electrical service and WASH service deficiencies observed on site visits, the following illustrative climate-resilient upgrade activities have been identified and costed using local market price averages for labor, supplies and equipment from the nine site visit locations (see Annex 3 for detailed activity budget assumptions):
16. The menu of illustrative activities will be validated with site assessments at each of the 79 target health facilities as part of the project baseline assessment. Given the available budget and the expected variation in need, not all 79 health facilities will receive the same level and type of upgrade support. Detailed budget assumptions on how many health facilities (by type) will receive each type of upgrade support can be found in Annex 3: Detailed Budget. Should sufficient funding remain available after completing upgrades in the 79 health facilities prioritized by MoH, the project will consult with GCF, MoH and community stakeholders to develop an expansion plan to additional health facilities within target districts.

Table 1. Illustrative climate-related infrastructure, electrical service and WASH service upgrade activities for target health facilities based on completed site assessments

Category	Illustrative Upgrade Activity	Estimated # (%) of target HCFs to receive support (n=79)	Estimated # (%) of supported HCF infrastructure requiring repair service
Exterior & interior Infrastructure upgrades	Roof rehabilitation/replacement	79 (100%)	7 (9%)
	drainage and flood controls upgrade to protect building foundation and mitigate flood damage to buildings/materials		
	shading enhancements (awnings/other shading improvements)		
	ventilation and natural lighting improvements		
Electrical service upgrades	Solar panel installation, to include independent power storage units and power storage shed fabrication (alternative power solutions where solar is not feasible)	79 (100%)	17 (21%)
	Upgrades to electrical wiring and climate resilience improvements. Connection to solar power supply		
	Fan installation		
	Air conditioning unit installation or repair		
Water Rehabilitation for Primary Water System: Inbound (potable) water service upgrades	Rehabilitation of primary water point (typically borehole or tube well)	25 (31%)	6 (24%)
	Installation or repair of decentralized water filtration/treatment system		
	Replacement/extension of water piping throughout health facility		
	Water taps repair or replacement		
	Water pump station replacement or repair		
Secondary water supply services	Provision of secondary water supply for seasonally water-stressed locations – in the form of rainwater harvesting units	55 (70%)	10 (18%)
Sanitation facility upgrades	Toilet/urinal rehabilitation, to include toilet facilities and superstructure (doors, windows, etc.)	79 (100%)	10 (13%)
Sewerage service upgrades	Septic tank installation or rehabilitation (or alternative technology as site assessments require)	61 (77%)	9 (15%)
	Rehabilitation of leach field		
	Replacement of sewerage piping		

Project Implementation Plan overview:

17. Once awarded, the project will follow a sequence of tasks to assess, design, implement, evaluate and monitor project-funded upgrades at target health facilities. The steps to be conducted in sequence include:
- a. Identify specific health facilities for upgrade investments (completed during proposal stage in consultation with district, provincial and national health offices based on climate vulnerabilities within each target province and district).
 - b. Validate health facility site assessment protocols and tools for infrastructure, electrical services, WASH services and GHG emissions assessments (including pre-testing).
 - c. Conduct detailed Infrastructure, electrical service, WASH service and GHG emissions assessments at all 79 health facility sites.
 - d. Conduct a review of site-specific risks and needed improvements, considering the following factors:
 - I. AE's GCF ESS Accreditation level compliance
 - II. Budget
 - III. Relevance to climate-resilience
 - IV. Cost of specific improvements
 - e. Review the site-specific needs and recommended project priorities with health facility management, district health office and provincial health office to secure consensus on prioritized upgrades by site.
 - f. Produce site specific architectural designs (to include GESI considerations), along with bills of quantity. Share plans and pricing with community health facility, district health office and provincial health office stakeholders
 - g. Procure required contractors and orient them to project standards and site plans for upgrades.
 - h. Implement site-specific upgrades and routine quality assurance visits on upgrade progress
 - i. Conduct any immediate post-upgrade water quality monitoring (for water-related upgrades)
 - j. Approve completion of site-specific upgrades
 - k. Conduct routine post-upgrade monitoring (including water equality monitoring) (MoH and Nam Saat)

Project and MoH Staffing and oversight:

18. The project will employ two senior engineers (based out of each of the two regional hub offices) who will work with MoH and Nam Saat engineers to review and approve site assessments, upgrade design plans, completion of works and to oversee post-upgrade monitoring. The project staff will also provide capacity strengthening support to MoH, Nam Saat and contracted firms to ensure proper site assessment protocols, upgrade design and implementation quality and the application of sound monitoring and quality assurance plans.