

TECHNICAL SPECIFICATIONS

Feasibility study of the project “SUMUD-Lebanon – Health in the Face of Climate Change”¹

implemented within the AdaptAction program



AGENCE FRANCAISE DE DEVELOPPEMENT

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Agence Française de Développement, 5, rue Roland Barthes, 75598 Paris Cedex 12- RCS PARIS B 775 665 599- phone: 00 33 (0)1. 53. 44. 31. 31
(Hereafter “the Client”)

¹ 'Sumud' (صمود) translates as 'resilience' in Arabic, and its acronym stands for 'Health in the Face of Climate Change in the Lebanese State' (الصحة في مواجهة تغير المناخ في الدولة اللبنانية).

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Article 1. GENERAL CONTEXT

1.1 Presentation of the *Agence Française de Développement* (AFD)

As a public financial and solidarity institution, AFD is the central player in French development cooperation. It participates in projects that tangibly improve the daily lives of people in developing and emerging countries, as well as in French overseas territories. Through its work in numerous sectors (energy, health, biodiversity, water, digital economy, education, etc.), AFD supports the transition to a safer, fairer, and more sustainable world—our “world in common.” Its actions are fully aligned with the Sustainable Development Goals (SDGs).

The AFD team works on more than 4,200 projects aimed at having a positive social and environmental impact in 150 countries and French overseas territories.

Since 2000, AFD has been working in Lebanon. The AFD Group's engagement in Lebanon has two objectives: (i) helping the country respond to multifaceted crises, and (ii) supporting the development of more inclusive and effective governance. AFD collaborates with various stakeholders, especially Lebanese civil society organizations, to achieve five strategic goals: improving access to education, vocational training, and employment; strengthening access to healthcare; expanding access to water services; promoting inclusive territorial development; and supporting economic and financial reforms.

More information on the Group's activities and organization is available on its website: <https://www.afd.fr/en>

1.2 Presentation of the AdaptAction Program

AdaptAction is a technical assistance program of the AFD. Since 2017, it has supported partner countries in implementing climate-resilient development pathways. Through vulnerability and feasibility studies for project preparation, support for the design of national policies and action plans, as well as capacity-building and institutional strengthening initiatives, AdaptAction facilitates countries' access to international climate finance and accelerates investments in adaptation.

The second phase of AdaptAction, launched in 2022, now covers 19 countries. It is structured around three pillars (Understanding, Planning, Investing) and two cross-cutting components (Gender and Social Inclusion, and Knowledge Management and Valorization). It is co-financed by the European Union in the Middle East and North Africa for a period of three years (2024-2027).

A threefold strategy: understanding, planning, investing

AdaptAction strives to better understand adaptation processes, but also to support the translation of scientific knowledge into governance mechanisms, public policies and adaptation-sensitive investments.



For more information about the program, please visit: <https://www.afd.fr/en/adaptaction>.

Article 2. CONTEXT AND PURPOSE OF THE ASSIGNMENT

2.1 Background

Climate change context

Climate Adaptation

Lebanon's Mediterranean climate, characterized by hot, dry summers and cool, wet winters, is increasingly affected by climate change. The health sector is identified as a priority in both the NDC 3.0 and the National Adaptation Plan (NAP). Since 1950, average temperatures have increased by 1.5°C and could rise by up to 4.3°C by 2100 under the SSP5-8.5 scenario, alongside a projected 65% increase in the number of hot days.

These changes are already affecting public health. Heat-related illnesses and mortality are rising, particularly among people over 65, who represent 10% of Lebanon's population. Heat-related deaths increased by 307% between 1990 and 2023, compared with a projected increase of 110% without climate change. Without adaptation measures, mortality among people aged 65 and older could rise from around 2 deaths per 100,000 today to 48 per 100,000 by 2080.

Air pollution further exacerbates health risks. During heatwaves, ozone formation intensifies the effects of PM2.5 emissions from diesel generators – which already exceed WHO guidelines by 244% in Beirut – while wildfires directly harm local air quality with wildfire-specific PM2.5 triggering up to 10 times more respiratory hospitalizations than conventional pollution sources, contributing to ischemic heart disease, COPD, respiratory infections, and stroke mortality. Climate impacts also threaten healthcare operations through cooling system failures and disruptions to medical cold chains during power cuts.

Additional risks include flash floods damaging health facilities and spreading waterborne diseases, as well as droughts reducing water availability, threatening food security, and increasing malnutrition and food-borne diseases. These challenges are compounded by Lebanon's socioeconomic crisis, including a 58% GDP contraction since 2018, the emigration of 40% of specialist physicians since 2019, governance weaknesses and infrastructure deficit, and the impacts of conflict and displacement.

Climate Mitigation

According to Lebanon's Low-Emissions Development Strategy (LT-LEDS) 2025–2050, national GHG emissions reached 21 MtCO₂eq in 2022, down from 30 MtCO₂eq in 2019 due to the economic crisis. Emissions nevertheless remain high compared with peer countries because of a carbon-intensive energy mix, which accounts for 44.8% of total emissions. The health sector is particularly energy intensive and is estimated to contribute around 1 Mt CO₂eq annually in Lebanon, or approximately 5% of national emissions, largely due to heavy reliance on diesel generators caused by the unreliable electricity supply from *Electricité du Liban* (EDL).

Most emissions stem from Scope 1 sources, notably diesel combustion for backup power, and Scope 3 sources such as imported pharmaceuticals, medical equipment, supply chains, and waste management. Proposed mitigation measures include installing solar PV systems with battery storage to reduce diesel dependence, alongside energy efficiency upgrades including

LED lighting, improved HVAC systems, and insulation. Waste management measures include replacing open burning with autoclaves, implementing waste segregation, and reducing landfill disposal. These interventions are expected to avoid approximately 103,000–180,000 tCO₂eq over the project lifetime, subject to confirmation through a GHG baseline assessment during the feasibility study stage.

The mitigation measures also provide important adaptation co-benefits, including more reliable cold chains for vaccines, blood, and medicines, uninterrupted cooling for ICUs and operating theatres during heatwaves, and reduced PM_{2.5} emissions from diesel combustion and medical waste burning, thereby improving air quality during extreme heat events.

Health sector governance and crisis dynamics

To strengthen Lebanon's health system resilience to climate change and reduce its eq-CO₂ emissions, it is essential to consider:

- Crisis dynamics that create a reinforcing cycle in which low readiness exacerbates vulnerability to climate shocks, while continuously erode the foundations needed to build resilience. Improving climate readiness in Lebanon therefore require aligning climate interventions with broader crisis-response systems. In this context, it is all the more important to build the project on existing risk management mechanisms. These include national structures such as the Disaster Risk Management (DRM) Unit and the Public Health Emergency Operations Center (PHEOC), as well as capacities at governorate and facility levels (e.g. hospitals). Moreover, Consultants are required to adopt a multi-hazard risk approach, integrating both climate-related and conflict and crisis-related risks into their diagnostics and proposed measures. Adaptation and mitigation options must therefore be context-specific, risk-informed, conflict-sensitive, and designed to strengthen overall system resilience.
- The country's political-economic context and the health system's fragmented, poorly regulated, and largely private structure, while ensuring preparedness for security tensions and the pressures from large population influxes. While the primary health care sector plays a critical role ensuring equitable access—especially for vulnerable populations, it remains constrained by weak regulation, limited coordination with hospitals, lack of regional planning, low public funding and heavy dependence on international aid, and the destructions of its health infrastructure, a reduced availability of health staff and increased population vulnerability created by the armed conflicts. Therefore, strengthening and consolidating PHCs remains a key challenge to address social and environmental determinants of health, and scale up prevention and health promotion. Still, Lebanon's health sector presents strengths, including a responsive private health sector with demonstrated crisis-management capacity (such as during the COVID-19 epidemics and during the 2024 Israel-Hezbollah war in Lebanon), strong national health expertise at operational and academic levels, strong national commitment prioritizing health in its climate agenda and an established disaster-risk management system including community engagement through municipalities and civil society organizations.

Climate Strategies

Health is one of the priority sectors of the NDC 3.0 (2025-2030), the National Adaptation Plan (NAP 2025-2035), as well as the Long-Term Low Emission Development Strategy (LT-LEDS 2025-2050) that were all officially presented in September 2025 as a "climate policy package". Lebanon had previously lacked these strategic documents.

The NAP presents the following strategic objectives to strengthen the resilience of health systems, which are to a large extent addressed by the present project:

- Support community-based risk reduction initiatives focusing on health risks related to disasters, water, waste, food, and air pollution.
- Enhance the Early Warning and Response System to health risks, including epidemic, climatic, and other risks through the full automation and operationalization of the One Health approach.
- Build the capacity of health sector professionals to identify and manage health impacts across sectors.
- Enhance the climate resilience of healthcare facilities through targeted interventions, including risk management, energy management, and infrastructure adaptation.
- Promote coordination and communication among stakeholders to enhance awareness, policy coherence, and climate-adaptive health governance.
- Assess population and public health vulnerability to climate change, identifying current and future health effects, as well as impacts related to the additional burden of climate change on health.
- Upgrade epidemiological surveillance to incorporate new climate-related health outcomes and integrate climate data into the national health information system.

The objective to “strengthen the health sector’s resilience to climate-induced risks, including heat stress, vector-borne diseases, and disaster preparedness” is also mentioned in the National Health Strategy: Vision 2030 (2023) and Two-Year Review (2025).

The Green Climate Fund

The Green Climate Fund (GCF) aims to contribute to the fight against climate change by promoting low-carbon and resilient development in developing countries, particularly those most vulnerable to climate change. The Fund comprises a mitigation component, an adaptation component, and a private sector mechanism.

The GCF portfolio allocation rules aim for: (i) an equal distribution between mitigation and adaptation (in grant equivalents); (ii) a minimum allocation of 50% of adaptation resources to the most vulnerable countries, least developed countries (LDCs), and African states; (iii) a significant allocation of resources to the private sector; and (iv) equitable and geographically balanced distribution to maximize the transformative impact and scale of projects. All developing countries are eligible for support without a predetermined country-specific allocation. To implement its funds, the GCF works with financial intermediaries and implementing agencies, including:

- National or subnational organizations (ministries, NGOs, national development banks, or any other organization meeting the Fund's criteria);
- Accredited regional or international organizations (international development finance institutions, United Nations agencies, regional development banks, and regional institutions); and
- Private sector entities.

The GCF convenes a selection committee (“Board”) three times a year, generally in March, June and October. Access to GCF financing is based on six investment criteria which must highlight: (i) the impact of the project, (ii) its potential for transformation towards low-carbon and resilient models, (iii) its co-benefits in terms of sustainable development, (iv) its benefits for vulnerable populations, (v) national ownership and engagement of national stakeholders, (vi) its

effectiveness and cost-effectiveness, including the capacity of the GCF contribution to mobilize potential co-financing.

In the Middle East, a region where its engagement is less significant than elsewhere, the GCF has strong ambitions to accelerate the financing of its programs and projects, particularly in fragile and conflict-affected states (FCAS) – Iraq, Yemen, Syria, Palestine and Lebanon². In the health sector, along with the AFD project, the GCF is supporting the appraisal of a multi-country program called “Sustainable Adaptation for Healthcare Advancement” (SAHA) focusing on 5 participating countries: Oman, Jordan, Egypt, Iraq and Lebanon, to be implemented by NGO Pathfinder International³.

AFD and other donor interventions in the health sector in Lebanon

The health sector in Lebanon receives significant support from international donors. The European Union (EU) funds essential services, medicines, and primary care centers across the country, including emergency assistance for vulnerable populations and refugees. The World Bank strengthens system resilience and expands primary and hospital care, including pandemic response and preparedness measures. The European Investment Bank (EIB), in partnership with the World Health Organization, is investing in the Central Public Health Laboratory and essential medicine supply to enhance emergency preparedness. In addition, Lebanon has received financing from the Pandemic Fund to strengthen integrated surveillance, laboratory systems, and workforce capacity through a One Health approach with WHO, FAO, UNICEF, and the World Bank, aimed at improving preparedness and response capacities for future health threats.

The Agence Française de Développement complements these efforts by funding primary care programmes (SAQIRH I & II) with NGOs, upgrading hospitals (Tripoli and Rafic Hariri) with the International Committee of the Red Cross, strengthening human resources, harmonizing primary care services, improving access for vulnerable populations, and institutionalizing mental health support.

Since 2018, AFD has invested over €134 million in Lebanon’s health sector, supporting more than 57 healthcare facilities and benefiting over one million people. Investments have focused on strengthening primary and hospital care, enhancing human resources through vocational training in public hospitals, harmonizing healthcare services at the primary level, improving access for vulnerable populations, and institutionalizing mental health and psychosocial support services through partnerships with the International Committee of the Red Cross (ICRC), international and national NGOs such as Première Urgence Internationale and Amel Association, Saint Joseph University, and the World Health Organization.

Project Overview

Following initial consultations with the French Development Agency (AFD) and the Green Climate Fund (GCF), the Ministry of Environment of Lebanon has requested AFD, as an Accredited Entity to the GCF, to proceed with the appraisal of the project, in an official letter sent on 24/05/2024. The project was then included in the Lebanon country program drafted by the Ministry of Environment for the GCF and released on 13/12/2024⁴.

² For more information on the GCF’s sub-regional dialogue: <https://www.greenclimate.fund/event/gcf-sub-regional-dialogue-fragile-and-conflict-affected-states-middle-east>

³ For more information: <https://www.greenclimate.fund/document/sustainable-adaptation-healthcare-advancement-mena-region-saha>.

⁴ <https://www.greenclimate.fund/document/lebanon-country-programme>

On that basis, a prefeasibility study has been commissioned in 2025⁵. The study has provided an initial diagnosis on climate and health risks in Lebanon and supported the drafting of a concept note, currently under review by the GCF and expected to be approved by September 2026.

The proposed project is based on the following rationale:

IF the Government of Lebanon strengthens climate and health mitigation and adaptation policies at national and local levels, implements them through coordinated investments, data systems, monitoring and learning mechanisms, and climate-informed early warning systems, through coordinated engagement with communities and the private sector,

THEN investments in the health sector's preparedness, response and recovery capacities will increase. This will improve the sector's resilience to climate-related health risks – particularly heatwaves and climate-sensitive diseases,

BECAUSE although the Lebanese health system has demonstrated strong shock absorption capacities, it remains structurally vulnerable due to chronic financial, institutional and governance constraints exacerbated by the ongoing conflict since 2023 and the impacts of climate change.

The theory of change therefore aims to support a transition from a fragmented and reactive health system toward a proactive, climate-resilient and environmentally sustainable one through institutional strengthening, climate-risk mainstreaming, low-carbon and resilient investments, public-private cooperation, and community participation.

The project is expected to strengthen Lebanon's capacity to manage climate-related health risks through three primary outcomes presented below: (i) enhanced climate-health-informed strategic and action planning, (ii) climate-resilient and environmentally sustainable health service delivery, and (iii) improved surveillance, prevention, and community-based epidemiological response.

Outcome 1: Climate mitigation and adaptation planning in the health sector is strengthened at national and local levels

This outcome addresses structural barriers such as fragmented governance, reactive planning, and weak coordination between climate and health stakeholders.

Output 1: Evidence-based climate-health planning frameworks are developed and implemented

Activity 1.1 – Development of a National Health Mitigation Roadmap

Building on the greenhouse gas (GHG) emissions baseline developed during the feasibility study, the project will support the preparation of a mitigation roadmap identifying priority actions by emission scope and investment needs for both public and private actors. A monitoring, reporting and verification (MRV) framework for health-sector emissions will also be developed and progressively integrated into the national MRV system under the leadership of the MoE.

Activity 1.2 – Development of Lebanon's first HNAP

Based on climate-risk and vulnerability assessments conducted at national and local levels during the feasibility phase, the project will support the preparation of Lebanon's first HNAP. Local adaptation action plans will also be developed with municipalities or unions of municipalities. These plans will identify priority investments, implementation modalities and financing needs to strengthen adaptive capacities. A national monitoring, evaluation and

⁵ See pre-feasibility study annexed.

learning (MEL) system will support periodic updates, cross-learning and capitalization across governorates and complementary programmes supported by AFD, Pathfinder and other partners.

Outcome 2: Climate resilience and environmental sustainability of the health sector are strengthened across Lebanon

At least 50 public and private health facilities will benefit from the project, including approximately 10 large facilities and 40 smaller structures. During the feasibility stage, climate resilience pathways and GHG baselines will be developed for a representative sample of facilities in order to guide prioritization and sequencing of investments.

At facility level, interventions will be designed as integrated transformation packages combining infrastructure, operational systems, workforce capacities and supply-chain measures in a mutually reinforcing manner⁶.

Output 2.1 – Climate-resilient and low-carbon transformation of health facilities

Activity 2.1.1 – Climate-resilient and low-carbon infrastructure upgrades

Investments will pursue both mitigation and adaptation objectives. Energy systems are expected to constitute a major entry point for mitigation, while also generating important co-benefits in terms of service continuity, resilience, operational sustainability and air quality. Potential investments may include solar energy systems replacing diesel generators, thermal efficiency and passive cooling measures, climate-resilient building upgrades, water-efficiency measures and greywater recycling. Potential investments may also include sustainable healthcare waste management solutions, such as improved waste segregation systems and autoclaves replacing open burning of infectious waste, subject to feasibility assessment and demonstration of mitigation and resilience co-benefits.

Activity 2.1.2 – Climate-resilient operations and coordination

The project will strengthen operational procedures, clinical pathways and coordination mechanisms for climate-related events, building on existing preparedness structures such as the Public Health Emergency Operations Center (PHEOC). The project will also reinforce cooperation between public and private providers and support citizen engagement mechanisms.

Output 2.2 – Climate-smart workforce and organizational strengthening

Activity 2.2.1 – Climate-health competencies and professional development

The project will support the development of a climate-health competency framework and the integration of climate modules into continuous professional development systems for both clinical and non-clinical staff.

Activity 2.2.2 – Organizational strengthening and risk communication

Support will also be provided for updated standard operating procedures (SOPs), staffing contingency plans, human resource management improvements and risk communication capacities for health professionals and community actors.

Output 2.3 – Low-carbon and resilient health supply chains

Activity 2.3.1 – Climate-resilient and low-carbon supply chain investments

The feasibility study will assess investments and partnership models that could strengthen mitigation and adaptation across pharmaceutical, medical-device and healthcare waste supply chains, including low-carbon procurement approaches and resilient low-emission hazardous healthcare waste management systems.

⁶ Preliminary mitigation estimates are based on the assumption that Outcome 2 investments will target approximately 10 hospitals of 80 beds each, including 5 hospitals located in climatic zone 1 (coastal regions) and 5 hospitals located in climatic zone 2 (western mountainous regions). Estimated emissions reductions assume an average 40% reduction in energy consumption resulting from proposed energy-efficiency interventions.

Outcome 3: Climate-informed health information, surveillance and disaster risk-management systems are strengthened

Outcome 3 addresses persistent gaps in climate-health data production, integration and use. Gender and social inclusion (GESI) considerations will be integrated through disaggregated data collection and inclusive participation mechanisms.

AFD's approach aims to combine: (i) central-level investments in data production, modelling and analytical capacities; (ii) operational climate-health surveillance systems piloted in selected governorates; (iii) and operational research on climate and health.

Output 3: Integrated climate-health surveillance, early warning and community response systems are operational

Activity 3.1 – Community-based risk reduction and emergency response

Community preparedness will be strengthened through local hazard mapping, awareness campaigns on climate-related health risks, and community emergency response protocols. These interventions will reinforce the capacities of municipalities, governorates and local actors to manage climate-related health risks and service disruptions while building on existing community engagement mechanisms.

Activity 3.2 – Climate-informed early warning systems and epidemiological surveillance

The project will support the integration of meteorological, environmental and health indicators into interoperable digital platforms to improve data-sharing, validation and real-time analysis across institutions at local and national levels. Existing surveillance systems will be upgraded to integrate climate variables, strengthen laboratory and digital reporting functions, and improve the detection of climate-sensitive disease patterns in support of timely public health decision-making and emergency response.

Each component will emphasize community participation through structured local consultations, engagement with municipalities and civil society, and feedback mechanisms to inform planning, implementation, and risk communication. The project will also be gender responsive with gender being mainstreamed into all adaptation plans and investment plans.

The total estimated cost of the project is €48-53 million, which includes grants from the GCF (about €43 million), the AFD, and, tentatively, the European Union (mobilized through the PEEB Med program⁷). The Partnership for Energy Efficiency in Buildings (PEEB) accelerates the global shift towards sustainable buildings by providing (i) technical assistance for the technical design and financial feasibility of green public and private renovation and construction projects as well as (ii) grants to lower the financial barriers and perceived risks of investing in energy-efficient buildings. The PEEB Med program, funded by the European Union and implemented by the AFD, supports seven partner countries, including Lebanon.

2.2 Timeline and governance of the study

The full funding proposal for this project is expected to be submitted in May 2027, in time for the project to be presented tentatively at the GCF Board meeting in October 2027 (otherwise at the GCF Board in March 2028). AFD's funding is expected to be appraised by its Board two months after GCF Board approval.

The study is intended to be conducted in two stages, ideally between October 2026 and May 2027, with further refinements until the project is presented to the GCF Board in October 2027. However, the main deliverables of the study are expected **by April 2027**.

⁷ <https://peeb.build/peeb-med/>

The main beneficiaries of this assignment are the Ministry of Environment, the GCF's National Designated Authority (NDA), and the Ministry of Public Health, the government ministry responsible for health policy. The AFD is the GCF's accredited entity in charge of developing the funding proposal and overseeing, supervising, managing, and monitoring the implementation of this feasibility study.

A steering committee will be established for this study to guide implementation, comprising AFD, the Ministry of Environment (MoENV), the Ministry of Public Health (MoPH), and other key technical institutions as appropriate. This committee will:

- Oversee progress of the study;
- Comment and validate deliverables of the assignment;
- Ensure coherence with Lebanon's NDC, NAP, health sector strategies, emerging climate–health priorities and other investments in these fields;
- Facilitate stakeholder engagement across national and subnational levels.

This committee will be composed of at least one focal point from each Ministry and AFD's project team.

2.3 Objectives and expected deliverables

Objectives

The overarching goal of this assignment is to support the French Development Agency (AFD) in structuring the project titled "SUMUD-Lebanon – Health in the Face of Climate Change".

The specific objectives of this assignment are:

- To assess needs, identify priorities within each component in line with national strategies and structure the components and the operational set-up of the project.
- To support AFD in its dialogue with the GCF until the project is presented to the GCF Board ideally in October 2027 (preparing draft responses, conducting additional analyses, etc.).

Expected outputs/deliverables

The expected deliverables of this assignment are:

- Deliverable 1: Inception report
- Deliverable 2: Assessment of climate and health vulnerability and adaptation options in 3 selected pilot governorates.
- Deliverable 3: Mapping of stakeholders, rules, and processes at the national, governorate, and district levels regarding climate and health surveillance, preparation, and response.
- Deliverable 4: Operational research to be financed on climate and health risks to inform public policy.
- Deliverable 5: Preliminary roadmaps and investment plans for climate and health adaptation measures in selected pilot governorates.
- Deliverable 6: Assessment of greenhouse gas (GHG) emissions and adaptation needs for a sample of health facilities (10 large public and private organizations and 5 smaller

ones) and design of adaptation and mitigation objectives and measures under scopes 1, 2, and 3.

- Deliverable 7: Definition of sustainable, low-carbon-footprint investments in hazardous healthcare waste management.
- Deliverable 8: Public regulations and incentives for the public and private health sectors to invest in mitigation and adaptation measures sustainable over time.
- Deliverable 9: Environmental and social assessments and action plans for all activities.
- Deliverable 10: Gender, social inclusion and participation assessments and action plans.
- Deliverable 11: Possible setups for project implementation across all three components.
- Deliverable 12: Drafting of the Funding Proposal
- Deliverable 13: Support for AFD teams during interactions with the GCF between the submission of the funding proposal and the presentation to the Board
- Deliverable 14: Capitalization report

In addition, the Consultants shall provide written responses to any AFD and/or GCF questions/comments on the deliverables submitted.

Deliverables will be written in English. However, parts of these deliverables (minutes of workshops, for instance) may be written in Arabic or French.

Article 3. DEFINITION AND NATURE OF REQUESTED SERVICES

The assignment takes the form of a feasibility study, covering technical, financial and governance aspects. The aim is to submit a comprehensive full funding proposal to the GCF for the project by May 2027 at the latest.

The development of national strategic documents – including the Health National Adaptation Plan (HNAP) and the GHG emissions baseline and roadmap – will take place at a later stage, during the implementation of the project. However, Consultants may orientate the feasibility study in order to have a sound methodology and framework that will allow the adaptation action plans at governorate level and the mitigation investment plans per facility to be integrated in these national exercises at a further stage.

Overall, the feasibility study will follow a dual approach: (i) a national and territorial logic for health–climate adaptation measures, structured through Components 1 and 3 of the project, and (ii) a facility, actor and sector-based approach for mitigation and adaptation measures for the health sector, focusing on strengthening the resilience and preparedness of healthcare facilities and stakeholders, structured through Component 2 of the project.

The study will focus on assessing climate and health adaptation risks and measures in three to four pilot governorates. Based on initial consultations with the Ministries of Environment and Public Health, which were conducted to ensure coherent coverage of the country, and taking into account ongoing security issues, **the following governorates have been tentatively selected: Beirut, Mount Lebanon, North and potentially Baalbek-Hermel.** The specific local authorities within the governorates that will be targeted will be confirmed at the start of the study.

In terms of health risks, the study shall specify the climate and health risks on which operational actions at local level and structural actions at governorate and national level can be launched in

the framework of the project (primarily heat-health risks, in addition to water-borne diseases, respiratory diseases, antimicrobial resistance, etc.).

The project shall be aligned with the OECD criteria for a DAC 1 Gender project. This means that the study will ensure that gender is mainstreamed into all adaptation plans and investments, provide operational recommendations to ensure this alignment with the OECD standards for a DAC 1 Gender project and propose specific objectives reflect the project's gender-related ambitions.

In close coordination with the Ministry of Environment and the Ministry of Public Health, the Consultants shall propose adapted methodologies to produce the following deliverables. Although an indicative sequence is provided below, some deliverables may be developed in parallel and inform or build upon one another.

In particular, consultants must ensure that all key assumptions, methodological choices and critical findings are properly reviewed and submitted for validation to the relevant ministries.

To ensure alignment and coherence of strategic priorities, as well as contribute to the development of a consistent operational health-climate agenda, the consultant will support the AFD, and the Ministry of Public Health, in ensuring a smooth coordination with the project "Sustainable Adaptation for Healthcare Advancement in the MENA Region" (SAHA)⁸ being appraised by NGO Pathfinder International with GCF funding. The funding proposal for this project is expected to be presented to the GCF board in March 2027.

3.1 Inception phase

At the start of the mission, a list of documents will be provided to the Consultants, and a kick-off meeting will be organized with AFD, the MoENV, and the MoPH.

Following this meeting, the Consultants will prepare a **short 10-page inception report (Deliverable 1)** including:

- An assessment of available data, studies or other documentation and a list of data to be collected based on a first desk review
- An updated work plan, methodology, and mission timeline including a list of stakeholders to be consulted (individually or in groups), along with a series of questions
- Any request for support, data, or documentation needed to carry out the assignment. Consultants are expected to propose an approach that ensures inclusion and, where possible and relevant, citizen participation in the strategy. The inception report shall include a citizen participation strategy proposal, distinguishing between institutional stakeholders and affected populations, and detailing methods, formats, and feedback mechanisms.
- Consultants shall also clarify in their methodology the approach to integrate fragility and context-specific risks into the analysis, including how these factors may interact with and influence climate and health risks.
- Consultants must ensure that a gender sensitive and transformative approach is proposed in the inception report detailing not only how specific gender vulnerabilities will be evaluated but also gender opportunities at strategic levels regarding the governance structure and the capacity building of the teams involved.

⁸ <https://www.greenclimate.fund/document/sustainable-adaptation-healthcare-advancement-mena-region-saha>

3.2 Climate and health vulnerability and adaptation assessments in selected pilot governorates

While the overarching logic of the study will be national—ensuring that climate-health adaptation plans developed at the governorate level will fuel the elaboration of a Health National Adaptation Plan (HNAP) that will be elaborated during the project implementation period—this deliverable will focus on elaborating preliminary roadmaps for health and climate adaptation measures in three pilot governorates that might be further extended in other governorates and municipalities at the project stage. Therefore, Consultants shall suggest clear methodologies in order for this work to be pursued in other governorates after the feasibility stage. These preliminary roadmaps will be detailed per actor, during the project phase to ensure they will be operational. The intervention approach will complement the geographic coverage and thematic approach of the GCF-funded project implemented by Pathfinder International, allowing lessons learned to inform the scaling up of interventions to additional governorates over time.

The consultants will follow these major steps, considering the WHO guidelines on vulnerability and adaptation assessments⁹ (that relies on the IPCC's AR5 definition of climate risk). However, each candidate is free to propose an alternative methodology in their technical offer to prioritize health and climate risks, develop adaptation measures, and engage stakeholders, taking into account the Lebanese context.

Climate-health risk diagnosis:

- Analyze relevant historical climate variables (e.g. average temperature, precipitation and extreme weather events) and characterize future climate trends based on the project's sectoral and geographical context. When making climate projections, consultants should use the most up-to-date datasets available, preferably from CMIP6, and at the relevant geographical scale. In accordance with the new guidelines adopted by the IPCC, consultants are invited to consider future climate based on levels of global warming already achieved (e.g. +1.5°C, +2°C or +3°C above pre-industrial levels). Alternatively, they may consider future climate based on preferably two scenarios (SSP/RCP) and two-time horizons (2050 and 2080/2100). In any case, the consultant will clearly justify the chosen approach, specifying any limitations and methodological implications.
- Compile historical and current data on climate conditions, health outcomes (mortality, morbidity), and socio-economic determinants, analyze interactions between climate exposure and health and use climate scenarios to estimate how health risks may evolve over time and integrate demographic and socio-economic projections. The analysis will also incorporate fragility and context-specific risks, including conflict and crisis risks, in order to assess how these factors interact with climate-related health risks, influence population vulnerability, and shape priorities for action. **The consultant will not be required to generation new impact data and will base its analysis solely on existing data.**
- Determine the most significant health impacts of climate change per governorate¹⁰ and those on which local actors and populations are willing to take action on through a participatory and evidence-based approach, informed by context-specific conditions,

⁹ <https://www.who.int/publications/i/item/9789240036383>

¹⁰ Main threats might include heat-related illnesses, waterborne diseases, air pollution-related health impacts and antimicrobial resistance.

fragility, gender norms and social dynamics. Consultants shall ensure that vulnerability assessments and prioritization of risks are co-constructed with local populations through participatory workshops, gender sensitive and inclusive consultation processes. Example: citizen workshops in pilot governorates, focus groups (women, refugees, healthcare workers), participatory risk mapping). This prioritization will be key in order to identify the most efficient and viable adaptation measures in a fragile and crisis-affected context, where weakened systems, limited access to services, and increased pressure on resources amplify exposure, vulnerability, and health impacts.

- Identify specific syndromes and/or pathogens that should receive particular attention when developing and implementing surveillance, preparedness, and response activities at the governorate level. Validate prioritization and focus for the service with local and national stakeholders and with the Steering Committee.
- For these priorities, list needed data/databases – including sex disaggregation, map at which level (district/caza, governorate, national, or by stakeholder identified hereunder) it is expected to be found, and evaluate the level of confidence on its availability and quality.

Exposure and vulnerability assessment:

- Within each governorate, determine which populations and geographical zones are most exposed and sensitive to these health impacts and how.
- Identify main stakeholders, institutions and governance structures in the social and health spaces that should provide protection, using the list of essential functions listed below. Collect and analyze any achievements and lesson learned from past health crisis responses. **Identify specific geographical constraints to implement crisis responses (people, infrastructure, governance, etc.)**

Adaptation orientations and measures:

- Identify existing policies and programs that enhance health resilience to climate change and risks.
- Propose a list of priority adaptation orientations and measures to strengthen climate resilience at the governorate level, including policies, systems, and programs. These recommendations will inform the activities presented below.
- All measures must pay a particular attention to the integration of gender, social inclusion issues and context-specific conditions, to ensure that selected interventions are equitable, do not exacerbate existing disparities, and are responsive to the needs of populations in fragile and crisis-affected settings. Measures that can engage citizens in adaptation processes will be particularly inspiring. For this purpose, the assessment of Activity 3.10 will be conducted in parallel.

Content of deliverable 2 “Assessment of climate and health vulnerability and adaptation options in selected pilot governorates:

- Climate-health risk diagnosis (including an exposure and vulnerability assessment)
- Adaptation orientations and priority measures

3.3 Climate-related health surveillance, preparedness and response governance mechanisms, current and target in order to build an efficient governance set-up on health and climate adaptation measures

Objective

The first objective is to provide an assessment of current governance, organizations and social participation related to climate-related health surveillance, preparedness, and response in Lebanon for the priorities identified in Activity 3.2, with recommendations to strengthen effectiveness, coordination, and inclusion. It will consider both the overall governance and shed light on each of the stakeholder's capacities.

The assessment shall examine existing mechanisms with a view to improving them or designing new operational mechanisms at institutional level and integrating community-based surveillance and citizen feedback loops, early warning and reporting systems involving local populations. It will also focus on the gaps and opportunities to ensure gender equality in these governance mechanisms specifically focusing on the management and governance of the stakeholders, the capacity building opportunities to support the design of gender à sensitive mechanisms.

The second and final objective of this activity (3.3) is to co-construct a target vision of the governance and RACI (Responsible, Accountable, Consulted, Informed) to implement climate and health adaptation measures at governorate and national level.

Scope of work

The assessment will focus on national and sub-national actors including (but not limited to) the Epidemiological Surveillance Unit, the Public Health Emergency Operations Center, the Disaster Reduction Management Unit, the *Conseil National de la Recherche Scientifique* of Lebanon (CNRS-Lebanon), the municipalities and union of municipalities, the governorates, the Lebanese Red Cross as well as health facilities with a focus in pilot governorates. It will examine:

- Roles, responsibilities, current and aspired organizational capacities, and interrelations among relevant actors.
- Functional gaps, overlaps, and collaboration opportunities.
- stakeholders' engagement with social participation to ensure legitimacy, equity, inclusion, and improved decision-making.
- Consultations or participation mechanisms relating to health or adaptation implemented in the past, existing patient or citizen involvement governance mechanisms (for example at the level of health establishments, or localities)
- Risks related to fragility and social dynamics, including perceived or actual disparities, exclusion, and tensions, and how these may affect the effectiveness, acceptability, and equitable delivery of interventions.
- The capabilities, both in terms of their internal integration of gender and gender equality, and their ability to incorporate gender and gender equality into their activities, in line with the sector and the project's objectives.

The assessment will allow to build a target vision and identify and prioritize gaps to fill in order to reinforce the governance set-up in charge of implementing health and climate adaptation measures at governorate and national levels.

The analysis and recommendations will be operationalized for key climate-sensitive health threats identified in the previous deliverable.

Essential functions to be assessed

a) Climate-related health surveillance and intelligence

- Surveillance of climate-related risks and diseases including climate-sensitive conditions such as vector-borne, water-borne and heat-related diseases, analysis of weak signals
- Statistic and predictive modelling integrating climate data and scenarios
- Early detection, data collection integrating multiple sources (hospitals, laboratories, doctors, drug stores, civil society, emergency departments, meteorological services, etc.), analysis, interpretation, and dissemination, and operation of integrated early warning systems (e.g. alerts when critical thresholds are reached)
- Assessment of surveillance approaches in Lebanon: syndromic, laboratory-based, event-based, community-based, gender-sensitive, and environmental. Within environmental surveillance, a particular emphasis shall be given to air pollution and water-related surveillance and water quality monitoring, drawing on international best practices, including lessons learned from wastewater-based epidemiological surveillance implemented in countries such as France during the COVID-19 pandemic
- Strengthening interoperability and governance of climate and health data systems

b) National reference laboratory functions

- Coordination of laboratory networks and reference services
- Accreditation (including on security and confidentiality standards), diagnostic confirmation, and quality assurance
- Strengthening diagnostic capacity for climate-sensitive diseases
- Focus on human and water laboratories and environmental laboratories, including rapid detection capacities during emergencies

c) Public health emergency preparedness and response

- National preparedness plans, outbreak coordination, technical support including climate-related hazards
- Compliance with International Health Regulations (IHR)
- Providing support and coordinating stakeholder's plans
- Organizing stocks at national, governorate and stakeholder level, and securing supply chains including cold chain management and last-mile delivery in crisis settings
- Ensuring continuity of essential health services during climate-related shocks

d) Risk assessment and scientific expertise

Epidemiological and climate risk assessments, modeling, technical guidance including multi-hazard risk and vulnerability assessments and risk mapping

e) Communication and community engagement

- Risk communication, community engagement, public and policymaker communication including crisis communication and early warning dissemination

- Addressing misinformation and promoting behavior change (e.g. heat protection, water safety, hygiene practices)

f) Research and knowledge generation

- Applied climate and health research, evaluation of interventions, methodological innovation
- Operational research, documentation of lessons learned, and promotion of innovation

g) Workforce development and capacity building

- Field Epidemiology Training Programs (FETP), strengthening public health workforce, institutional capacity and communities
- Training of healthcare workers, decision-makers, and local actors on climate and health risks

h) Policy support, governance and strategic coordination

- Contribution to national health strategies, multisectoral coordination, technical advice
- Strengthening governance mechanisms and coordination platforms across sectors (health, environment, water, agriculture, urban planning)
- Alignment with national climate policies and adaptation frameworks

i) Health service delivery and system resilience

- Assessment and strengthening of the resilience of health facilities to climate risks
- Ensuring continuity and accessibility of essential health services, particularly for vulnerable populations
- Integration of climate risks into health service planning and infrastructure design

j) Supply chain and logistics systems

- Strengthening procurement, storage, and distribution systems for essential medicines and supplies
- Ensuring climate-resilient logistics systems, including cold chain management
- Coordination with public and private actors for emergency logistics and last-mile delivery

k) Financing and resource mobilization

- Assessment of financing needs for climate and health adaptation
- Identification and mobilization of domestic and international funding sources
- Strengthening capacities to access climate finance mechanisms
- Integration of climate considerations into health budgeting and planning

l) Data governance and digital health systems

- Strengthening governance, interoperability, and integration of health and climate data systems
- Development of digital tools supporting surveillance, early warning, and decision-making
- Ensuring data quality, accessibility, and security

Methodology

i. Governance and ecosystem assessments

The Consultants will:

- 1) map current RACI (Responsible, Accountable, Consulted, Informed) for each essential function, according to the official mandates of the structures in place and to existing civil society mechanisms. Identify gaps or overlaps.
- 2) Analyze any other existing mechanisms, governance structures, procedures, collaboration practices that could be leveraged.
- 3) Identify discrepancies among pilot governorates.

ii. Organizational assessment

For each stakeholder identified in activity 3.3.i, an assessment will be conducted to examine stakeholders' capacities, understanding what works or what could be reinforced, considering:

- Internal organizational levers (governance, human resources, procedures, material and IT, public communication, etc.) contributing to the essential functions listed here-above
- Data collection and analysis capacities
- Financial resources
- Experience in involving civil society (see detail hereunder)
- Proven experience and performance in managing similar crisis (see detail hereunder)
- Gender sensitive organizational levers

In terms of data collection and analysis capacity, the Consultants will assess the following:

- Availability and accessibility of data: for the list of needed data, availability, description (sources, storage format (excel, databases, softwares), current usage, etc.) and estimation of the quality (completion level, accuracy, capacity to link with other data), statistical representativeness, and promptness (frequency of updates, communication format, readiness to share) and identification of main constraints hindering the previous parameters.
- Teams, expertise and capacity to take on new projects.
- Systems: IT capacity and scalability, interoperability / ability to communicate in real-time, level of security and vulnerability, confidentiality rules applied.

Consultants will also assess social participation in surveillance, including the extent to which actors involve communities, civil society organizations, and local stakeholders in planning, decision-making, and operational implementation. The study will examine mechanisms for community engagement, information sharing, early reporting, and feedback loops, as well as the potential to strengthen these processes to ensure sustainable and inclusive surveillance practices.

The assessment will draw on lessons from disaster risk management in Lebanon, including effective local actors such as the National Disaster Risk Management Unit (DRM Unit) and the Lebanese Red Cross, who have proven experience operating under conflict- or security-sensitive conditions. In parallel, it will consider lessons from comparable international settings for

climate-health adaptation strategies. Consultants should analyze these experiences in light of Lebanon's political economy—its fragmented, community-oriented society and governance structures—to propose approaches and systems that are feasible, contextually appropriate, and capable of enhancing coordination, social participation, and operational effectiveness.

These assessments will be based on:

- Interviews conducted with stakeholders from the ecosystem, managers and operations teams,
- Documentation and procedures,
- Analysis of IT systems and data extracts.

Key findings will be shared in a common workshop session for each governorate to build a baseline situation among the ecosystem. Presentations can be mutualized with that of activity 3.10.

iii. Target institutional set-up

The Consultants will propose target governance, institutional and civil society set-up scenarios for implementing the climate and health adaptation measures financed by the project. Building on the existing RACI matrix, the aim will be to define a clear and implementable governance framework at governorate and national levels, in line with existing crisis and disaster management systems, recognizing the need for flexibility in a fragile and evolving context.

It will include:

- Roles and responsibilities at central and governorate levels
- Coordination mechanisms (vertical and horizontal)
- Recommendations for strengthening governance, coordination, and social participation.

In terms of surveillance, these scenarios will take into account ongoing developments in public health architecture, including investments in the National Public Health Laboratory, EIB projects, and the Pandemic Fund. This ensures that the scenarios are realistic and aligned with current initiatives.

Content of Deliverable 3 “Mapping of stakeholders, rules, and processes at the national, governorate, and district levels regarding climate and health surveillance, preparation, and response”:

- Comprehensive mapping of current national and subnational stakeholders
- Description of roles, responsibilities: RACI matrices for essential functions
- Gaps, strengths and weaknesses of the ecosystem and of each organization for this purpose, including a gender sensitive assessment
- Target governance and organization
- Recommendations for strengthening governance, coordination, and social participation.

3.4. Identification of research priorities and development of a funding and coordination mechanism for climate-health adaptation evidence-based policies.

Objective

The Consultants will identify priority research areas at the intersection of climate change and health in Lebanon, and propose a structured mechanism to support and fund research that directly informs gender responsive national adaptation strategies and operational health interventions.

Scope of work

- a) **Complete the mapping and analysis the current landscape of climate-health research in Lebanon**, including ongoing and recent projects led by universities, research centers, NGOs, and international partners **and identify priority research areas**.
- b) **Engage with relevant stakeholders** – Ministry of Public Health, Ministry of Environment, CNRS-L, Ministry of Water and Energy, laboratories, academia, NGOs, and international organizations – to validate priorities and ensure relevance to policy and operational decision-making.
- c) **Define preliminary actionable data requirements that will allow research to directly inform policy and operational plans**. This includes identifying the data, collection methods, and analytics necessary to produce outputs that are immediately usable (in particular in order to foster implementation of adaptation action plans in the selected governorates).
- d) **Propose a funding and coordination mechanism for climate-health research**, including:
 - Recommended approach for competitive calls for proposals and/or targeted grants
 - Governance and oversight structure, including engagement with authorities and multisectoral partners
 - Criteria for selection of research projects emphasizing policy relevance, feasibility, and operational impact
 - Integration of research outputs into national climate-health adaptation plans and preparedness strategies.
- e) **Provide recommendations on how to ensure sustainability of the mechanism**, including links to potential funding sources, partnerships, and strategies for knowledge translation into policy and operational actions.

Content of deliverable 4 “: Operational research to be financed on climate and health risks to inform public policy”:

- Report mapping current climate-health research and identifying gaps
- List of priority research topics validated with stakeholders
- Proposed design of a research funding and coordination mechanism, including governance, selection criteria, and procedures
- Recommendations for integrating research outputs into operational climate-health adaptation strategies

3.5 Preliminary roadmaps and investment plans for climate and health adaptation measures in pilot governorates

Following the analyses and recommendations produced previously (deliverables 2, 3 and 4), the Consultants will **elaborate gender-responsive climate and health adaptation roadmaps** in the selected governorates to be financed within the project. However, this assignment will not include the detailed design of operational protocols (e.g. alert thresholds or standard operating procedures), but will focus on defining priority investments, governance arrangements, and implementation mechanisms required for project preparation and financing.

Objective

The objective of this component is to identify, prioritize, and structure a set of climate and health adaptation measures, and to define the associated investment, governance, and implementation arrangements, in order to support the preparation of adaptation action plans to be further detailed and launched at the project stage.

This includes:

- Translating the previous analytical outputs (risk assessments, adaptation axes, RACI matrix) into prioritized investment packages
- Defining institutional roles and responsibilities across central and governorate levels
- Establishing a clear operational and financial implementation architecture, including fund flows and allocation mechanisms
- Identifying investment needs (CAPEX/OPEX) and capacity-building requirements
- Ensuring the feasibility, scalability, and sustainability of the proposed project structure

Scope of Work

a) Prioritization of adaptation measures

Building on the climate–health risk analysis, identified adaptation axes and target set-up and recommendations, the Consultants will further define and refine priority adaptation measures per governorate.

b) Structuring of investment packages

- Group prioritized measures into coherent investment packages, also coherent with other projects financed by international organizations and in particular with the Saha project designed by Pathfinder in other governorates.
- For each package, define scope and objectives, key components and expected outcomes.
- Ensure coherence across geographic levels and types of interventions.

c) Investment plans

Estimate indicative costs for each investment package, including:

- CAPEX (infrastructure, equipment, systems)
- OPEX (staffing, training, maintenance, operations)
- Develop a multi-year (minimum 3-year) investment plan,
- Identify complementary support needs, including:
 - Capacity building
 - Technical assistance

- Institutional strengthening

d) Operational and financial implementation architecture

Building on the targeted governance scenario (cf. deliverable 3), the Consultants will define a detailed implementation architecture. This shall include:

- Identification and justification of :
 - Executing entities / Implementing entities
 - Beneficiaries
- Definition of fund flow arrangements, including:
 - Disbursement channels
 - Sub-granting mechanisms (e.g. to municipalities, hospitals, NGOs)
- Allocation of investment packages to clearly identified:
 - Implementing entities
 - Final beneficiaries
- Assessment of institutional, technical, and fiduciary capacities, including identification of capacity gaps and required support

e) Risk analysis and mitigation

- Identify key risks related to:
 - Institutional coordination
 - Financial management
 - Operational capacity
 - Fragility and crisis context
- Propose practical mitigation measures, aligned with governance and implementation arrangements in line with AFD and GCF's risk mitigation guidelines and procedures.

Moreover, the proposed roadmaps and investment structure shall:

- Take into account the specificities of a fragile and crisis-affected environment, where overlapping crises and shocks are likely to persist
- Ensure that adaptation measures are aligned with and embedded within existing crisis management systems
- Remain flexible and responsive to evolving priorities of institutions, partners, and affected populations

f) Project structuring

- Consolidate all elements into a coherent preliminary project structure for the implementation of component 1.
- In the final set-up of the project, the Consultants will integrate and link recommendations from Activity 3.10 and ensure coherence and consistency with outputs from Activities 3.6, 3.7, and 3.9.
- Ensure consistency with expectations of the GCF including:
 - Climate rationale
 - Feasibility and sustainability
 - Potential for scale-up

Methodology

The Consultants will adopt a participatory, feasibility-oriented, and implementation-focused approach, combining:

- Review and consolidation of existing analytical outputs
- Stakeholder consultations at central and governorate levels (see detail hereunder)
- Targeted engagement with public, private, and non-governmental actors

Indeed, AFD considers that key stakeholders should themselves identify/validate and prioritize the measures, actions, and investments required to achieve the target vision.

Accordingly, the outputs of activity a) will be developed through onsite participatory workshops, involving:

- Public authorities
- Technical teams
- Civil society representatives
- Other relevant stakeholders identified under Activity 3.3

These workshops will aim to collectively:

- Validate and share a common vision and target state for the ecosystem
- Identify and prioritize adaptation measures and investments
- Define and plan major projects and actions, including change management measures
- Establish sequencing, milestones, and actionable steps
- Define and validate technical assistance needs
- Adapt and specify priorities at governorate and institutional levels
- Identify entities responsible for leading and steering implementation
- Provide first estimation of cost and timing.

These workshops will also constitute a first step in mobilizing stakeholders and building implementation momentum.

For this, the role of the Consultants will be to:

- Facilitate and structure the workshops
- Ensure inclusion of relevant stakeholders
- Consolidate and refine workshop outputs for activities b) to f), including:
 - Fine-tuning sequencing and timelines
 - Clarifying implementation stages and expected outcomes
 - Estimating funding requirements
- Ensure overall coherence, consistency, and technical robustness of the final outputs

Content of deliverable 5 “Preliminary roadmaps for climate and health adaptation measures in selected pilot governorates”:

Per selected pilot governorate:

1. Prioritized adaptation measures
2. Investment packages and 3-year investment plan
3. Operational and financial implementation architecture
4. Risk and mitigation analysis
5. Preliminary project structure
6. Final adaptation roadmap per governorate, integrating all previous elements.

3.6 Assessment of GHG emissions and design of mitigation and adaptation measures in a selection of health facilities

Objective

This deliverable shall focus on health facility interventions combining infrastructure, operational, and organizational measures to address climate and multi-hazard risks while also contributing to greenhouse gas (GHG) mitigation. These may include renovation works on the envelope, the energy and water systems and the surrounding environment of health buildings. Facilities should also be designed or retrofitted with flexible spaces that can be rapidly converted into emergency or isolation units, with separate patient flows for infectious diseases. These investments must be complemented by strengthened emergency preparedness, including multi-hazard risk management plans, staff training, and coordination mechanisms, to ensure continuity of care in the face of climate shocks, epidemics, and potential security-related disruptions.

In particular, the Consultants shall assess greenhouse gas (GHG) emissions and adaptation gaps of a selection of health facilities in Lebanon and develop actionable mitigation and adaptation objectives and measures that will be financed totally or partially by the project. At each facility level, the study shall provide a comprehensive roadmap and investment plan for reducing GHG emissions and strengthening adaptive capacities, including investment costs, operational costs, capacity needs, and financing options, aligned with international standards (on scopes 1, 2, and 3).

This roadmap will integrate and link with environmental and social outputs described in activity 3.9.

Moreover, should the following assessment concern organizations interviewed for activity 3.3, these activities will be coordinated to avoid mobilizing the same actors multiple times.

Scope of work

a) Suggest a representative sample of 10 large and 5 smaller public and private health facilities in which the project will invest

- Facilities shall be chosen on the basis of a multi-criteria analysis that will be suggested by the Consultants and submitted to the Ministry of Environment and the Ministry of Public Health for validation.
- Criteria for investing in these structures should include sound governance and sustainability of investments. Investments may include any implementation costs including capital but also operational expenditures and any form of capacity building in order to adapt and maintain new processes or the use of new technology.
- The selected health facilities may be located across the entire national territory and may vary in size and type (including laboratories, pharmaceutical industries, hospitals, imaging centers, etc.).

b) Conduct GHG emissions assessment:

- Quantify emissions under Scope 1, 2, and 3:
 - Scope 1: emissions from sources that are owned or controlled by the health facility.
 - Scope 2: emissions from purchased energy consumed by the facility, generated outside the organization.

- Scope 3: emissions that occur upstream or downstream of facility operations, not owned or controlled by the facility, but resulting from its activities.
- Use internationally recognized protocols and methods for calculation and assessments.

c) Identify key emission sources and hotspots:

- Analyze energy consumption patterns, procurement practices, waste generation, water consumption and organizational operations
- Compare across facility types to highlight priority areas for mitigation

d) Identify key natural and climate risks that affect healthcare buildings

Analyse the potential risks affecting the sampled buildings and measures to reduce vulnerabilities

e) Design mitigation objectives and measures:

- Set facility-level and sector-level mitigation targets (reasonable and measurable within the project duration)
- Recommend operational and technical measures, including:
 - Architectural improvements
 - Energy efficiency improvements (lighting, HVAC, medical devices)
 - Renewable energy integration
 - Sustainable procurement policies
 - Waste reduction and circular economy strategies
 - Organizational and behavioral changes (training, awareness).

For each mitigation intervention (e.g., renewable energy installations, energy efficiency upgrades, waste management improvements), Consultants shall:

- Step 1 – Clearly Define Each Mitigation Activity
- Step 2 – Select an Appropriate Mitigation Methodology (CDM, Gold standard, etc.)
- Step 3 – Define Baseline and Demonstrate Additionality
- Step 4 – Conduct a Common Practice Analysis
- Step 5 – Quantify Emission Reductions

f) Estimate costs and resource requirements:

- Determine capital expenditures (CAPEX) for infrastructure, equipment, and energy upgrades
- Estimate operational expenditures (OPEX) associated with mitigation measures
- Identify training and capacity-building needs for staff and management
- Assess financing options, including self-financing and potential debt capacity
- In line with activity 3.9, adapt the investments to be made according to the assessment of environmental (including biodiversity disturbance) and social risks linked to these investments and recommended mitigation measures.
- In line with the PEEB Med Grant Funding preparation (i.e. box below), for each selected facility:
 - Carry out an energy performance assessment and develop a calibrated baseline energy model based on available utility data, site surveys and operating conditions.
 - Prepare dynamic thermal simulations (or equivalent building energy modelling) for each selected health facility in order to quantify current energy performance and assess the impact of proposed energy efficiency measures.
 - Develop several energy efficiency investment packages for each selected facility, combining passive measures, equipment upgrades and renewable energy solutions where relevant.

- Quantify the expected energy performance improvement associated with each package and identify investment scenarios achieving at least 30% energy performance improvement, with additional scenarios targeting 35%, 40% and up to 45% improvement compared to the baseline situation.
- For each scenario, estimate incremental investment costs attributable to energy efficiency measures, expected energy savings, greenhouse gas emission reductions, operating cost savings, payback period and lifecycle cost implications.
- Clearly distinguish between base investment costs and additional costs associated with enhanced energy performance measures in order to support potential grant applications and investment decision-making.

PEEB Med Grant Funding Preparation

In order to facilitate the potential mobilization of PEEB Med investment grant financing, the Consultants shall prepare a dedicated assessment of the eligibility of the proposed investments for PEEB Med support.

This assessment shall include:

- A baseline energy performance assessment for each selected facility.
- Dynamic thermal simulations and/or building energy modelling demonstrating the expected performance improvements associated with the proposed measures.
- The definition of energy efficiency investment packages allowing facilities to reach different performance levels, including at minimum:
 - Scenario 1: $\geq 30\%$ energy performance improvement;
 - Scenario 2: $\geq 35\%$ energy performance improvement;
 - Scenario 3: $\geq 40\%$ energy performance improvement;
 - Scenario 4: $\geq 45\%$ energy performance improvement.
- A detailed breakdown of investment costs distinguishing:
 - Base investment costs;
 - Incremental costs directly attributable to energy efficiency and climate-resilient design measures.
- An assessment of expected energy savings, GHG emission reductions, operating cost savings and return on investment for each scenario.
- An estimation of the potential amount of PEEB Med investment grant that could be mobilized under each scenario, based on the applicable grant contribution rates and eligible incremental costs.
- A calculation of the residual investment cost to be borne by the project owner after deduction of the potential grant contribution.
- A summary decision-making matrix comparing all scenarios in terms of investment costs, grant eligibility, energy performance improvement, climate benefits, operating savings and affordability.

The objective of this task is to provide participating health facilities with a robust technical and financial justification for the mobilization of PEEB Med grant funding and to support the selection of the most appropriate investment scenario.

g) Facilitate the co-construction of an implementation roadmap:

With pilot structures, the Consultants will:

- Build indicative training and capacity building plans for facility staff and management
- Prioritize measures according to feasibility, cost-effectiveness, and impact

- Define a monitoring and reporting framework for progress tracking
- Link mitigation measures to potential funding mechanisms (private financing, project subsidization and support, PEEB facility, etc.) and timelines

Content of deliverable 6 “Assessment of greenhouse gas (GHG) emissions from a sample of health facilities (10 large public and private organizations and 5 smaller ones) and design of mitigation objectives and measures”:

- Criteria and validated selection of facilities
- Comprehensive GHG emissions inventory for the sampled facilities (scopes 1, 2, 3)
- Identification of emissions hotspots and sources
- Identification of natural and climate risks, and measures to reduce vulnerabilities
- Proposed mitigation objectives and targets for each facility type
- Detailed list of mitigation measures with feasibility assessment, estimated CAPEX/OPEX, potential GHG reduction, and cost-benefit considerations
- Training and capacity-building plan for facility staff and management
- Financing assessment outlining self-financing potential, willingness/capacity to borrow, and external funding opportunities
- Implementation roadmap with prioritization, timelines, monitoring, and reporting framework

3.7 Defining sustainable and low carbon footprint investments on hazardous healthcare waste management

Objective

Building on the Healthcare Waste National Masterplan (developed by the UNDP on behalf of the Ministry of Environment and released in May 2026¹¹), the Consultants will identify and propose sustainable, low-carbon investments for the management of hazardous healthcare waste in Lebanon, including infectious, pharmaceutical, and cytotoxic waste. The work will include a regulatory gap analysis, assessment of waste volumes and operational conditions, investment modeling, and recommendations for end-to-end traceability and mitigation of GHG emissions; facilitated with existing stakeholders. Consultants will clearly measure and identify investments that would directly translate into mitigation of GHG emissions and environmental, public health co-benefits that could be financed by the GCF. Remaining preliminary or complementary actions could be financed by AFD.

Any social and environmental risks associated with these investments shall be included according to safeguards listed in activity 3.9.

Scope of work

a) Regulatory and Normative Gap Analysis:

- Assess current regulations and standards covering classification, collection, transport, treatment, and financial responsibility of polluters.
- Evaluate the effective implementation of the ‘polluter-pays’ principle in Lebanon, particularly for healthcare and pharmaceutical waste, as established in law 444/2002

¹¹ https://www.undp.org/sites/g/files/zskgke326/files/2026-05/healthcare_waste_national_master_plan.pdf

and related decrees¹². Consultants will assess the conditions under which this regulatory framework could be further enforced in the Lebanese context, what incentives or support mechanisms would be required, and what practical approaches could ensure safe and responsible waste management in line with the polluter-pays principle.

- Compare national regulations and institutional arrangements with international best practices, including WHO guidelines, and peer countries' experiences.
- Identify possible regulatory and institutional improvements to strengthen compliance and governance.

b) Assessment of volumes, costs, and operational conditions

- Quantify historical and projected waste volumes for infectious, pharmaceutical, and cytotoxic waste.
- Evaluate current treatment capacities and regional approaches for hazardous waste management.
- Estimate capital (CAPEX) and operational (OPEX) costs required to strengthen treatment infrastructure.
- Take into consideration the EU-funded Masterplan on healthcare waste management, and the experience and potential investment needs of key actors such as:
 - NGO Arc-en-Ciel (main actor in Lebanon in charge of declassifying and incinerating hazardous waste)
 - Public hospitals with treatment facilities (e.g., UHRH and Karantina Hospital)

c) Structuring investment models:

- Co-construct credible economic and legal assumptions so as to build a viable organization for incineration of pharmaceutical and cytotoxic waste, integrating private sector participation and potential foreign investments. Involve private sector stakeholders in the study's recommendations and investment identification.
- Identify incentives for private sector participation, potential return on investment, and subsidies required.
- Include governance structures that ensure accountability, efficiency, and environmental compliance.

d) End-to-end traceability and monitoring system:

- Define conditions, RACI, investments, and operational requirements to implement a traceability system for all types of hazardous healthcare waste.
- Provide estimates of CAPEX/OPEX per waste category for collection, transport, treatment, and monitoring.
- Ensure alignment with GHG reduction objectives and low-carbon strategies.

e) Mitigation and sustainability measures:

- Recommend operational measures to reduce emissions along the waste management lifecycle.

¹² The 'polluter-pays' principle in waste management establishes that the producer or generator of waste is financially and legally responsible for its safe collection, treatment, and disposal.

- In line with activity 3.9, integrate measures and/or adapt investments to be made in order to mitigate the social risks of these investments (location, noise, air pollution)
- Integrate training and capacity-building needs for staff managing hazardous waste.
- Outline potential financing options, including self-financing, government allocations, EU/foreign funding, and private sector participation.

Content of deliverable 7 “Definition of sustainable, low-carbon-footprint investments in hazardous healthcare waste management.”

- Regulatory gap analysis and recommendations to strengthen the legal and institutional framework, including Polluter Pays Principle
- Assessment of waste volumes, treatment capacities, operational conditions, and cost estimates (CAPEX/OPEX)
- Investment model for incineration of pharmaceutical and cytotoxic waste, with governance structure and incentives
- End-to-end traceability system design with estimated investments per waste type
- Roadmap for implementation of sustainable and low-carbon healthcare waste management
- Recommendations for capacity-building and staff training.

3.8 Development of public regulations, incentives, and financial intermediation for environmental sustainability and climate resilience in the health sector

Objective:

The Consultants will suggest regulatory, financial, and incentive mechanisms to encourage public and private health facilities to invest in environmental sustainability and climate resilience. The study will also include the design of a financial intermediation framework to enable private facilities to access loans for capital expenditures (CAPEX) related to low-carbon and climate-resilient investments.

Scope of work:

- Review existing regulations, incentive and financial mechanisms and facilities** for environmental sustainability and climate resilience in the health sector.
- Identify and assess potential incentive mechanisms**, including:
 - Subsidized loans for sustainability and adaptation projects
 - Repayable grants or blended finance instruments
 - Integration of mitigation and adaptation measures into hospital classification and reimbursement criteria by the Ministry of Public Health
 - Recognition through national and international certifications for sustainable and climate-resilient health facilities.
- Design a financial intermediation framework to support private health facilities in financing CAPEX:**
 - Evaluate options for interest rate subsidies, reducing the cost of borrowing for facilities
 - Assess mechanisms to subsidize pre-financing feasibility and investment needs analysis including co-investments with the PEEB Med facility managed by AFD or other funds.

- Identify strategies to mitigate financial risks for lending institutions, including partial guarantees or insurance mechanisms
 - Explore potential blended finance structures, leveraging public, donor, and private capital
- d) Assess feasibility, impact, and alignment of proposed regulatory and financial mechanisms with national health and climate policies.**
- e) Provide recommendations** on implementation, monitoring, and integration into existing financing and regulatory frameworks.

Content of deliverable 8 “Public regulations and incentives for the public and private health sectors to invest in environmental sustainability and climate resilience”:

- Review report of existing regulations, incentives, and financing mechanisms
- List of recommended incentive mechanisms with feasibility, impact, and alignment assessment
- Financial intermediation model for CAPEX financing in private health facilities, including:
 - Interest rate subsidies
 - Pre-investment analysis support
 - Risk mitigation mechanisms for financial institutions
- Recommendations for integrating sustainability and climate-resilience criteria into hospital reimbursement systems
- Guidance on alignment with national and international certifications and standards
- Implementation roadmap with governance, monitoring, and evaluation framework
- Executive summary highlighting policy, operational, and financial recommendations for the Ministry of Public Health and key stakeholders

3.9 Environmental and social assessments and action plans

Objective:

The Consultants will conduct comprehensive environmental and social (E&S) assessments for all activities under the study, with particular attention to:

- Activity 3.6: GHG emissions assessment and mitigation in health facilities
- Activity 3.7: Hazardous healthcare waste management (infectious, pharmaceutical, cytotoxic)
- Activity 3.8: Regulations, incentives, and financial intermediation mechanisms for private sector investments

The assessments will ensure compliance with any national E&S standards and regulations as well as international E&S standards, including AFD and GCF Environmental & Social Safeguards, and will result in actionable E&S management plans integrated into the investment design. The Consultants will also elaborate the Environmental and Social Commitment Plan of the project in order to articulate the E&S management plans designed.

Scope of Work:

- a) Assess environmental and social risks and impacts** of all proposed activities, including:
- Environmental impacts (emissions, effluents, waste, energy use)
 - Occupational health and safety of staff and patients
 - Community health and safety considerations

- Social impacts, including equity, inclusion, and gender
- b) Conduct specialized E&S assessments for Activities 3.6, 3.7, and 3.8:**
- **Activity 3.6:** Evaluate impacts of GHG mitigation and energy efficiency measures in facilities
 - **Activity 3.7:** Assess risks related to hazardous healthcare waste management, including treatment, transport, incineration, and traceability
 - **Activity 3.8 :**
 - Assess potential E&S impacts of regulatory and financial mechanisms
 - Verify the E&S due diligence practices of all identified financial intermediaries involved in CAPEX financing for private health facilities
 - Propose measures to bring intermediary E&S practices up to international standards if gaps are identified.
- c) Develop Environmental & Social Action Plans (ESAPs):**
- Define mitigation, monitoring, and management measures for all activities
 - Estimate the costs of these measures
 - Assign responsibilities and timelines for implementation
 - Include capacity-building measures for facility staff, regulators, and financial intermediaries.
- d) Ensure alignment with national regulations, AFD and GCF E&S standards:**
- Apply national, AFD, and GCF safeguards in risk classification, assessment, and management, and identify any gaps or discrepancies between them.
 - In particular, the assessment will incorporate among others, policies and procedures for the identification of risks and impacts, development of management programs, establish organizational capacity and competency, draw-up emergency preparedness and response plans (as needed), monitoring and review of environmental and social performance, and conduct stakeholder engagement (including information disclosure and establishing grievance redress mechanism).
 - As needed, and following GCF's requirements, the assessment and recommendations may include relevant frameworks (as applicable), such as but not limited to: Livelihood restoration and/or compensation framework (LRCF); Indigenous Peoples Policy Framework (IPPF), as relevant. The ESMS should also provide guidance to the conduct of due diligence and preparing safeguards instruments such as environmental and social audit/environmental and social due diligence (ESDD) for expansion and/or existing facilities/brownfield investments with corresponding Environmental and Social Action Plan (ESAP) for gaps identified in the ESDD. The project's ESMF has to provide guidance for the management of issues concerning applicable concerns such as on labour and working conditions, resource efficiency and pollution prevention, community health, safety, and security, land acquisition and involuntary resettlement, biodiversity conservation and sustainable management of living natural resources, indigenous peoples, and cultural heritage.
 - Given that Lebanon is in a fragile and conflict-affected area, a project level conflict sensitivity analysis will need to be prepared.

- The assessment should also include a Sexual Exploitation, Sexual Abuse, and Sexual Harassment (SEAH) assessment according to GCF's guidelines.
 - Include mechanisms for stakeholder consultation, grievance mechanism, and disclosure
 - Ensure country context, institutional capacity, and social inclusion are considered.
- e) Integrate E&S into project design and investment planning:**
- Ensure all mitigation measures, incentives, and investment instruments incorporate E&S considerations
 - Provide recommendations for monitoring and reporting E&S performance across facilities and financial intermediaries

f) Develop the Environmental and Social Commitment Plan of the project (ESCP)

Content of deliverable 9 "Environmental and social assessments and action plans for all activities":

- Environmental and Social general risk and impact assessment report for all activities
- Specialized E&S assessment report for activities 5, 6, and 7, including verification of any identified intermediary financial institutions' E&S diligences
- ESAPs with mitigation measures, monitoring indicators, responsibilities, and timelines
- Recommendations for capacity-building and training on E&S for facilities, regulators, and financial intermediaries
- Draft of the the ESCP
- Integration of E&S requirements into overall investment and implementation plans.

3.10 Gender, Social Inclusion, and Participation Assessments and Action Plans

Objective:

The Consultants will conduct **assessments on gender, social inclusion, and stakeholder participation** for all activities under the study. Special emphasis will be placed on assessing gender opportunities at all level of the project and ensuring that **vulnerable and marginalized populations** are considered in the design and implementation of climate and health adaptation measures, following the Locally-Led Climate Action (LLCA) principles¹³. Consultation processes shall be inclusive, accessible to non-expert audiences, and include feedback mechanisms to inform participants of how their inputs were used. The assessment shall also ensure a conflict sensitive / do no harm approach. It will ensure that gender is mainstreamed into all the adaptation plans and investments, provide operational recommendations for the project design to be aligned with the OECD criteria of a DAC 1 Gender project, and include specific objectives that reflect the project's gender-related ambitions in its logical framework.

Scope of work:

- a) Assess gender and social inclusion aspects** across all activities, including:

¹³ <https://www.greenclimate.fund/theme/locally-led-climate-action>

- Identification of vulnerable groups and specific needs and interests of men and women affected by climate-sensitive health risks in accessing all investments and operational measures elaborated in the project
- Barriers to participation in planning and decision-making processes
- Opportunities to enhance gender equity in the governance of the stakeholders and capacity building recommendations
- Opportunities to enhance equity, inclusion, and access specifically to adaptation measures designed in the governorate level adaptation action plans (and identification and mitigation of risks of perceived or actual exclusion, inequalities, and tensions).
- Produce baselines about gender equity in all the activities

b) Conduct specialized assessments for activities 1–4:

- Activity 1: Vulnerability and adaptation gender sensitive assessments at governorate level
- Activity 2: Climate-related health surveillance, preparedness and response governance mechanisms
- Activity 3: Elaboration of gender sensitive climate and health adaptation action plans at governorate level
- Activity 4: Identification of gender sensitive research priorities and development of a funding and coordination mechanism for climate-health adaptation evidence-based policies.

c) Develop Gender, Social Inclusion, and Participation Action Plans:

- Recommend operational measures to enhance equity, inclusion, and participation in climate and health adaptation planning and implementation at all level (governorate, health actors, etc.)
- Identify responsibilities, timelines, and monitoring indicators to be included in the logical framework
- Estimate the costs of these measures
- Include guidance on stakeholder engagement, consultation, and participation processes that are conflict sensitive.

d) Integrate findings into overall project design:

- Ensure that gender is mainstreamed into all adaptation plans, investment measures, and operational recommendations
- Formulate specific objectives that reflect the project's gender-related ambitions in alignment with the OECD DAC 1 Gender criteria to be reflected in the logical framework of the project
- Provide recommendations for capacity-building and awareness-raising on inclusion and participatory approaches

Content of deliverable 10 “Gender and social inclusion and participation assessments and action plans”:

- Gender, social inclusion, and participation assessment report for all activities
- Specialized assessment report for Activities 1–4, highlighting vulnerable populations and barriers to participation

- Gender, Social Inclusion, and Participation Action Plans including actions, costs, responsibilities, and monitoring indicators
- Operational recommendations on integrating gender equity, inclusion and participation into national and governorate adaptation plans and investment measures
- Specific objectives reflecting the project's gender-related ambitions in alignment with the OECD DAC 1 Gender criteria.

3.11 Project implementation arrangements

Objective:

The Consultants shall define possible implementation set-ups for each component of the project, ensuring clarity in governance, responsibilities, financial management, risk mitigation, and sustainability.

Scope of work:

a) Validate the scope of the project

Facilitate the discussion on the scope of the project with at least the members of the Steering Committee.

b) Establish governance structures

Define national and governorate-level governance bodies responsible for project oversight and coordination, taking into account fragility, social dynamics, and political economy considerations, to minimize risks of exclusion, inequalities, or tensions and ensure effective, inclusive, and context-responsive decision-making. The governance structure should consider the inclusion of civil society and community representatives in advisory or consultative bodies.

c) Clarify responsibilities

Specify technical, administrative, and financial responsibilities for each project component.

d) Assess financial management capacity

Evaluate the ability of executing entities to manage project funds efficiently and in compliance with donor requirements.

e) Identify risks and mitigation measures

Identify potential risks during project execution and propose mitigation strategies for each scenario.

f) Explore co-financing opportunities

Identify potential co-financing sources, in collaboration with:

- The Saha project in coordination with Pathfinder (to be financed by GCF)
- The Pandemic Fund and in particular the World Bank and the European Investment Bank
- The European Union
- The UN agencies

g) Define disbursement conditions and sustainability safeguards

- Specify conditions that should be met before fund disbursement

- Recommend undertakings to ensure project sustainability and minimize operational risks.

Content of deliverable 11 “Possible setups for project implementation across all three components”:

- Documented implementation arrangements, including governance, responsibilities, and financial management
- Risk analysis and mitigation plan for project execution scenarios
- Identification of co-financing opportunities and recommended strategies for mobilization
- Guidelines on fund disbursement conditions and operational sustainability measures

3.12 Drafting of the Funding Proposal

Upon validation of deliverables 2 - 11 by the steering committee of the study, AFD will draft a full funding proposal (FP) with the support of the Consultants, using the GCF template here annexed (or any revised official version) and including all annexes required by the GCF. In particular, Consultants will be responsible for elaborating the Summary of consultations and stakeholder engagement plan” (as Annex 7 of the FP package). AFD will then submit this proposal to the Green Climate Fund. The proposal must be written in English.

Content of deliverable 12: Full funding proposal including all required annexes.

3.13 Support to AFD teams during interactions with the GCF between the submission of the funding proposal and the presentation to the Board

The Consultants will support AFD in the review process of the FP until presentation of the project to the Board. The FP and its annexes are reviewed and commented on by several departments within the Secretariat during the *Technical Review* and *Second Level Due Diligence*, before being presented to the Climate Investment Committee and analyzed by the panel of independent experts (independent technical advisory panel – ITAP).

The GCF may raise issues that will require specific responses and modifications to the project structure, the Project Proposal, and its annexes at each stage. This process may involve numerous rounds of revisions and versions of the Project Proposal and its annexes, as well as several meetings with the Secretariat.

The Consultant will support AFD throughout this phase, which includes:

- Participating in meetings with the GCF teams
- Updating the project proposal and its annexes based on feedback from the secretariat, committees and experts involved in evaluating the project proposal. Further analyses and addenda to the full funding proposal may be requested, allowing earlier deliverables to be refined and completed prior to the targeted GCF Board meeting.
- Participating in Board meetings (if required)

Content of deliverable 13:

- Minutes of exchanges with the GCF in presence of the consultant,
- Updated version of the funding proposal taking into account comments

3.14 Capitalization and Communication

Capitalization

The **capitalization report (deliverable 14)** serves to present the lessons learned from the assignment. It shall highlight the approaches, results achieved, and any element deemed replicable, or innovative.

The content should focus on an analysis of the knowledge on climate adaptation generated, and suggest avenues for future assignments.

- Regarding the writing style, the capitalization report shall be written in clear, structured, and accessible language, highlighting the most relevant elements for readers who may not have been directly involved in the assignment.
- Regarding format, the capitalization report shall be a ready-to-use document not exceeding 4,000 words – 5 pages (excluding appendices).

The capitalization report will be accompanied by an appendix that identifies the difficulties encountered, the factors that facilitated or hindered the implementation of the assignment, as well as recommendations for improving the organizational structure.

Photo library

The Consultants will provide communication and knowledge dissemination materials to ensure the dissemination of the results and lessons learned from the support. Specifically, they will be required to compile a photo library of at least thirty photographs taken during the implementation of the activities.

Article 4. DELIVERABLES AND CONDITIONS OF DELIVERY

4.1. Description of Expected Deliverables

Special attention will be given to the quality of writing and the presentation of the deliverables, for which an attractive formatting and design should be pursued whether on word, excel or power point presentations. Each report must include an executive summary. Meeting minutes and workshop reports (where applicable) must be included as appendices. Moreover, seeking co-construction and validation by main stakeholders will be crucial.

The table below presents the deadlines for the deliverables, in their draft version. Please note that activities can be carried in parallel.

Expected deliverable	Submission deadline
Deliverable 1: Inception report including data status assessment highlighting missing data if any; preliminary observations, and detailed work plan	M0 (Notification of contract award and start of services) + 2 weeks
Deliverable 2: Climate and health vulnerability and adaptation assessments in selected pilot governorates.	M0 + 2 months

Deliverable 3: Mapping of actors, rules and processes at national, governorate and district levels on climate and health surveillance, preparation and response	M0 + 2 months
Deliverable 4: Operational research to be financed on climate and health risks to orientate public policies	M0 + 3 months
Deliverable 5: Preliminary roadmaps for climate and health adaptation measures in selected pilot governorates.	M0 + 5 months
Deliverable 6: Assessment of GHG emissions, climate risks and energy performance of a sample of health facilities (10 large and 5 smaller public and private organizations) including the identification and prioritization of adaptation and mitigation measures (under scopes 1, 2 and 3), development of energy efficiency investment scenarios, estimation of CAPEX/OPEX requirements, and preparation of investment plans supporting potential climate and energy efficiency financing opportunities.	M0 + 5 months
Deliverable 7: Defining sustainable and low carbon footprint investments on hazardous healthcare waste management.	M0 + 5 months
Deliverable 8: Elaborating public regulations and incentives for the health sector (public and private) to invest in environmental sustainability and climate resilience.	M0 + 5 months
Deliverable 9: Environmental and social assessments, and action plans on all activities.	M0 + 6 months
Deliverable 10: Gender, social inclusion and participation assessments and action plans.	M0 + 6 months
Deliverable 11: Defining possible set-ups for the project implementation on all three components.	M0 + 6 months
Deliverable 12: Drafting of the Funding Proposal	M0 + 7 months
Deliverable 13: Support for AFD teams during interactions with the GCF between the submission of the funding proposal and the presentation to the Board	M0 + 13 months
Deliverable 14: Capitalization report	M0 + 13 months

The bulk of the deliverables are expected to be handed by March 2027 (M0 + 6 months) in order to finalize the Full Funding Proposal in May 2027.

4.2. Global methodology and validation of the deliverables

All diagnostics and recommendations leading to the elaboration of the deliverables of the study shall be developed through a participatory approach, in close coordination with relevant stakeholders, the Ministry of Public Health and the Ministry of Environment, reflecting the cross-cutting nature of this health–climate project.

The Consultants shall ensure that each deliverable is presented in the form of a full word deliverable, an executive summary and a PowerPoint presentation highlighting the main findings, including key diagnostics, recommendations, and decision or arbitration points. They will also be required to organize debriefing and consultation meetings with AFD and the focal points designed by the Ministry of Environment and the Ministry of Public Health (as part of the steering committee established to oversee the assignment), both in person and via videoconference, in order to facilitate exchanges and ensure the effective involvement of remote experts who contributed to the deliverables.

Upon receipt of the three formats of each deliverable by AFD (full word text, executive summary in word text and power point presentation), the AFD will have a period of 15 working days to analyze their comments and send their comments to the Consultants.

Once received, the Consultants may need to modify the reports and deliverables, within a reasonable timeframe (7 working days), before sharing the improved version of these deliverables, again electronically, in word, and power point format (as well as any Excel spreadsheet if necessary), to the above-mentioned emails. To facilitate the review, the documents will also be sent by the Consultants in word format with “track changes” mode.

Final validation of the deliverables will be carried out following the meetings mentioned above in the presence of AFD and the focal points of both Ministries. For these meetings, the Consultants shall send an agenda and the power point presentations at least 5 working days before the date of the presentation. Following the presentation, the Consultants shall send the minutes of the meeting with key suggestions and recommendations made that shall be taken into account in all deliverables no later than 15 working days after the meeting.

The process may be repeated as long as the deliverables are not satisfactory to AFD and the stakeholders.

This final validation will trigger payment of the related invoices.

The organization of this validation process should be preferably conducted by a designated focal point or “team leader” (cf. 6.2. for a description of his/her main duties) acting as the main interface with AFD and the Lebanese authorities. This individual, who may be any expert mobilized under the assignment but preferably based in Lebanon and fluent in Arabic, French, and English, shall have an overarching understanding of the study and be able to address partners’ queries effectively, acting as a “conductor” ensuring overall coherence and coordination.

Article 5. PROFILES OF EXPERTS

5.1 Qualification of the consulting firm(s)

The assignment will be awarded to a renowned consulting firm or consortium with proven experience, over the past ten years, in:

- (i) developing health and climate mitigation and adaptation programs and in conducting feasibility studies for development projects and programs in the health sector.
- (ii) project appraisal for the Green Climate Fund (GCF), the French Development Agency (AFD) or similar development finance institutions;
- (iii) countries in the Middle East and North Africa region (especially Lebanon).

5.2 Areas of Expertise

Ten **areas** of expertise are requested for this assignment. **Each of these areas of expertise may be filled by one or several experts. Also, one or a combination of individual experts or experts attached to a particular firm may cover several areas of expertise.**

1. Climate & health expertise

Skills: Climate change impacts on health, climate and health adaptation and mitigation.

Deliverables and tasks concerned: conducting climate vulnerability assessments, prioritizing climate-related health risks, identifying adaptation measures, and elaborating adaptation roadmaps and recommendations in order to support climate and health data management (contribution is expected on all deliverables).

2. Epidemiology, public health and climate-sensitive surveillance expertise

Skills: Epidemiological surveillance, health data management, early detection, laboratory systems, syndromic and environmental event-based surveillance. Experience in climate-sensitive disease surveillance, environmental public health surveillance, heat-health surveillance systems, and the use of meteorological, environmental and climate information for public health decision-making. Knowledge of early warning systems, public health preparedness and response mechanisms, surveillance indicators, and monitoring frameworks in low- and middle-income countries. Experience in assessing surveillance systems and translating data into operational decision-making processes would be highly valued.

Deliverables and tasks concerned: Assessing existing health, environmental and climate-related surveillance systems and their use for preparedness and response; mapping surveillance actors, data flows, indicators and decision-making processes; identifying climate-related health risks and surveillance needs; supporting the development of climate-sensitive surveillance indicators, monitoring frameworks and early warning mechanisms; contributing to preparedness and response plans, adaptation roadmaps and actionable recommendations; and identifying opportunities for operational integration and coordinated use of climate and health information for public health action. (Specific but not exclusive contributions are expected on deliverables 1, 2, 3, 4, 6, 7 and 11).

3. Health–climate information systems, data governance and interoperability expertise

Skills: Health information systems architecture, digital epidemiology, data governance, interoperability of heterogeneous datasets (health, laboratory, environmental and climate data), and digital public health systems in fragile and resource-constrained contexts. Specific experience in designing and implementing interoperable surveillance and early warning systems in low- and middle-income countries will be highly appreciated. Expertise in data governance frameworks, institutional arrangements, data sharing mechanisms, interoperability standards, and the design of sustainable information systems spanning multiple sectors and institutions.

Deliverables and tasks concerned: Assessing the technical, institutional and financial conditions required to enable interoperability between climate and health data systems in Lebanon in a highly fragmented digital environment; mapping data producers, custodians and users across health, meteorological, environmental and disaster risk management institutions; assessing mandates, governance arrangements, coordination mechanisms and incentives governing data production, sharing and use; identifying gaps, constraints and investment needs related to digital infrastructure, interoperability standards, governance frameworks and capacity building; proposing phased and operational scenarios for integrating climate variables into routine epidemiological surveillance and early warning systems; defining data governance arrangements, including data ownership, access rights, sharing protocols, institutional responsibilities and long-term sustainability mechanisms; and supporting alignment with national health information system reforms and ongoing donor-supported initiatives. (Specific but not exclusive contribution is expected on deliverables 1, 2, 3, 4, 5, 6, 7, 8 and 11).

4. Project structuring and donor funding expertise

Skills: Project structuring, international and bilateral funding, fund management, grant/loan mechanisms. Specific experience and track record with AFD and the GCF will be highly appreciated.

Deliverables and tasks concerned: Structuring projects financed by international development partners and banks in particular, estimating CAPEX/OPEX financing needs, setting up an operational and financial governance structure for the project implementation that would meet GCF and AFD criteria and mitigate anticipated risks, identifying co-financing opportunities. (Specific but not exclusive contribution is expected on deliverables 1, 5, 6, 7, 8, 11 and 12)

5. Private sector green investment and enabling environment expertise

Skills: expertise in public policies, regulatory frameworks and incentive mechanisms supporting private sector investment in sustainable and climate-resilient infrastructure; knowledge of green financing instruments, including grants, concessional finance, guarantees, risk-sharing mechanisms and blended finance; experience in designing enabling environments for private sector participation in climate and health-related investments; understanding of investment barriers and drivers for private healthcare providers and the pharmaceutical industry; familiarity with financial institutions, green credit lines, energy efficiency financing schemes and public support mechanisms promoting low-carbon and climate-resilient investments.

Deliverables and tasks concerned: Assessing barriers and incentives for private sector participation; identifying regulatory, institutional and financial measures to encourage investments in climate-resilient and low-carbon health infrastructure and services; analysing the business case and investment attractiveness of proposed interventions; identifying opportunities for public support mechanisms and financial instruments to leverage private investment in healthcare facilities and related industries, including the pharmaceutical sector. (Specific but not exclusive contribution is expected on deliverables 3, 6, 7, 8 and 11.)

6. Health sector governance, change management and organizational transformation expertise

Skills: Health sector governance, hospital administration and health facility management, organizational assessment, institutional mapping, stakeholder analysis, RACI framework, change management, strategic planning, and data and information

systems assessment. Proven experience in analysing organizations and designing strategic and operational roadmaps for strengthening institutions in fragile, conflict-affected, or crisis-affected settings with high levels of human capital and strong professional capacity. Experience leading organizational transformation processes in healthcare settings, including hospital governance, service organization, operational performance improvement, healthcare waste management, sustainable procurement, business continuity planning, emergency preparedness, and resilience to climate-related risks. Demonstrated ability to facilitate institutional coordination and support behavioural, managerial and organizational changes required to implement climate-resilient and low-carbon health strategies. Previous experience as a hospital manager, health facility director, senior health administrator, or advisor on health system reforms would be highly valued.

Deliverables and tasks concerned: Mapping stakeholders, institutions and governance arrangements across the health and climate sectors; assessing governance structures, organizational capacities, management systems, operational processes and institutional coordination mechanisms; developing RACI matrices and implementation arrangements for climate and health interventions; identifying organizational, managerial, behavioural and operational changes required to achieve adaptation and mitigation objectives within health facilities and health systems; supporting the co-design of institutional, operational and governance reforms; providing recommendations and action plans to strengthen governance, resilience, sustainability and operational performance; and contributing to the development of implementation roadmaps, coordination mechanisms and accountability frameworks supporting the integration of climate resilience and sustainability into health sector policies, institutions and healthcare facilities. (Specific but not exclusive contribution is expected on deliverables 3, 5, 6, 8, 10 and 11).

7. Health infrastructure, energy efficiency and climate resilience expertise

Skills: energy audits, building energy modelling and dynamic thermal simulations, bioclimatic architecture, energy engineering, energy efficiency, eco-materials and sustainable construction practices, life-cycle assessment (LCA), refrigerants and cooling systems, and clean technologies applied to health facilities; assessment of building energy performance and development of energy efficiency investment packages; waste management, including medical and pharmaceutical waste, and incineration; calculation and reporting of greenhouse gas (GHG) emissions using recognized methodologies (e.g. GHG Protocol, IPCC Guidelines, scopes 1, 2 and 3); design of technical and organizational measures for GHG reduction in hospitals and health systems; climate adaptation and sustainable investment planning for the health sector; CAPEX/OPEX analysis, cost-benefit assessment, and evaluation of incremental investment costs associated with energy efficiency and climate-resilient measures; knowledge of financing mechanisms and financial products supporting energy efficiency, green building and renovation projects; familiarity with decision-support tools related to building energy efficiency, including energy audits, dynamic thermal simulations and energy planning tools; knowledge of public policies, regulatory frameworks and implementation mechanisms related to building energy efficiency; familiarity with international green building and environmental certification schemes (e.g. LEED, BREEAM, EDGE, HQE or equivalent); experience working on energy efficiency and sustainable building projects in emerging and developing economies; understanding of development partners' procedures and institutional arrangements for development projects (previous experience in projects financed with AFD would be an

added value) ; sound knowledge of environmental and social aspects of development projects in the health sector; and experience conducting environmental and social assessments and diagnostics for health, education and social housing infrastructure projects in emerging and middle-income countries.

Deliverables and tasks concerned: Quantifying GHG emissions of the health sector (carbon footprint, inventories); identifying and designing mitigation measures (energy, waste, procurement, infrastructure); developing and comparing energy efficiency scenarios (including pathways achieving 30% to 45% energy performance improvement where relevant), quantifying associated energy savings and emission reductions, and assessing financing needs and opportunities; integrating adaptation and sustainability considerations into health facility planning. Specific but not exclusive contribution is expected on deliverables 6, 7, 8, 9, and 11.

8. Environmental & Social (E&S) expertise

Skills: proven expertise in applying environmental and Social (E&S) safeguards of development banks, such as AFD and the World Bank, expertise in Lebanese E&S regulatory frameworks

Deliverables and tasks concerned: leading E&S assessments of all activities (in particular concerning deliverables 6, 7, 8 and 9), verifying and upgrading financial intermediaries' E&S due diligence, integration of E&S considerations into investments and planning.

9. Social inclusion, gender and stakeholder engagement expertise

Skills: Stakeholder engagement, participatory approaches, multisectoral coordination, social inclusion, gender equality and gender mainstreaming. Proven experience in the design and implementation of stakeholder consultation, social participation and co-construction processes. Extensive knowledge of gender-responsive and gender-transformative approaches, including OECD gender methodologies, international standards on gender mainstreaming, intersectionality, and the integration of gender and social inclusion considerations into development programmes. Experience engaging vulnerable and marginalized populations and supporting inclusive planning processes in health, climate, humanitarian, fragile and conflict-affected settings.

Deliverables and tasks concerned: Mapping stakeholders and vulnerable groups; assessing existing mechanisms for social participation, stakeholder engagement and inclusion; facilitating consultations and co-construction processes with public institutions, healthcare providers, communities and civil society organizations; ensuring that gender, equity and social inclusion considerations are integrated into climate and health assessments, adaptation roadmaps, monitoring frameworks and action plans; and providing recommendations to strengthen participation, inclusion, accountability and stakeholder coordination throughout project preparation and implementation. (Specific but not exclusive contribution is expected on deliverables 3, 5, 6, 10 and 11).

10. Climate finance and GCF procedures

Skills: demonstrated experience in climate adaptation and mitigation assessments according to GCF methodologies and supporting accredited entities in accessing funds from the Green Climate Fund (GCF) with a strong understanding of GCF operational procedures and governance processes, in order to facilitate efficient and timely progression of the project preparation and approval stages.

Deliverables and tasks concerned: all deliverables and in particular the full funding proposal.

Key experts shall prove the following skills and/or experience:

- Postgraduate degree (at least a Master's degree) in a relevant field
- At least 7 years of proven experience in the relevant field
- At least 3 assignments in the area of expertise required (studies, preparation, evaluation or implementation of public policies, programmes or projects in the health and/or climate sectors, as applicable)
- Demonstrated experience in the preparation, structuring, appraisal, implementation or evaluation of projects financed by international development partners and financial institutions (e.g. AFD, GCF, World Bank, EU, UN agencies, development banks or bilateral donors) would be highly valued
- Familiarity with the requirements, procedures and operational frameworks of international development partners, particularly in relation to project preparation, investment planning, institutional arrangements and implementation modalities with IDFI's such as AFD would be an asset
- Proficiency in English
- Proficiency in Arabic is a strong added value
- Strong analytical and writing skills
- Stakeholder engagement and facilitation skills

In addition, the Consultant will identify a **team leader** (minimum 15 years of experience, with at least 10 directly related to the field of the assignment) whose main duties will be:

- Overall responsibility for direction of staff.
- Maintaining contact with client.
- Liaison with public authorities.
- Preparation and monitoring of work programs, planning schedules.
- Staff scheduling.
- Analysis of potential constraints and delays with identification of remedial measures to be taken.
- Responsible for quality of deliverables.

Additional expertise

Complementary expertise may be provided by the Consultants for the successful completion of the assignment.

6.3 Additional considerations

A Curriculum vitae of no more than 3 pages will be submitted for each proposed expert. The academic qualifications, experience and previous assignments of similar nature and/or related consultancy services of each member of the team of experts should be detailed in the submitted CVs.

The experts proposed cannot come from a beneficiary administration. However, civil servants from a public institution / trust organization other than the beneficiary can be nominated (if feasible) when there is no hierarchical link between the expert and the beneficiary. A document from the official's administration, giving his agreement for his mobilization, will be necessary.

Article 6. BUDGET

6.1 Level of effort

The total level of effort is estimated at 510 man-days.

6.2 Financial offer

The tenderer should propose a budget based on the elements indicated in the Terms of Reference. This should cover all consultancy costs, including expert fees, a limited budget to cover the cost of participatory workshops (excluding venue costs), living and travel expenses (per diems), and security expenses.

Costs related to backstopping, quality control and the participation of the Consultant's project director to the kick-off meeting should be covered by the experts' fees.

The time required to organize and present the deliverables to both Ministries shall be covered by the budget. However, these meetings should not incur any additional organizational costs, as they can be held at the premises of either Ministry or at AFD's offices in Beirut.

Article 7. ANNEXES

Funding proposal template

Prefeasibility study

PEEB Med brochure

Funding Proposal

Project/Programme title:	<u>Please indicate the project title. Ideally this should reference the country where the project/programme will be implemented and be less than 100 characters, approximately 10-15 words.</u>
Country(ies):	<u>List all the countries where the project/programme will be implemented.</u>
Accredited Entity:	<u>Indicate the Accredited Entity submitting this proposal.</u>
Date of first submission:	<u>[YYYY/MM/DD]</u>
Date of current submission	<u>[YYYY/MM/DD]</u>
Version number	<u>[V.000]</u>



Contents

Section A	<u>PROJECT / PROGRAMME SUMMARY</u>
Section B	<u>PROJECT / PROGRAMME INFORMATION</u>
Section C	<u>FINANCING INFORMATION</u>
Section D	<u>EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA</u>
Section E	<u>LOGICAL FRAMEWORK</u>
Section F	<u>RISK ASSESSMENT AND MANAGEMENT</u>
Section G	<u>GCF POLICIES AND STANDARDS</u>
Section H	<u>ANNEXES</u>

NOTE TO ACCREDITED ENTITIES ON THE USE OF THE FUNDING PROPOSAL TEMPLATE

- Accredited Entities should provide summary information in the proposal with cross-reference to annexes such as feasibility studies, gender action plan, term sheet, etc.
- Accredited Entities should ensure that annexes provided are consistent with the details provided in the funding proposal. Updates to the funding proposal and/or annexes must be reflected in all relevant documents.
- The total number of pages for the funding proposal (excluding annexes) **should not exceed 60**. Proposals exceeding the prescribed length will not be assessed within the usual service standard time.
- The recommended font is Arial, size 11.
- Under the [GCF Information Disclosure Policy](#), project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Accredited Entities are asked to fill out information on disclosure in section G.4.

Please submit the completed proposal to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

“FP-[Accredited Entity Short Name]-[Country/Region]-[YYYY/MM/DD]”

PROJECT/PROGRAMME SUMMARY				
A.1. Project or programme	<u>Choose an item.</u>	A.2. Public or private sector	<u>Choose an item.</u>	
A.3. Request for Proposals (RFP)	If the funding proposal is being submitted in response to a specific GCF Request for Proposals, indicate which RFP it is targeted for. Please note that there is a separate template for the Simplified Approval Process and REDD+. <u>Choose an item.</u>			
A.4. Result area(s)	Check the applicable GCF result area(s) that the <u>overall</u> proposed project/programme targets below. For each checked result area(s), indicate the estimated percentage of GCF and Co-financers' contribution devoted to it. The total of the percentages when summed should be 100% for GCF and Co-financers' contribution respectively.			
		GCF contribution	Co-financers' contribution¹⁴	
	Mitigation total	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Energy generation and access	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Low-emission transport	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Buildings, cities, industries and appliances	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Forestry and land use	<u>Enter number</u> %	<u>Enter number</u> %	
	Adaptation total	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Most vulnerable people and communities	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Health and well-being, and food and water security	<u>Enter number</u> %	<u>Enter number</u> %	
	☐ Infrastructure and built environment	<u>Enter number</u> %	<u>Enter number</u> %	
☐ Ecosystems and ecosystem services	<u>Enter number</u> %	<u>Enter number</u> %		
A.5. Expected mitigation outcome (Core indicator 1: GHG emissions reduced, avoided or removed / sequestered)	Indicate greenhouse gas (GHG) emission reductions or removals in tCO₂eq over total lifespan of the project/programme¹⁵	A.6. Expected adaptation outcome (Core indicator 2: direct and indirect beneficiaries reached)	Indicate total number of direct and indirect beneficiaries	
			Indicate number of direct beneficiaries	Indicate number of indirect beneficiaries
			Indicate % of direct beneficiaries vis-à-vis total population	Indicate % of indirect beneficiaries vis-à-vis total population
A.7. Total financing (GCF + co-finance¹⁶)	<u>Choose an item.</u>	A.9. Project size	<u>Choose an item.</u>	
A.8. Total GCF funding requested	<u>Choose an item.</u> For multi-country proposals, please fill out annex 17.			

¹⁴ Co-financer's contribution means the financial resources required, whether Public Finance or Private Finance, in addition to the GCF contribution (i.e. GCF financial resources requested by the Accredited Entity) to implement the project or programme described in the funding proposal.

¹⁵ The total lifespan of the project/programme is defined as the maximum number of years over which the outcomes of the investment are expected to be effective. This is different from the project/programme implementation period.

¹⁶ Refer to the [Policy of Co-financing](#) of the GCF.

A.10. Financial instrument(s) requested for the GCF funding	Mark all that apply and provide total amounts. The sum of all total amounts should be consistent with A.8. ☐ Grant <u>Enter number</u> ☐ Equity <u>Enter number</u> ☐ Loan <u>Enter number</u> ☐ Results-based payment <u>Enter number</u> ☐ Guarantee <u>Enter number</u>		
A.11. Implementation period	Indicate the number of years and months the project/programme is expected to be implemented.	A.12. Total lifespan	Indicate the maximum number of years over which the outcomes of the investment are expected to be effective, i.e. to lead to adaptation and/or mitigation results.
A.13. Expected date of AE internal approval	This is the date that the Accredited Entity obtained/will obtain its own approval to implement the project/programme, if available. <u>Click or tap to enter a date.</u>	A.14. ESS category	Refer to the AE's safeguard policy and GCF ESS Standards to assess your FP category. <u>Choose an item.</u>
A.15. Has this FP been submitted as a CN before?	Yes ☐ No ☐	A.16. Has Readiness or PPF support been used to prepare this FP?	Yes ☐ No ☐
A.17. Is this FP included in the entity work programme?	Yes ☐ No ☐	A.18. Is this FP included in the country programme?	Yes ☐ No ☐
A.19. Complementarity and coherence	Does the project/programme complement other climate finance funding (e.g. GEF, AF, CIF, etc.)? If yes, please elaborate in section B.1. Yes ☐ No ☐		
A.20. Executing Entity information	If not the Accredited Entity, please indicate the full legal name of the Executing Entity(ies) and provide its country of registration and ownership type. Note that there can be more than one Executing Entity. Also indicate if an Executing Entity is the National Designated Authority. Refer to the definition of Executing Entity in the Accreditation Master Agreement.		
A.21. Executive summary (max. 750 words, approximately 1.5 pages)			
Provide an executive summary of the project/programme including: 1. Climate change problem 2. Proposed interventions 3. Climate results/benefits			

PROJECT/PROGRAMME INFORMATION

B.1. Climate context (max. 1000 words, approximately 2 pages)

Climate change problem: Describe the climate change problem the proposal is expected to address. Describe the mitigation needs (GHG emissions profile) and/or adaptation needs (climate hazards and associated risks based on impacts, exposure, and vulnerabilities) that the proposed interventions are expected to address. Also describe the most likely scenario (prevailing conditions or other alternative) that would remain or continue in the absence of the proposed interventions. Include baseline information. The methodologies used to derive such information, including the mitigation and adaptation needs, should be included in the feasibility study.

Context: In describing the mitigation and/or adaptation needs, briefly describe the target region/area of the proposed interventions including information on the demographics, economy, topography, etc.

Related projects/interventions: Also describe any recent or ongoing projects/interventions that are related to the proposal from other domestic or international sources of funding, such as the Global Environment Facility, Adaptation Fund, Climate Investment Funds, etc., and how they will be complemented by this project/programme (e.g. scaling up, replication, etc.). Please identify current gaps and barriers regarding recent or ongoing projects and elaborate further how this project/programme complements or addresses these.

B.2 (a). Theory of change narrative and diagram (max. 1500 words, approximately 3 pages plus diagram)

Present the theory of change (ToC) that contains a goal statement and describes how the proposed project/programme will contribute towards the goal statement by using results chain links from activities, outputs, to outcomes. By referring to the sample ToC diagram template available in the guidance note, present a ToC diagram (approximately 1 page) which visually represents the same logic in the narrative description. The ToC diagram and narrative may include a wide range of co-benefits¹⁷ as applicable in the context of the project/programme.

Note all co-benefits will need to be further elaborated in section D.3 (sustainable development potential) and correspondent co-benefit indicators should be provided under section E.5 (project/programme specific indicators).

The theory of change should also include any relevant barriers (social, gender, fiscal, regulatory, technological, financial, ecological, institutional, etc.) that need to be addressed as well as risks and assumptions. Note that the assumptions can be elaborated further in sections E.3 (GCF outcome level: reduced reduced emissions and increased resilience) and E.5 (project/programme specific indicators) for each relevant indicator, as appropriate.

B.2 (b). Outcome mapping to GCF results areas and co-benefit categorization

Fill in the GCF results area table below to map each project/programme outcome identified in section B.2(a) to the contributing GCF results area(s) by referring to the description of eight results areas provided in the guidance note.

Outcome number	GCF Mitigation Results Area (MRA 1-4)				GCF Adaptation Results Area (ARA 1-4)			
	MRA 1 Energy generation and access	MRA 2 Low-emission transport	MRA 3 Building, cities, industries, appliances	MRA 4 Forestry and land use	ARA 1 Most vulnerable people and communities	ARA 2 Health, well-being, food and water security	ARA 3 Infrastructure and built environment	ARA 4 Ecosystems and ecosystem services
Outcome 1	☐	☐	☐	☐	☐	☐	☐	☐
Outcome 2	☐	☐	☐	☐	☐	☐	☐	☐
Outcome 3	☐	☐	☐	☐	☐	☐	☐	☐
Outcome 4	☐	☐	☐	☐	☐	☐	☐	☐
Outcome ...	☐	☐	☐	☐	☐	☐	☐	☐
Outcome ...	☐	☐	☐	☐	☐	☐	☐	☐

If any co-benefits have been identified in section B.2(a), fill in the Co-benefit table below to map each co-benefit to the corresponding category as defined in the FP guidance note.

Co-benefit number	Co-benefit					
	Environmental	Social	Economic	Gender	Adaptation	Mitigation
Co-benefit 1	☐	☐	☐	☐	☐	☐

¹⁷ GCF categorizes co-benefits into six areas which are: environmental, social, economic, gender, adaptation (relevant for pure mitigation projects) and mitigation (relevant for pure adaptation projects). Further guidance is available in the funding proposal (FP) guidance note.

Co-benefit 2	☐	☐	☐	☐	☐	☐
Co-benefit ...	☐	☐	☐	☐	☐	☐
Co-benefit ...	☐	☐	☐	☐	☐	☐

B.3. Project/programme description (max. 2500 words, approximately 5 pages)

Define the project/programme. Describe the proposed set of components, outputs and activities that will be undertaken by the project/programme to attain the intended outcomes elaborated in Section B.2 (a). Please also elaborate how the project/programme activities will address the barriers described in Section B.2.

This section of the funding proposal should be consistent with sections C.2 (financing by component), E.5 (project/programme results level) and E.6 (project/programme activities and deliverables).

Referring to the feasibility study, describe why this set of interventions was selected instead of alternative solutions and how the project/programme can help unlock the needed support in a sustainable manner. Also identify trade-offs of the selected interventions, if applicable.

For Enhanced Direct Access (EDA) proposals and projects/programmes with financial intermediation (loans or on-granting), describe the selection criteria of the sub-project and types.

B.4. Implementation arrangements (max. 1500 words, approximately 3 pages plus diagrams)

Provide a description of the project/programme implementation structure, outlining legal, contractual, institutional and financial arrangements from and between the GCF, the Accredited Entity (AE) and/or the Executing Entity(ies) (EE) or any third parties (if applicable) and beneficiaries.

- Provide information on governance arrangements (supervisory boards, consultative groups among others) set to oversee and guide project implementation. Provide a composition of the decision-making body and oversight function, particularly for Enhanced Direct Access (EDA) proposals.
- Provide information on the financial flows and implementation arrangements (legal and contractual) between the AE and the EE, between the EE or any third party and beneficiaries. For EEs that will administer GCF funds, indicate if a Capacity Assessment has been carried out. Where applicable, summarize the results of the assessment.
- Describe the experience and track record of the AE and EEs with respect to the activities (sector and country/region) that they are expected to undertake in the proposed project/programme.

Provide a diagram(s) or organogram(s) that maps such arrangements including the governance structure, legal arrangements, and the flow and reflow of funds between entities.

B.5. Justification for GCF funding request (max. 1000 words, approximately 2 pages)

Explain why the project/programme requires GCF funding to address mitigation or adaptation measures, i.e. Why is the project/programme not currently being financed by public and/or private sector? Which market failure is being addressed with GCF funding? Are there any other domestic or international sources of financing?

Explain why the proposed financial instruments were selected in light of the proposed activities and the overall financing package. i.e. What is the coherence between activities financed by grants and those financed by reimbursable funds? How were co-financing amounts and prices determined? How does the concessionality of the GCF financing compare to that of the co-financing? If applicable, provide a short market read on the prevailing of the pricing and/or financial markets for similar projects/programmes.

Justify why the level of concessionality of the GCF financial instrument(s) is the minimum required to make the investment viable. Additionally, how does the financial structure and the proposed pricing fit with the concept of minimum concessionality? Who benefits from concessionality?

In your answer, please consider the risk sharing structure between the public and private sectors, the barriers to investment and the indebtedness of the recipient. Please reference relevant annexes, such as the feasibility study, economic analysis or financial analysis when appropriate.

B.6. Exit strategy (max. 500 words, approximately 1 page)

Explain how the project/programme will successfully exit once implementation is completed, including how results and benefits will continue beyond the project/programme period and how the contribution to paradigm shift will be maintained.

Include information pertaining to the longer-term ownership, project/programme exit strategy, operations and maintenance of investments (e.g. key infrastructure, assets, contractual arrangements). In case of private sector, please describe the GCF's financial exit strategy through Initial Public Offerings, trade sales, etc.

Provide information on additional actions to be undertaken by public and private sector or civil society as part of the project/programme to ensure sustainability of the results attained.

FINANCING INFORMATION						
C.1. Total financing						
(a) Requested GCF funding (i + ii + iii + iv + v + vi + vii)	Total amount			Currency		
	<u>Enter amount</u>			<u>Options</u>		
GCF financial instrument	Amount	Tenor	Grace period	Pricing		
(i) Senior loans	<u>Enter amount</u>	<u>Enter years</u>	<u>Enter years</u>	<u>Enter %</u>		
(ii) Subordinated loans	<u>Enter amount</u>	<u>Enter years</u>	<u>Enter years</u>	<u>Enter %</u>		
(iii) Equity	<u>Enter amount</u>	<u>Enter years</u>		<u>Enter % equity return</u>		
(iv) Guarantees	<u>Enter amount</u>					
(v) Reimbursable grants	<u>Enter amount</u>					
(vi) Grants	<u>Enter amount</u>					
(vii) Results-based payments	<u>Enter amount</u>					
(b) Co-financing information	Total amount			Currency		
	<u>Enter amount</u>			<u>Options</u>		
Name of institution	Financial instrument	Amount	Currency	Tenor & grace	Pricing	Seniority
Click here to enter text.	<u>Options</u>	<u>Enter amount</u>	<u>Options</u>	<u>Enter years</u> <u>Enter years</u>	<u>Enter%</u>	<u>Options</u>
Click here to enter text.	<u>Options</u>	<u>Enter amount</u>	<u>Options</u>	<u>Enter years</u> <u>Enter years</u>	<u>Enter%</u>	<u>Options</u>
Click here to enter text.	<u>Options</u>	<u>Enter amount</u>	<u>Options</u>	<u>Enter years</u> <u>Enter years</u>	<u>Enter%</u>	<u>Options</u>
Click here to enter text.	<u>Options</u>	<u>Enter amount</u>	<u>Options</u>	<u>Enter years</u> <u>Enter years</u>	<u>Enter%</u>	<u>Options</u>
(c) Total financing (c) = (a)+(b)	Amount			Currency		
	<u>Enter amount</u>			<u>Options</u>		
(d) Other financing arrangements and contributions (max. 250 words, approximately 0.5 page)	Please explain if any of the financing parties including the AE would benefit from any type of guarantee (e.g. sovereign guarantee, MIGA guarantee). Please also explain other contributions such as in-kind contributions including tax exemptions and contributions of assets. Please also include parallel financing associated with this project or programme (refer to the co-financing policy).					
C.2. Financing by component						
Please provide an estimate of the total cost per component and output as outlined in section B.3. above and disaggregate by source of financing. More than one co-financing institution can fund a single component or output. Provide the summarised cost estimates in the table below and the detailed budget plan as annex 4.						

Component	Output	Indicative cost Options	GCF financing		Co-financing		
			Amount Options	Financial Instrument	Amount Options	Financial Instrument	Name of Institutions
Click here to enter text.	Click here to enter text.	Enter amount	Enter amount	Choose an item.	Enter amount	Choose an item.	Click here to enter text.
	Click here to enter text.	Enter amount	Enter amount	Choose an item.	Enter amount	Choose an item.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Enter amount	Enter amount	Choose an item.	Enter amount	Choose an item.	Click here to enter text.
	Click here to enter text.	Enter amount	Enter amount	Choose an item.	Enter amount	Choose an item.	Click here to enter text.
Click here to enter text.	Click here to enter text.	Enter amount	Enter amount	Choose an item.	Enter amount	Choose an item.	Click here to enter text.
	Click here to enter text.	Enter amount	Enter amount	Choose an item.	Enter amount	Choose an item.	Click here to enter text.
Indicative total cost (USD)		Enter amount	Enter amount		Enter amount		

This table should match the one presented in the term sheet and be consistent with information presented in other annexes including the detailed budget plan and implementation timetable.

In case of a multi-country/region programme, specify indicative requested GCF funding amount for each country in annex 17, if available.

C.3 Capacity building and technology development/transfer (max. 250 words, approximately 0.5 page)

C.3.1 Does GCF funding finance capacity building activities?	Yes ☐ No ☐
C.3.2. Does GCF funding finance technology development/transfer?	Yes ☐ No ☐

If the project/programme is expected to support capacity building and technology development/transfer, please provide a brief description of these activities and quantify the total requested GCF funding amount for these activities, to the extent possible.

EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

This section refers to the performance of the project/programme against the investment criteria as set out in the GCF's [Initial Investment Framework](#).

D.1. Impact potential (max. 500 words, approximately 1 page)

Describe the potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas. As applicable, describe the envisaged project/programme benefits for mitigation and/or adaptation. Provide the intended outcomes for mitigation by elaborating on how the project/programme contributes to low-emission sustainable development pathways. Provide the intended outcomes for adaptation by elaborating on how the project/programme contributes to increased climate-resilient sustainable development. Calculations should be provided as an annex. This should be consistent with section E.3 reporting GCF's core indicators.

D.2. Paradigm shift potential (max. 500 words, approximately 1 page)

Paradigm shift potential is defined as 'degree to which the proposed activity can catalyse impact beyond a one-off project or programme investment'. In this section, elaborate on the contribution to paradigm shift and how the proposed project/programme aims to contribute towards it based on the theory of change described in section B2(a). Also describe how and to what extent the project/programme will be able to promote or contribute to paradigm shift through the below.

- *Potential for scaling up and replication*
- *Potential for knowledge sharing and learning*
- *Contribution to the creation of an enabling environment*
- *Contribution to the regulatory framework and policies*
- *Overall contribution to climate-resilient development pathways consistent with relevant national climate change adaptation strategies and plans*

D.3. Sustainable development (max. 500 words, approximately 1 page)

Describe the wider benefits and priorities of the project/programme in relation to the Sustainable Development Goals and provide the potential in terms of:

- *Environmental co-benefits*
- *Social co-benefits including health co-benefit*
- *Economic co-benefits*
- *Gender-sensitive development benefit*

D.4. Needs of recipient (max. 500 words, approximately 1 page)

Describe the scale and intensity of vulnerability of the country and beneficiary groups and elaborate how the project/programme addresses the issue (e.g. the level of exposure to climate risks for beneficiary country and groups, overall income level, etc.). Describe how the project/programme addresses the following needs:

- *Vulnerability of the country and/or specific vulnerable groups, including gender aspects (for adaptation only)*
- *Economic and social development level of the country and the affected population*
- *Absence of alternative sources of financing (e.g. fiscal or balance of payments gap that prevents government from addressing the needs of the country; and lack of depth and history in the local capital market)*
- *Need for strengthening institutions and implementation capacity*

D.5. Country ownership (max. 500 words, approximately 1 page)

Please describe how the beneficiary country takes ownership of and implements the funded project/programme. Describe the following:

- *Existing national climate strategy*
- *Existing GCF country programme*
- *Relevance to and alignment with existing policies such as Nationally Determined Contributions (NDCs), Nationally Appropriate Mitigation Actions (NAMAs), and National Adaptation Plans (NAPs)*
- *NDCs, NAMAs, and NAPs*
- *Capacity of Accredited Entities or Executing Entities to deliver*
- *Role of National Designated Authority*
- *Engagement with civil society organizations and other relevant stakeholders, including indigenous peoples, women and other vulnerable groups*

D.6. Efficiency and effectiveness (max` . 500 words, approximately 1 page)

Describe how the financial structure is adequate and reasonable in order to achieve the proposal's objectives, including addressing existing bottlenecks and/or barriers, and providing the minimum concessionality to ensure the project is viable without crowding out private and other public investments. Refer to section B.5 on the justification of GCF funding requested as necessary.

Please describe the efficiency and effectiveness of the proposed project/programme, taking into account the total financing and mitigation/ adaptation outcome the project/programme aims to achieve, and explain how this compares to an appropriate benchmark.

Please specify the expected economic rate of return based on a comparison of the scenarios with and without the project/programme.

IPlease specify the expected financial rate of return with and without the Fund's support to illustrate the need for GCF funding to illustrate overall cost effectiveness.

Please explain how best available technologies and practices have been considered and applied. If applicable, specify the innovations/modifications/adjustments that are made based on industry best practices.

LOGICAL FRAMEWORK

*This section refers to the project/programme's logical framework in accordance with the **GCF's Integrated Results Management Framework** to which the project/programme contributes as a whole, including in respect of any co-financing.*

E.1. Project/Programme Focus

Please indicate whether this proposal is for a mitigation or adaptation project/programme. For cross-cutting proposals, select both.

- ☐ Reduced emissions (mitigation)
☐ Increased resilience (adaptation)

E.2. GCF Impact level: Paradigm shift potential (max 600 words, approximately 1-2 pages)

This section of the logical framework is meant to help a project/programme monitor and assess how it contributes to the paradigm shift described in section D.2 above by applying three assessment dimensions - scale, replicability, and sustainability.

Accordingly, for each assessment dimension (see the definition per assessment in the accompanying guidance note), describe the current state (baseline) and the potential scenario (target) and rate the current state (baseline) by using the three-point-scale rating (low, medium, and high) provided in the guidance note. Also describe how the project/programme will contribute to that shift/ transformation under respective assessment dimensions (scale, replicability and sustainability). In doing so, please refer to section B.2(a) (theory of change).

Assessment Dimension	Current state (baseline)		Potential target scenario (Description)	How the project/programme will contribute (Description)
	Description	Rating		
Scale		<u>Choose an item.</u>		<i>Describe key applicable outputs and or resulting outcomes relevant to increasing (scaling up) quantifiable results within and beyond the scope of the intervention.</i>
Replicability		<u>Choose an item.</u>		<i>Describe key applicable outputs and resulting outcomes that will be replicated to other sectors, markets, geographical regions, or countries.</i>
Sustainability		<u>Choose an item</u>		<i>Describe key applicable outputs and resulting outcomes that will be sustained beyond the project/programme period.</i>

E.3. GCF Outcome level: Reduced emissions and increased resilience (IRMF core indicators 1-4, quantitative indicators)

Select appropriate IRMF core and supplementary indicators to monitor project/programme progress. More than one IRMF (core and or supplementary) indicators may be selected as applicable for each GCF results area and project/programme outcome (as defined in the table in section B.2(b)). If IRMF indicators are unable to measure any given project/programme outcomes, project/programme-specific indicators should be developed under section E.5 (project/programme specific indicators).

GCF Result Area	IRMF Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final ¹⁸	
<u>Choose an item.</u>	<u>Choose appropriate indicators and supplementary indicators</u>	Sources of information and methods used to collect and report data /information to measure progress against targets	The starting point or current value of the indicators before the implementation of the project	The estimated value of the indicator at the mid-point of the implementation	The estimated value of the indicator at the completion of the implementation	Externalities and factors outside project management's control that may impact the outcomes Data sources and methodologies applied for estimating baseline and targets
<u>Choose an item.</u>	<u>Choose appropriate indicators and supplementary indicators</u>					
<u>Choose an item.</u>	<u>Choose appropriate indicators and supplementary indicators</u>					

E.4. GCF Outcome level: Enabling environment (IRMF core indicators 5-8 as applicable)

¹⁸ The final target means the target at the end of project/programme implementation period. However, for core indicator 1 (GHG emission reduction), please also provide the target value at the end of the total lifespan period which is defined as the maximum number of years over which the impacts of the investment are expected to be effective.

Select at least two relevant IRMF core (enabling environment) indicators to monitor and elaborate the baseline context and project/programme's targeted outcome against the respective indicators. Rate the current state (baseline) vis-à-vis the target scenario and select the geographical scope of the outcome to be assessed. Describe how the project/programme will contribute towards the target scenario. Refer to a case example in the accompanying guidance to complete this section.

Core Indicator	Baseline context (description)	Rating for current state (baseline)	Target scenario (description)	How the project will contribute	Coverage
<u>Choose an item.</u>		<u>Choose an item.</u>			<u>Choose an item.</u>
<u>Choose an item.</u>		<u>Choose an item.</u>			<u>Choose an item.</u>
<u>Choose an item.</u>		<u>Choose an item.</u>			<u>Choose an item.</u>
<u>Choose an item.</u>		<u>Choose an item.</u>			<u>Choose an item.</u>

E.5. Project/programme specific indicators (project outcomes and outputs)

This section should list out project/programme-specific performance indicators (outcomes and outputs) that are not covered in sections above (E.1-E.4). List down tailored indicators to monitor /track progress against relevant project/programme results (outcomes/outputs). AEs have the freedom to decide against which outcomes they would like to set project/programme specific indicators. If any co-benefits are identified in sections B.2(a)(b), and D.3, AEs are encouraged to add and monitor co-benefit indicators under the "Project/programme co-benefit indicators" section in table below. Add rows as needed.

Please number each outcome and output as shown below to indicate association of outputs to the contributing outcome. The numbering for outputs under this section should correspond to the output numbering in annex 4 (detailed budget plan).

Project/programme results (outcomes/ outputs)	Project/programme specific Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions / Note
				Mid-term	Final	
Outcome 1		Sources of information and methods used to collect and report data/information to measure progress against targets	The starting point or current value of the indicators before the implementation of the project	The estimated value of the indicator at the mid-point of the implementation	The estimated value of the indicator at the completion of the implementation	Externalities and factors outside project management's control that may impact on the Component Data sources and methodologies applied for estimating baseline and targets
Output 1.1						

project/programme's contributions to a paradigm shift and enabling environment using a three-point scale rating. Refer to the guidance note for the summary requirements and factor in additional evaluation /assessment activities under this section accordingly.

RISK ASSESSMENT AND MANAGEMENT

F.1. Risk factors and mitigations measures (max. 3 pages)

Please describe financial, technical, operational, macroeconomic/political, money laundering/terrorist financing (ML/TF), sanctions, prohibited practices, and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures. Insert additional rows if necessary.

For probability: High has significant probability, Medium has moderate probability, Low has negligible probability

For impact: High has significant impact, Medium has moderate impact, Low has negligible impact

Prohibited practices include abuse, conflict of interest, corruption, retaliation against whistleblowers or witnesses, as well as fraudulent, coercive, collusive, and obstructive practices

Selected Risk Factor 1

Category	Probability	Impact
<u>Select</u>	<u>Select</u>	<u>Select</u>

Description

Please describe the risk to the best of your knowledge at this point in time.

Mitigation Measure(s)

Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?

Selected Risk Factor 2

Category	Probability	Impact
<u>Select</u>	<u>Select</u>	<u>Select</u>

Description

Please describe the risk to the best of your knowledge at this point in time.

Mitigation Measure(s)

Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?

Selected Risk Factor 3

Category	Probability	Impact
<u>Select</u>	<u>Select</u>	<u>Select</u>

Description

Please describe the risk to the best of your knowledge at this point in time.

Mitigation Measure(s)

Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?

GCF POLICIES AND STANDARDS

G.1. Environmental and social risk assessment (max. 750 words, approximately 1.5 pages)

Provide the environmental and social risk category assigned to the proposal as a result of screening and the rationale for assigning such category. Present also the environmental and social assessment and management instruments developed for the proposal (for example, Environment and Social Impact Assessment (ESIA), Environment and Social Management Framework (ESMF), Environmental and Social Management Plan (ESMP), Environmental and Social Management System (ESMS), environmental and social audits, etc.). Provide a summary of the main outcomes of these instruments. Present the key environmental and social risks and impacts and the measures on how the project/programme will avoid, minimize and mitigate negative impacts at each stage (e.g. preparation, implementation and operation), in accordance with GCF's [Environmental and Social Safeguard \(ESS\) standards](#). If the proposed project or programme involves investments through financial intermediations, describe the due diligence and management plans by the Executing Entities (EEs) and the oversight and supervision arrangements. Describe the capacity of the EEs to implement the ESMP and ESMF and arrangements for compliance monitoring, supervision and reporting. Include a description of the project/programme-level grievance redress mechanism, a summary of the extent of multi-stakeholder consultations undertaken for the project/programme, the plan of the Accredited Entity (AE) and EEs to continue to engage the stakeholders throughout project implementation, and the manner and timing of disclosure of the applicable safeguards reports following the requirements of the GCF [Information Disclosure Policy](#) and [Environmental and Social Policy](#).

Describe any potential impacts on indigenous peoples and the measures to address these impacts including the development of an Indigenous Peoples Plan and the process for meaningful consultation leading to free, prior and informed consent, pursuant to the GCF [Indigenous Peoples Policy](#).

Attach the appropriate assessment and management instruments or other applicable studies, depending on the environmental and social risk category as annex 6.

G.2. Gender assessment and action plan (max. 500 words, approximately 1 page)

Provide a summary of the gender assessment and project/programme-level gender action plan that is aligned with the objectives of GCF's [Gender Policy](#). Confirm a gender assessment and action plan exists describing the process used to develop both documents. Provide information on the key findings (who is vulnerable and why) and key recommendations (how to address the vulnerability identified) of the gender assessment. Indicate if stakeholder consultations have taken place and describe the key inputs integrated into the action plan, including: how addressing the vulnerability will ensure equal participation and benefits from funds investment; key gender-related results to be expected from the project/programme with targets; implementation arrangements that the AE has put in place to ensure activities are implemented and expected outcomes will be achieved, monitored and evaluated.

Provide the full gender assessment and project-level gender action plan as annex 8.

G.3. Financial management and procurement (max. 500 words, approximately 1 page)

Describe the project/programme's financial management including the financial monitoring systems, financial accounting, auditing, and disbursement structure and methods. Refer to section B.4 on implementation arrangements as necessary.

Articulate any procurement issues that may require attention, e.g. procurement implementation arrangements and the role of the AE under the respective proposal, articulation of procurement risk assessment undertaken and how that will be managed by the AE or the implementing agency. Provide a detailed procurement plan as annex 10.

G.4. Disclosure of funding proposal

Note: The Information Disclosure Policy (IDP) provides that the GCF will apply a presumption in favour of disclosure for all information and documents relating to the GCF and its funding activities. Under the IDP, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Information provided in confidence is one of the exceptions, but this exception should not be applied broadly to an entire document if the document contains specific, segregable portions that can be disclosed without prejudice or harm.

Indicate below whether or not the funding proposal includes confidential information.

- ☐ **No confidential information:** The accredited entity confirms that the funding proposal, including its annexes, may be disclosed in full by the GCF, as no information is being provided in confidence.
- ☐ **With confidential information:** The accredited entity declares that the funding proposal, including its annexes, may not be disclosed in full by the GCF, as certain information is being provided in confidence. Accordingly, the accredited entity is providing to the Secretariat the following two copies of the funding proposal, including all annexes:

- full copy for internal use of the GCF in which the confidential portions are marked accordingly, together with an explanatory note regarding the said portions and the corresponding reason for confidentiality under the accredited entity's disclosure policy, and
- redacted copy for disclosure on the GCF website.

The funding proposal can only be processed upon receipt of the two copies above, if containing confidential information.

ANNEXES

H.1. Mandatory annexes

- ☐ **ANNEX 1** NDA no-objection letter(s) [\(template provided\)](#)
- ☐ **ANNEX 2** Feasibility study - and a market study, if applicable
- ☐ **ANNEX 3** Economic and/or financial analyses in spreadsheet format
- ☐ **ANNEX 4** Detailed budget plan [\(template provided\)](#)
- ☐ **ANNEX 5** Implementation timetable including key project/programme milestones [\(template provided\)](#)
- ☐ **ANNEX 6** E&S document corresponding to the E&S category (A, B or C; or I1, I2 or I3):
[\(ESS disclosure form provided\)](#)
 - ☐ Environmental and Social Impact Assessment (ESIA) or
 - ☐ Environmental and Social Management Plan (ESMP) or
 - ☐ Environmental and Social Management System (ESMS)
 - ☐ **OTHERS (PLEASE SPECIFY – E.G. RESETTLEMENT ACTION PLAN, RESETTLEMENT POLICY FRAMEWORK, INDIGENOUS PEOPLE’S PLAN, LAND ACQUISITION PLAN, ETC.)**
- ☐ **ANNEX 7** Summary of consultations and stakeholder engagement plan
- ☐ **ANNEX 8** Gender assessment and project/programme-level action plan [\(template provided\)](#)
- ☐ **ANNEX 9** **LEGAL DUE DILIGENCE (REGULATION, TAXATION AND INSURANCE)**
- ☐ **ANNEX 10** Procurement plan [\(template provided\)](#)
- ☐ **ANNEX 11** Monitoring and evaluation plan [\(template provided\)](#)
- ☐ **ANNEX 12** AE fee request [\(template provided\)](#)
- ☐ **ANNEX 13** Co-financing commitment letter, if applicable [\(template provided\)](#)
- ☐ **ANNEX 14** Term sheet including a detailed disbursement schedule and, if applicable, repayment schedule

H.2. Other annexes as applicable

- ☐ **ANNEX 15** **EVIDENCE OF INTERNAL APPROVAL** [\(template provided\)](#)
- ☐ **Annex 16** Map(s) indicating the location of proposed interventions
- ☐ **Annex 17** Multi-country project/programme information [\(template provided\)](#)
- ☐ **Annex 18** Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project
- ☐ **Annex 19** Procedures for controlling procurement by third parties or executing entities undertaking projects financed by the entity
- ☐ **Annex 20** First level AML/CFT (KYC) assessment
- ☐ **Annex 21** Operations manual (Operations and maintenance)

- ☐ Annex 22 Assessment of GHG emission reductions and their monitoring and reporting (for mitigation and cross cutting-projects)¹⁹
- ☐ Annex X Other references

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

¹⁹ Annex 22 is mandatory for mitigation and cross-cutting projects.



**AMERICAN
UNIVERSITY
OF BEIRUT**

Assessing and Enhancing the Climate Resilience of Lebanon's Health Care System

Pre-Feasibility Report

Project Team:

Dr. Mey Jurdi

Dr. Rawya Khodor

Ms. Lama Said

Ms. Yara Daou

February 2026

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I. Executive Summary

Currently, Lebanon is already experiencing the effects of climate change. Collective with low institutional readiness, weak infrastructure, and existing socio-economic and environmental vulnerabilities, health impacts would be more prevalent, particularly for vulnerable communities (Figure ES 1). Rising temperatures are expected to substantially increase heat-related morbidity and mortality, while declining precipitation and droughts will reduce water availability, increasing the risk of waterborne diseases and food insecurity. The projected increase in the frequency and severity of climate episodes will add to the national burden of diseases (injuries, morbidity, and mortality), mostly heat-related illnesses resulting from increased temperatures and consecutive hot days; strokes, ischemic heart problems, infectious and chronic respiratory diseases from worsening air quality due to inefficient management of energy by government and private systems. Additionally, climate change would increase the incidence of vector-, rodent-, food-, and water-borne diseases due to climate-induced changes in disease patterns. Moreover, based on the data available from 2012, the health sector itself contributes annually to an estimated 558,000 tons of CO₂ emissions, highlighting the urgent need to implement mitigation interventions to reduce exposures and contributions to GHG emissions.

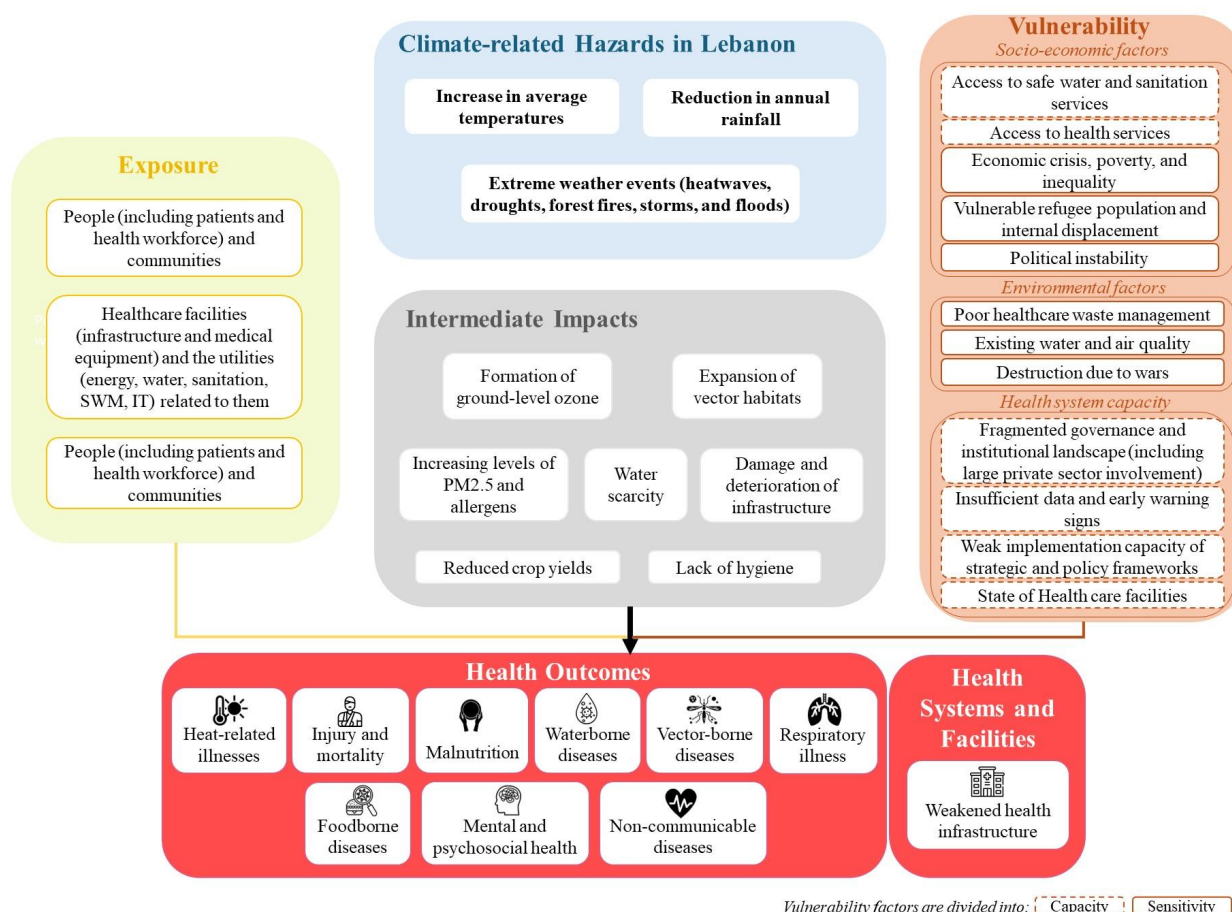


Figure ES 1. Impact chain illustrating exposure, vulnerability, and health risks associated with climate change in Lebanon

And, while recent national policies, strategies, and projects have started addressing the climate-health nexus, efforts remain fragmented and insufficient to build the climate resilience of the health sector.

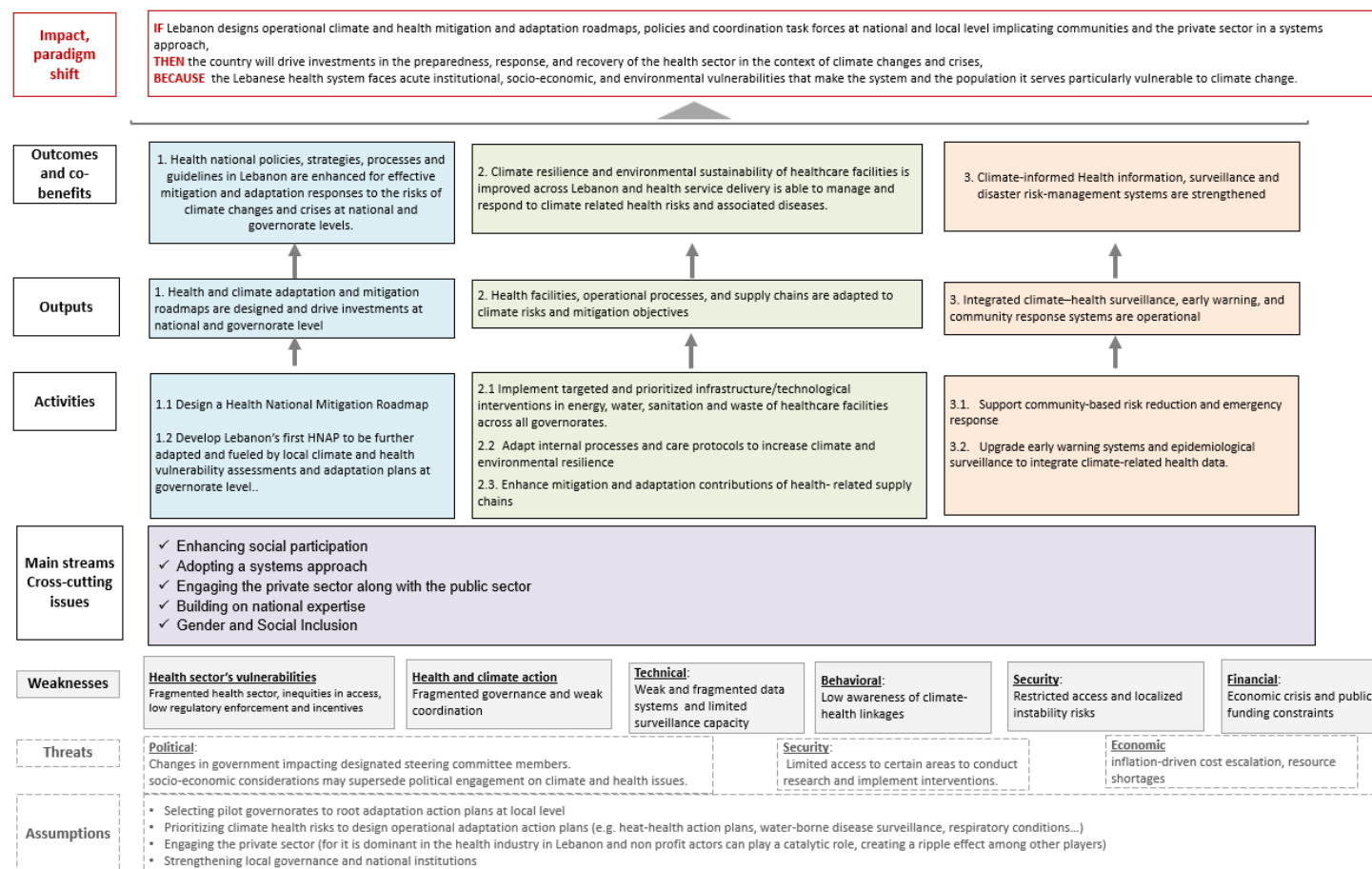
This pre-feasibility report provides the analytical and strategic foundation for assessing and enhancing the climate resilience and environmental sustainability of Lebanon's health care system. It proposes adaptation and mitigation activities through producing knowledge to nurture policies, national strategies, and in fine projects; fostering sustainable and resilient health care facilities and health systems; and encouraging the development of a baseline regarding health threats exacerbated by climate change to enhance the health system's preparedness and response. The project aims to catalyse a paradigm shift toward a national climate-resilient and environmentally sustainable health system that reduces the burden of climate-related diseases and disasters on human health, and specifically among vulnerable communities. By bridging science, policy, and practice, it seeks to transform fragmented sectoral responses into an integrated, data-driven national framework.

With minimal domestic institutional, financing and technical gaps in addressing climate vulnerability, especially in the time of crises, GCF funding is highly pertinent. The project intends to generate significant human, technical, socio-economic, infrastructural, and environmentally sustainable benefits to reduce public health care costs and increase direct financial return and revenue streams. The project's Theory of Change (Figure ES 2) outlines the expected activities, outputs, outcomes, co-benefits, barriers, risks, and assumptions.

Since the project's inception and throughout the development of the concept note, a broad and diverse group of national and local stakeholders active in the field of climate change and health has been consulted and engaged. These include the Ministries of Public Health and Environment and other relevant governmental bodies, academic and research institutions, international humanitarian and development organizations, civil society and non-governmental organizations (NGOs), and development agencies and donors.

Next steps will include the validation of the pre-feasibility study, the preparation and finalization of the Concept Note for submission to and review by the GCF, and ultimately, the completion of the full feasibility phase for appraising the project.

Figure ES 2: Theory of Change of the proposed project.



II. Introduction

This pre-feasibility report “Assessing and Enhancing the Climate Resilience of Lebanon’s Health Care System” aims to lay a solid analytical and strategic foundation for the development of a full climate-health adaptation and mitigation project in Lebanon. This work builds on the inception report and expands on the country’s climate context through a review of the existing knowledge and data on climate-health linkages. This includes a summary of the historical and projected trends, a description of the country’s climate vulnerability, an overview of key non-climatic drivers and their interactions with climate change, and an outline of the geographic and demographic vulnerability hotspots. It further examines the overall climate risk to the health sector and identifies gaps in the available data. It additionally reviews the available national policies and strategies and assesses relevant existing projects and initiatives.

The report sets the proposed project focus, including mitigation and adaptation interventions, to inform the feasibility study. It then presents the project’s rationale, justifies the GCF funding request, and develops the Theory of Change (ToC). The ToC defines the problem and identifies the project outcomes, outputs, activities, co-benefits, and the pre-existing and potential barriers and risks. Moreover, to ensure alignment with the Green Climate Fund (GCF) requirements, the report evaluates the proposed project’s performance against the GCF investment criteria. It also includes an environmental and social risk screening, focusing on a review of issues related to gender and social inclusion in service provision. Additionally, to inform the project’s governance, a review of relevant globally implemented models is presented, and a governance structure tailored to Lebanon’s context is proposed. Finally, the report provides indicative financing options, outlines the steps for stakeholder engagement, and presents a roadmap for the next steps leading to the full feasibility phase.

III. Climate context

A. A review of existing knowledge and data on climate-health linkages in Lebanon

1. Understanding climate-health linkages in Lebanon

Climate change extreme events would weaken health infrastructures, while simultaneously increasing the demand for health services due to the increase in climate-related health impacts on communities. Additionally, it would expose health care workers who are at the forefront of these emergencies to extreme weather events. A recent scoping review on the impacts of climate change on highlighted the compounded effects of physical health risks, mental health challenges, and occupational safety that threaten the capacity and resilience of health workers, risking health services and patient outcomes, particularly in vulnerable settings and emphasized the urgency for implementing multi- targeted training, reviewing facility infrastructure, providing mental health support, and promoting interdepartmental coordination (Tesfaye et al., 2025). Detailed examples of expected health impacts of climate change and risks to health care facilities (health workforce, energy, infrastructure, technologies, and products) are detailed in Section III B (Tables 6 - 8).

Moreover, reported studies in Lebanon reflect that higher temperatures would affect vulnerable populations, including the elderly, those living inland where temperature increases are more severe, and those with pre-existing health problems such as heart problems and asthma (Jurdi et al., 2022; MOE/GEF/UNDP, 2011; MOE/GEF/UNDP, 2016). Prolonged exposure to these high temperatures could cause heat cramps, heat syncope, heat exhaustion, and heat stroke, and could exacerbate existing health conditions such as cerebral, respiratory, cardiovascular conditions, and chronic kidney diseases (Karam et al., 2023; Portier et al., 2010). Such risk is particularly alarming in Lebanon where the population already suffers from a high burden of communicable and chronic diseases, with non-communicable diseases accounting for 90% of deaths (Bou-Orm et al., 2023; Hammoud et al., 2022). Additionally, escalating heat exposures, especially to heat waves, can impact maternal and neonatal health by increasing the risk of preterm birth, stillbirths, congenital anomalies, gestational diabetes, and other obstetric complications (Lakhoo et al., 2025). Further, heat-related illnesses are worsened by the high summer humidity (Mitri, 2025).

Intense short-term fluctuation in temperatures could lead to heat stress (hyperthermia) or extreme cold (hypothermia), which would increase death rates from heart and respiratory diseases and heat-related illnesses (dehydration, rash, cramps, heatstroke, heat exhaustion) (WHO, 2010; Honda et al., 2015; WHO and UNFCCC, 2021). The number of deaths due to heat stress among the Lebanese elderly (>65 years) is projected to increase from 2 to 48 deaths per 100,000 by 2080. Reducing emissions would significantly decrease the deaths to 10 per 100,000 (Honda et al., 2015; WHO and UNFCCC, 2021). Additionally, the total annual heat-related deaths are estimated at 65, with 2.15 deaths yearly per 100,000 people (Hajat et al., 2023). The Lebanese Ministry of Environment (MoE) predicted in 2015 that between 2010 and 2030, temperature increases would lead to 2,483 to 5,254 additional deaths (MoE/UNDP/GEF, 2015). The population most at risk is the elderly, children, women, outdoor workers, disadvantaged communities, and those living in semi-arid areas, refugees, and displaced populations, all of which have reduced access to health services (Jurdi et al., 2022).

Other extreme weather events, associated with climate change, could also be disparaging to human health and well-being by increasing event-related deaths, injuries, infectious diseases, and stress-related disorders (WHO et al., 2003; WHO, 2007; USEPA, 2010; ESCWA et al., 2017). Victims would be at a high risk of malnutrition, diarrhoea, and waterborne diseases caused by crowding and lack of hygiene. And, women, children, and the elderly, especially the uninsured, would be highly affected in such events (ESCWA et al., 2017).

Additionally, the frequency of smog (ground-level ozone) events and particulate air pollution could increase due to the warming, leading to worsened respiratory diseases (USEPA, 2010). In the presence of sunlight and high temperatures, combined with other pollutants such as nitrogen oxides and volatile organic compounds, ground-level ozone can increase (WHO et al., 2003; WHO, 2007; Nuwayhid et al., 2009, USEPA, 2010; ESCWA et al., 2017; Jurdi, 2021). The higher build-up of these concentrations would increase the risk of damage to the lung tissues in the urban Lebanese population with existing respiratory problems (Nuwayhid et al., 2009; MoE/GEF/UNDP, 2016).

Climate change can also impact natural or biogenic sources of particulate matter (PM), such as wildfires and dust from dry soils (USEPA, 2010). Similarly, the reduction in rainfall will result in

higher air pollution levels as pollutants and particulate matter remain in the atmosphere for longer periods instead of being washed away. Arid conditions would also increase allergens and dust amounts, triggering allergies and asthma in vulnerable populations (Mitri, 2025).

Likewise, climate-sensitive infectious diseases such as malaria, rodent-borne diseases, and the increased incidence of waterborne diseases would occur in Lebanon due to climate change. This could be mainly due to the widening in the area of distribution of vector-borne diseases following temperature increases, floods, and contamination of water as highlighted in table 3 (MoE/UNDP/GEF, 2015; 2022; WHO and UNFCCC, 2021).

The agricultural sector would also become more vulnerable to climate change due to effects on water resources, resulting in higher food insecurity and malnutrition (MoE/UNDP/GEF, 2016). Malnutrition and micronutrient deficiencies have already started to be documented due to water scarcity. Stunting in children under five has doubled from 7% to 13.9% between 2021 and 2024 and wasting affected 6% of infants under six months (ACF, 2025). Additionally, crop productivity would be impacted, as well as other health impacts such as loss in labour force, decreased quality of life, shift in disease patterns due to eroded ecosystems and biodiversity, and increased health care costs (MoE/UNDP/GEF, 2015). A study conducted on small farmers in Central Bekaa found that only 7.5% of households were food secure, while 89% were mildly to moderately food insecure, despite the implementation of environmentally sustainable measures (Al Dirani et al., 2021; Al Khatib et al., 2025).

A summary of studies reporting on climate sensitive diseases in Lebanon is presented in table 1 Jurdi, 2022: Adapted from Confalonieri et al., 2007, Jurdi 2021; WHO, 2003; WHO, 2010; WHO and UNFCCC, 2021; UNU-INWEH, 2017).

Table 1. Climate sensitive infectious diseases in Lebanon (Jurdi, 2022: Adapted from Confalonieri et al., 2007, Jurdi 2021; WHO, 2003; WHO, 2010; WHO and UNFCCC, 2021; UNU-INWEH, 2017).

Type of Disease		Relevance to Lebanon
Vector-borne diseases that are transmitted by arthropods, such as mosquitoes, ticks, sandflies, blackflies and rodents	Malaria	Malaria cases reported by the Ministry of Public Health (MoPH) all originate in Africa. Still, with the expected increase in temperature in Lebanon might widen the area of distribution of the vectors, favoring their growth and development over time. In this case, population groups with lower socio-economic status, no insurance coverage, and lower access to health care, as well as children and the elderly will be more vulnerable.
	Dengue Fever	Only one confirmed case of dengue fever was reported in Lebanon (2012), since the 1945 epidemic, following the elimination of the vector (<i>Aedes albopictus</i>) through the malaria control program and mosquito elimination

		efforts between 1945 and 1975. However, <i>Ae. albopictus</i> was detected in the country in 2003 and 2005 due to the expansion of the insect strain, making dengue fever a potential health threat in Lebanon (Alam et al., 2022; Youssef et al., 2018).
Rodent-borne diseases that are transmitted directly to humans by contact with rodent urine, feces, or other body fluids		Environmental factors that affect rodent population dynamics include unusually high rainfall, drought, introduction of exotic plant species and food sources (Confalonieri et al., 2007). Diseases associated with rodents and ticks include leptospirosis, tularemia, viral hemorrhagic diseases, plague, Lyme disease, tick borne encephalitis and Hantavirus pulmonary syndrome (WHO et al., 2003). Cutaneous Leishmaniasis may emerge in Lebanon through flies nesting on rodents in open fields, which manifests on the skin and is particularly sensitive for women engaged in agriculture (UNU-INWEH, 2017). These diseases might flourish in Lebanon in case of increased floods (Jurdi, 2021; WHO and UNFCCC, 2021).
Waterborne and foodborne diseases	Cholera Typhoid Hepatitis A Diarrhoea Non-Typhoidal Salmonella	The potential contamination of drinking water supplies and disruption of sewer systems and/or wastewater treatment plants and flooding that could result from climate change could lead to an increased incidence of cholera, typhoid and Hepatitis A cases in Lebanon (WHO and UNFCCC, 2021). The 2022 cholera outbreak, the hepatitis A cases in 2022 and 2024, and the typhoid fever cases were linked to the weak water and sanitation infrastructure (ACF, 2025). Regions with lower access to sanitation will be more exposed to water-borne diseases, and those with lower access to health care and insurance coverage, in addition to children and the elderly will be more affected (WHO, 2010). Cases have historically surged during periods of water stress due to poor sanitation and aging water networks (ACF, 2025). This infectious pathogen has recently started spreading in Lebanon (Al Khatib et al., 2025)

		as temperatures influence its survival and multiplication in food and the environment (Paz et al., 2021).
--	--	---

In addition to the physical ailments, climate change would affect the mental health of the population causing Post Traumatic Stress Disorders, anxiety, and depression following extreme climatic events and chronic stress due to worsened living conditions as presented in Figure 11 (WHO, 2022). Still, to date, studies on the impacts of climate change on mental health are limited; however, few studies have been published linking greater psychological distress (anxiety, stress, and depression) to higher levels of climate change anxiety, eco guilt, and eco grief in individuals (Awad et al., 2025; Fekih-Romdhane et al., 2024).

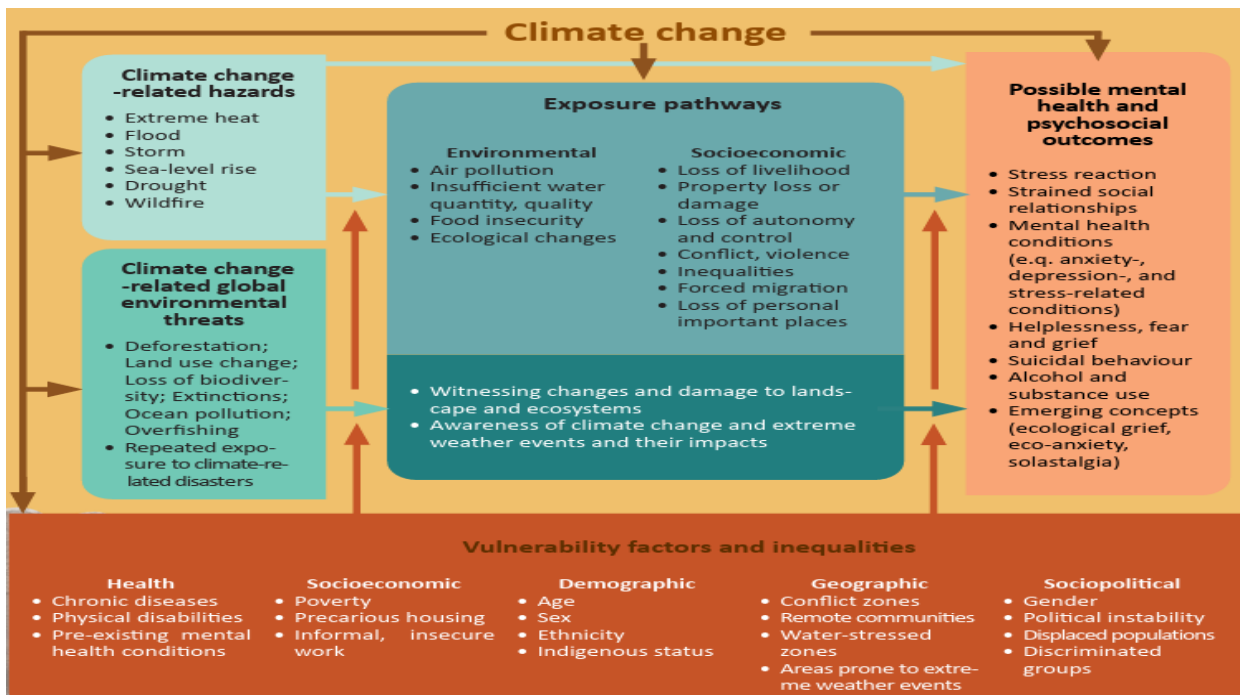


Figure 1. The impacts of Climate Change on Mental Health (WHO, 2022)

2. Historical and projected trends of climate change

Lebanon is characterized by hot and dry summers from June to September, and cool and rainy winters from December to March. Around 70% of precipitation levels fall as heavy storms between November and March. Temperatures and humidity in the coastal areas reach 30°C in the summer, whereas in the mountains, temperatures are relatively lower, and the regions experience heavier winter snows (MoE/UNDP/GEF, 2016). The historical and projected climate Trends and associated health impacts are presented in Table 2.

Table 2. Historical and projected climate trends in Lebanon (Jurdi et al., 2022: Adapted from: USAID, 2016; Hassoun et al., 2025; MoE/UNDP/GEF, 2024).

*Historical Climate Trends	Projected Climate Trends	Health Impacts
----------------------------	--------------------------	----------------

1.6°C increase in annual mean temperature (1950-2020)	Increase in mean annual temperatures of 2.1°C by mid-century (2041-2060) in the mountainous regions, and between 1.8°C to 2.0°C by 2060 in coastal areas and inland plains, and up to 3.2 °C by 2100	- Heat cramps, heat syncope, heat exhaustion, and heat stroke - Exacerbation of existing health conditions - Increase in frequency of smog events and particulate air pollution leading to damage to lung tissues - Emergence of vector-borne diseases (malaria and dengue fever) - Increased incidence of foodborne diseases (non-typhoidal Salmonella)
7% Increase in the number of hot nights (mostly June - September)	Increased frequency of heat waves and decreased number of frost days	- Heat stress (hyperthermia) or extreme cold (hypothermia) - Impacts on maternal and neonatal health
Average 11mm /month decrease in precipitation since 1950, 0.53 mm/decade (1950-2020), 0.35 mm/decade (1990-2020), and 50% reduction in rainfall between 2024 and 2025 (ACF, 2025)	3–14% decrease in precipitation by 2041-2060 during the wet season	- Higher air pollution levels causing respiratory problems.
Around 20 mm/year rise in Mediterranean Sea levels	Continued rise in sea level (30-80 cm) by the end of the century	- Injuries and increased incidence of water- and vector-borne diseases due to flooding in coastal areas, water contamination, and saltwater intrusion.
Flood incidents tripled just in 2015 (MoE/UNDP/GEF, 2024)	Increased flash flooding in urban and low-lying coastal areas due to reduced soil infiltration and more intense rainfall events.	- Event-related deaths, injuries, infectious diseases, and stress-related disorders - High risk of malnutrition, diarrhea, and waterborne diseases caused by crowding and lack of hygiene (Cholera, typhoid, and Hepatitis A) - Emergence of rodent-borne diseases - Impacts on psychosocial and mental health.
South-to-north gradient of Consecutive Dry Days (CDD), with southern Lebanon experiencing significantly more CDDs	Increased incidence of droughts.	- Increase in allergens and dust amounts triggering allergies and asthma - High risk of waterborne disease resulting from water stress - Higher food insecurity, malnutrition, and micronutrient deficiencies due to water scarcity

* Historical climate trends observed since 1982 unless stated otherwise.

The Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources in the Arab Region (RICCAR), led by the United Nations Economic and Social Commission for Western Asia (ESCWA), projected a temperature increase of 1.2°C to 1.7°C by mid-century (2046-2065), and by up to 3.2°C by the end of the century (MoE/UNDP/GEF, 2016). These projections reflect moderate and worst-case scenarios when compared to the baseline period of 1986-2005. Furthermore, the latest figures project an increase of 2.1°C by mid-century (2041-2060) under the worst-case scenario (fossil fuel development) in the mountainous regions, and between 1.8°C to 2.0°C by 2060 in coastal areas and inland plains compared to the period between 1995 and 2014 (Appendix I Figure 1) (MoE/UNDP/GEF, 2024).

Additionally, the precipitation levels, currently ranging from 700 to 1,000 mm annually, would decrease between 0.7 and 6.4 mm/month by mid-century under the moderate-case scenario, and between 1.5 and 7.1 mm/month under the worst-case scenario (Figure 2). A decline by up to 16.3 mm/month in runoff is also projected by 2041-2060, and by 49 mm/year by the end of the century (RCP4.5) (Appendix I Figures 2-3). Over and above declining snow cover on the Lebanese mountains causing a further 40-70% reduction (Appendix I Figures 4-5). Additionally, a decrease in snow residence time from 110 to 45 days, along with a shift in snowfall elevation from 1,500 to 1,900 m, is also expected (USAID, 2019).

Changes in temperatures, precipitation and runoff, and snow cover would affect water availability for drinking and agricultural use by impacting groundwater recharge, and surface runoff (MoE/UNDP/GEF, 2016; 2024). The total volume of water resources is expected to decrease by 6% to 8% with a 1°C increase, and by 12% to 16% with a 2°C increase (MOE/GEF/UNDP, 2016). By 2050, the increased demand for water as well as the induced climate-related reduction in water availability would result in a significant water deficit, specifically, in the Upper Litany River Basin (MoE/UNDP/GEF, 2024). Additionally, a decrease in rainfall amounts and intensity as well as a 70% projected decrease in snow cover, could result in a 2°C and 4°C increase in temperatures (MOE/GEF/UNDP, 2016). Water scarcity and food security have direct health impact in Lebanon specifically in rural and displaced communities and will aggravate attainment of the basic water requirement, and essential basic nutritive diet that crucial to sustain health and productivity.

The number of very hot days (temperatures above 40°C) and (above 35°C) is also expected to increase, respectively, to approximately 1-1.5 and 12-13 days annually by mid-century (2041–2060), and by 43 additional days by the end of the century (MoE/UNDP/GEF, 2016; 2024). Similarly, drought periods are projected to last 9 days longer by 2040 and 18 days longer by 2090, with an expanded geographical range and an occurrence of 15 days to 1 month earlier (MOE/GEF/UNDP, 2016). Additionally, the number of Consecutive Dry Days (CDD), days when precipitation is less than 1.0 mm, is also expected to increase by an additional 6 consecutive days annually by mid-century in the country's southern region (Appendix I figure 6) (MoE/UNDP/GEF, 2024). Further, increases in temperatures and drier weather conditions are expected to increase the risk of forest fires (Appendix I, figure 7) (NEWSP, 2024).

Still, and although not densely populated, the areas with the highest projected increase in temperatures such as the Baalback and Akkar Cazas are characterized by heavy agriculture and

livestock production that would have consequent implications for food security. These areas, in addition to Bcharre, Aley, Chouf, and Hasbaya, are also highly susceptible to flood risks (ACSAD/MoAg/CNRS/ESCWA, 2019) as seen in Figure 8a. Floods can, in turn, increase the risk of landslides (ICRC, 2024), which are distributed around the country (Appendix I figure 8). Moreover, coastal areas are threatened by sea level rise with a projected increase of 30 to 80 cm by the end of the century (MoE/UNDP/GEF, 2024). A summary of the projected impacts of climate change on the various sectors, resources, and infrastructures in Lebanon is presented in Appendix I, Table 1.

3. Lebanon's climate vulnerability

The Notre Dame Global Adaptation Initiative (ND-Gain) ranked Lebanon 112th in 2019 and 120th in 2024 out of 182 countries for its low vulnerability and low readiness to climate change (79th least vulnerable and 162nd least ready out of the 182 countries). This index measures vulnerability by the “exposure, sensitivity, and the ability to cope with climate-related hazards by accounting for the overall status of food, water, environment, health, and infrastructure within a country” (MoE/ GEF/UNDP, 2016). Additionally, it measures readiness by the “country’s ability to leverage investments and convert them to adaptation actions by looking at the country’s economic, governance, and social readiness” (ND GAIN, 2019; 2024). Focusing on the health sector, the readiness is highly impacted by major constraints such as: lack of financial resources- the budget allocated to MoPH never exceeded 6% of the total government budget (MOE/GEF/UNDP, 2016); Poor infrastructure such as flood control structures, building insulation, water and sanitation facilities, treatment and quality monitoring, storm water and drainage and mass transit that are vulnerable to climate-related disasters and extremes; weak institutional arrangements and inter-agency coordination; unequal access to improved infrastructures and health care systems; pre-existing disease burdens; and inadequate regulatory environment to ensure sustainability of environmental health infrastructure and services (Jurdi, 2020, 2021).

90% of Lebanon’s infrastructure and 225 km² of its surface area, and 70% of its population are along the coastline, making them at increased risk of exposure to sea-level rise and floods. The heavy urbanization and high concentration of critical infrastructure along the coast increase the country’s vulnerability, as floods and sea level rise could disrupt essential services (Farajalla et. al, 2023). The topography and land structure, with steep slopes exposed to water erosion, are at risk of loss of topsoil and a decreased capacity to retain water. Consequently, these degraded sandy soils can lead to dust and sandstorms, with impacts on human health and livestock (USAID, 2016; the Netherlands Ministry of Foreign Affairs, 2018; ICRC, 2021; WHO and UNFCCC, 2021). As such, the country’s biophysical vulnerability also derives from its diverse natural environment (coastal, agricultural, forest, and mountainous areas) with unique climate-sensitive ecosystems and biodiversity.

Alongside the biophysical vulnerabilities, Lebanon faces climate-related socioeconomic vulnerabilities. These include the large influx of refugees into the country and the consequent pressure on the country’s natural resources and infrastructure, increasing demand and consumption of water and energy, increasing the generation of municipal solid waste and wastewater, increasing demand for food, and impacting air quality and land use. Additionally,

vulnerability is also due to the high rates of urbanization, the history of conflicts and wars and its damage on already challenged infrastructure which to date is challenged by underinvestment and poor management, and Lebanon's economy that is vulnerable to regional and international market shocks due to its dependence on imports (Jurdi et al., 2022; USAID, 2016; the Netherlands Ministry of Foreign Affairs, 2018; ICRC, 2021; WHO and UNFCCC, 2021).

On one hand, sea level rise can cause seawater to infiltrate freshwater aquifers, impacting the water supply. Additionally, storm surges can damage low-lying infrastructure and communities. On the other hand, increases in drought conditions will affect agricultural production, potentially killing livestock, crops, and trees, and consequently impacting food security, which can lead to malnutrition, stunted child growth, and nutrient deficiencies, among others, as documented in neighbouring countries (Pennsylvania State University and United Nations Children's Fund, 2024). Such impacts will be most pronounced in already dry regions such as Bekaa, Hermel, and the South. In fact, 1.85 million people in Lebanon are considered as residing in drought-vulnerable areas (Figure 9) (ACF, 2025).

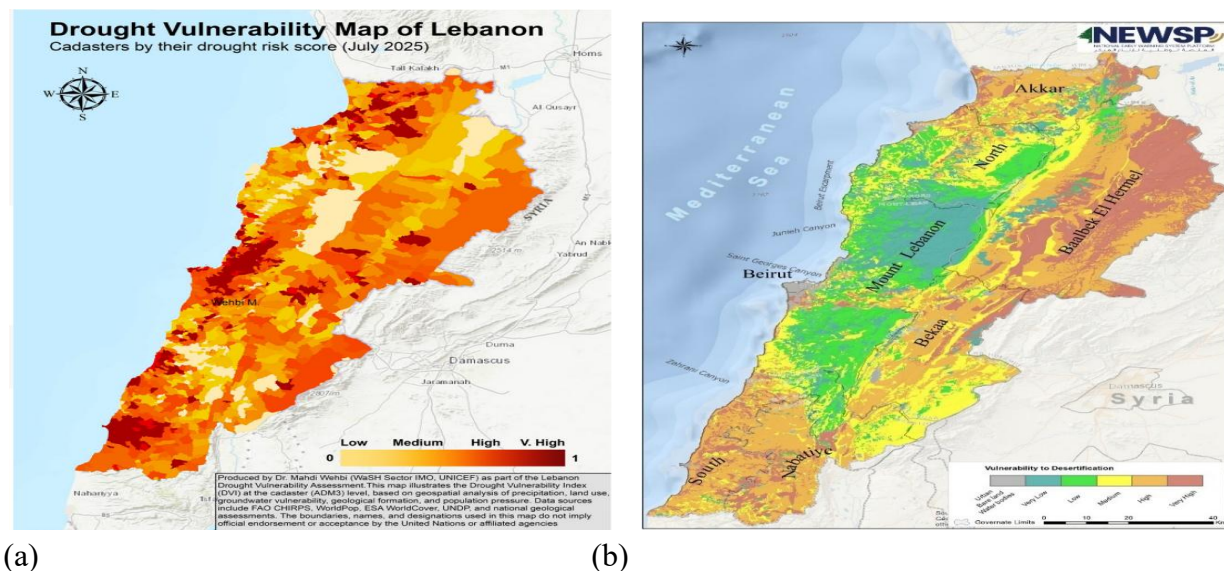


Figure 2. (a) Drought and (b) desertification vulnerability maps (ACF, 2025; NEWSP, 2022)

4. Geographic and demographic hotspots of vulnerability

a. Farming communities

Farmers, especially those operating on a small scale, are susceptible to climate change, given the agricultural sector's inherent vulnerability to climate-driven risks that often result in losses in crop output, productivity, and overall financial stability (Haddad, et al., 2014; Farjalla et al., 2022). The observed climatic stressors in Lebanon, including rising temperatures, a decline in total annual rainfall, and an increase in the frequency of both droughts and extreme precipitation events (floods), have already caused considerable harm to the country's agricultural areas and the environment in Lebanon (MoE, 2019). The resultant uncertainty regarding the timing and magnitude of cold and wet seasons has also posed serious adaptation challenges for farmers, leading to the destabilization of typical planting and harvesting cycles and subsequent production shortfalls (Farjalla et al., 2022). Thus, individuals whose primary income is derived from farming

are significantly and disproportionality exposed to climate change consequences. Research undertaken by the Issam Fares Institute for Public Policy and International Affairs at the American University of Beirut) investigated the climate resilience of various agricultural areas (Farjalla et al., 2022). The analysis revealed that the areas exhibiting the lowest resilience index scores - a measure derived from combining socioeconomic metrics with inherent crop sensitivity - are situated within the districts of East-Baalbeck and Akkar (Figure 18). The low resilience observed in densely agricultural localities, such as Nabi Chit (Baalbeck) and Abde and Halba (Akkar), signifies their heightened sensitivity to climate stressors and their proclivity for worsening conditions following unfavorable changes in rainfall and the required accumulation of chilling hours. Moreover, the study predicted significant future impacts by 2025, finding that areas characterized by high agricultural density (above 50%) are expected to be severely compromised, directly jeopardizing local means of subsistence (as illustrated in Figure 19).

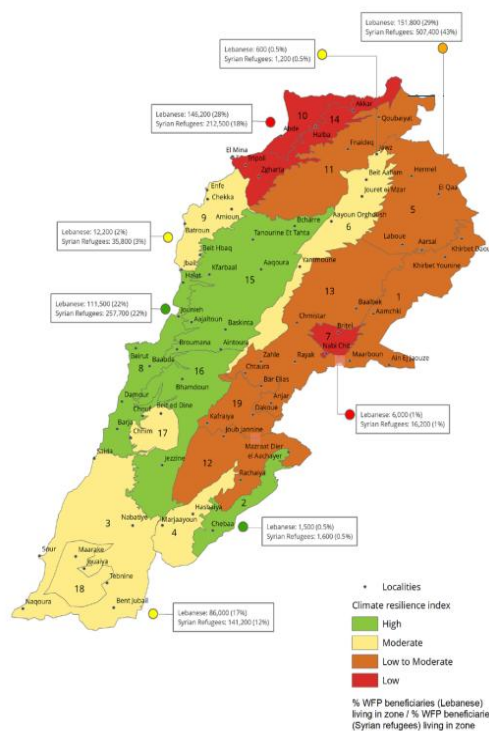


Figure 3. Climate resilience index map (Farajalla et al., 2022)

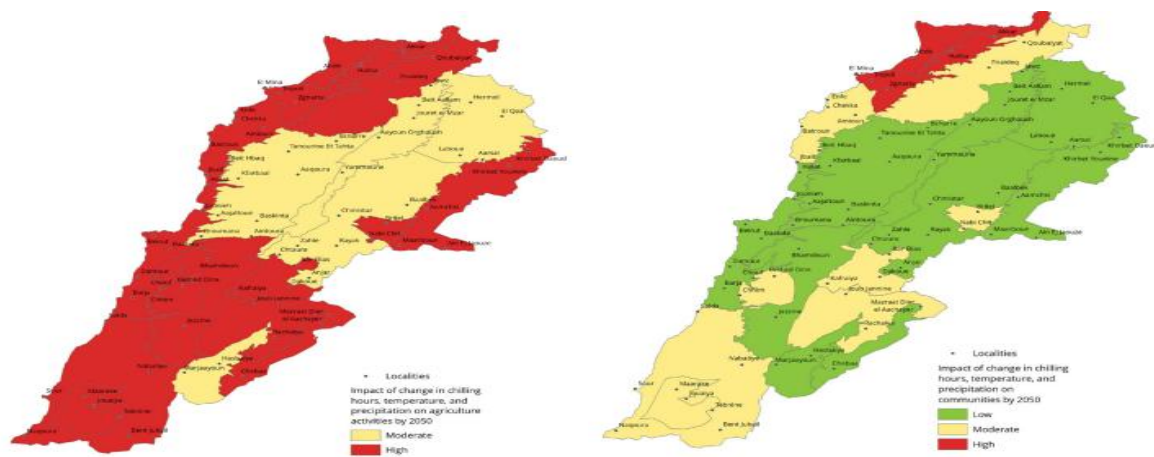


Figure 4. Impact of changes in chilling hours, temperature, and precipitation on agricultural activities (left map) and communities (right map) by 2050 (Farjalla et al., 2022)

Additionally, and according to Lebanon's Fourth Communication Report to the UNFCCC, agricultural land in Hasbaya, Rachaya and Becharreh are categorized as highly vulnerable by the end of the century (up to 14% of land areas) (MoE/UNDP/GEF, 2022). The MoE report also identified vulnerable hotspots for agricultural areas and are summarized in the figure below.

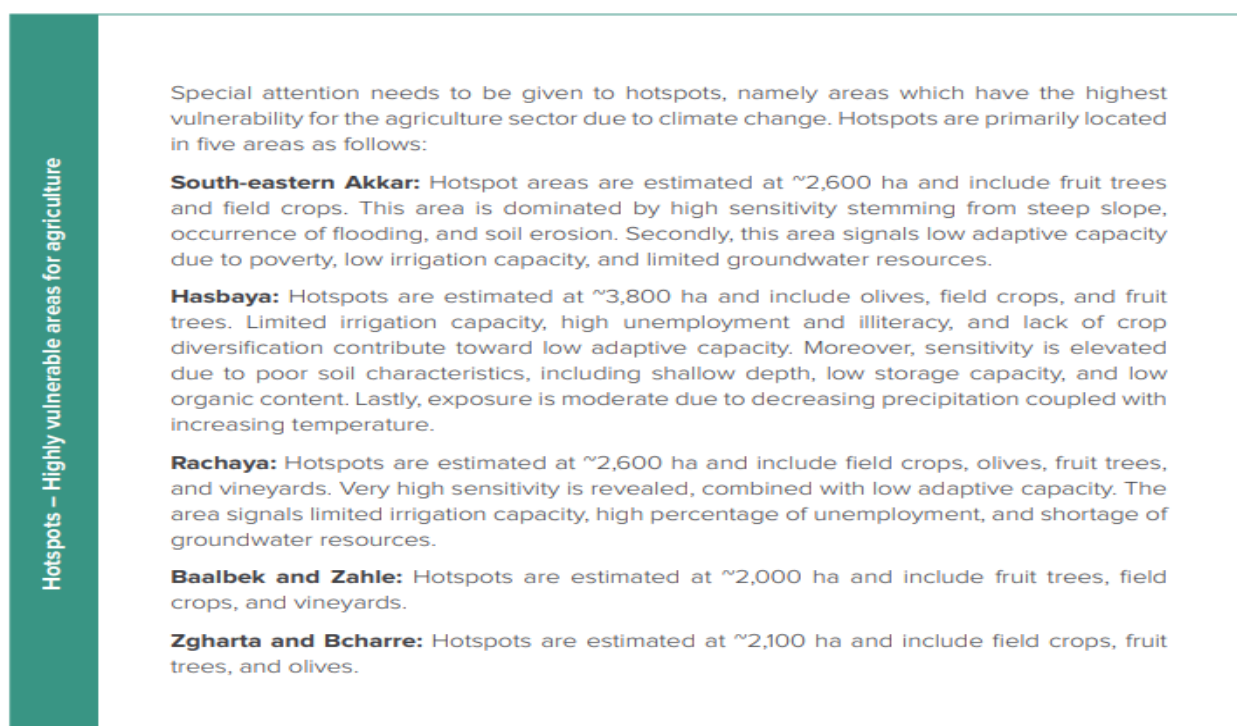


Figure 5. Hotspots for agricultural sector in Lebanon (MoE/UNDP/GEF, 2022)

b. Rural populations in forested mountain areas

Mountain forest ecosystems face amplified threats due to climate change. By 2040, climate models project a significant decrease in precipitation and a corresponding rise in temperatures, alongside the anticipated intensification of extreme weather events (UNDP, 2021). These shifts

are expected to result in greater water stress on vegetation and overall water scarcity, thereby accelerating the rate of forest and land degradation and the depletion of vital natural resources (FAO, 2024).

The poor rural populations residing in these mountain forest regions, including a growing number of Syrian refugees, are considered acutely vulnerable to these climatic shifts (FAO, 2024). These communities depend heavily on fuelwood for heating and on non-wood forest products (NWFP) as a component of their income and sustenance (Social Impact, 2019; FAO, 2024). The projected increase in pest outbreaks will further restrict the availability of both wood and NWFPs and threaten the livelihood of these communities (FAO, 2024). A critical additional threat for these communities is the escalating risk of forest fires. Recent studies show a significant increase in the occurrence of wildfires, rising from 343 events in 2019 to over 1,000 in 2021, exacerbated by prolonged droughts and mismanagement of natural resources (MoE/UNDP/GEF, 2024). The combined impact of increased temperature and drier conditions is projected to heighten the severity and intensity of these fires (UNDP, 2021). While rural and mountain woodlands are inherently fire-prone, the risk to populations is intensified where plantations and natural forests interface with urban areas, given Lebanon's high rate of urbanization (UNDP, 2021). This includes areas such as Mount Lebanon and Akkar (MoE/UNDP/GEF, 2024).

c. Coastal communities

Lebanon's 225-kilometer Mediterranean coastline is increasingly exposed to the combined effects of sea level rise and intensifying ocean storms, placing coastal communities - particularly those in Beirut, Saida, and Tripoli - at heightened vulnerability (Social Impact, 2019; UNDP, 2021). Projections indicate a continued rise in sea levels in the coming years, leading to greater saltwater intrusion into aquifers, coastal flooding, inundation of low-lying areas, and accelerated shoreline erosion that will transform existing coastal ecosystems (UNEP, 2009; Social Impact, 2019; UNDP, 2021). As a result, extensive sections of the coastline are expected to retreat or even disappear under the sea.

Approximately 70% of Lebanon's four million inhabitants reside along the coast, where major industrial zones, tourism facilities, hotels, and beach resorts are concentrated (Social Impact, 2019; USAID, 2016). In fact, the 500 m wide coastline corridor holds 40% of the urbanization, 41% of agricultural areas, and 19% of the remaining natural areas (MoE/UNDP/GEF, 2022). The country's sandy beaches and coastal nature reserves, including Palm Islands in the North and the Tyre Coast Nature Reserve in the South, will also be at significant risk (Social Impact, 2019). With the persistent rise in sea levels driven by climate change, these communities, ecosystems, and economic assets are projected to face increasing damage (Social Impact, 2019). Another study found that urban agglomerations, especially those along the coastline (Figure 21), exhibit vulnerability levels to climate change ranging from moderate to very high, identifying these areas as priority zones of concern (MoE/UNDP/GEF, 2011; MoE/UNDP/GEF, 2022).

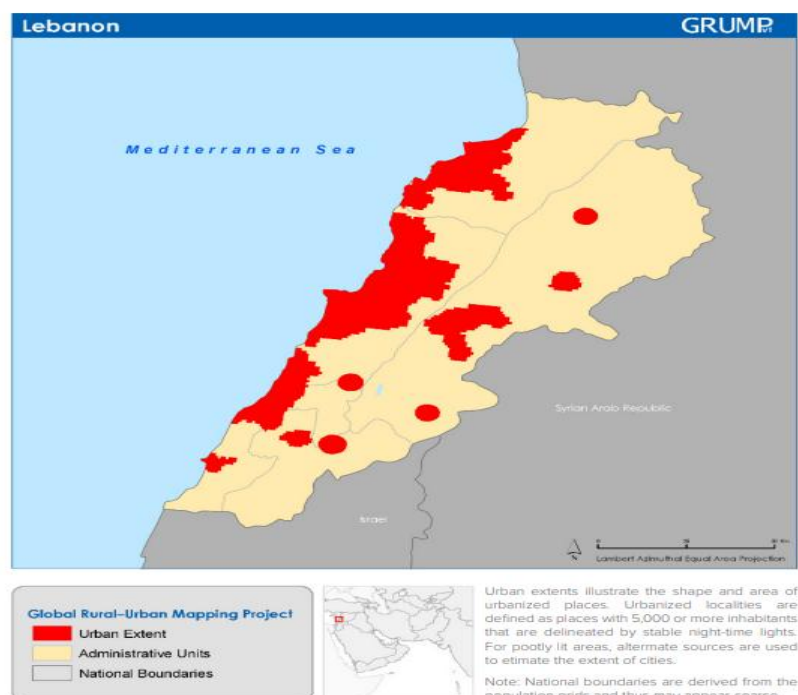


Figure 6. Urban agglomerations in Lebanon (MoE/UNDP/GEF, 2022)

d. Fishing communities

Lebanon's marine and coastal ecosystems are experiencing significant transformations driven by climate change impacts, including rising sea surface temperatures and sea level rise. These factors are collectively affecting marine biodiversity. Warming in marine water, acidification, and water pollution are likely to reduce marine productivity, affect species distribution and trigger local extinction of more than 20% of exploited fish and marine invertebrates by 2050 (MoE/UNDP/GEF, 2022). The main observed and projected impacts in Lebanon include (UNEP, 2009; IUCN, 2021; (MoE/UNDP/GEF, 2022):

- Mass mortalities and species loss: Native species located at the edge of their distribution range - such as *Posidonia oceanica*, *Mytilus galloprovincialis*, and *Sarpa salpa* - are experiencing die-offs and population declines due to increased thermal stress and habitat degradation.
- Expansion of invasive species: Warmer waters have enabled the spread of thermotolerant Lessepsian species (migrating from the Red Sea through the Suez Canal) and other eurybiontic species that can tolerate wide environmental variations, outcompeting native organisms.
- Stress on established non-native species: Even long-established introduced species, such as *Oculina patagonica*, are showing stress symptoms, highlighting the intensifying environmental pressures on the marine ecosystem.
- Frequent toxic plankton blooms: Rising temperatures and nutrient enrichment from untreated wastewater and agricultural runoff are causing recurrent algal blooms, some of which are toxic. These events negatively affect marine life health, fish stocks, and seafood quality.
- Acidification and deoxygenation: This will also shift the whole equilibrium of the coastal marine ecosystem.

All these impacts on marine biodiversity are expected to significantly affect fishing communities by reducing catch volumes and overall productivity. As many households rely on fishing as their primary source of income, these changes threaten their livelihoods and long-term resilience. Studies have also identified the Akkar Bay and Tyre coastal areas as the most vulnerable coastal zones (UNEP, 2009).

e. Poor communities and displaced populations

Prolonged exposure to high temperatures can lead to various heat-related illnesses, including heat stroke, heat exhaustion, and heat cramps. According to Lebanon's Fourth National Communication to the UNFCCC, poor populations with limited financial means and inadequate access to cooling systems, such as air conditioning, are considered the most vulnerable to these conditions. The report estimates that, at a global warming level of 1.5°C, the risk ratio for reaching “extremely dangerous” heat thresholds (29.1°C) ranges between 1.8 and 3.8 for the summer months of June, July, and August. This risk further increases to 2.6-7.6 under a 2°C warming scenario (MoE/GCF, 2021; MoE/UNDP/GEF, 2022). Figure 22 below illustrates the risk ratios for current and future warmer climate scenarios during the June-September period, at poverty levels of 22% and 11%, highlighting a clear increase in risk with increasing poverty rates.

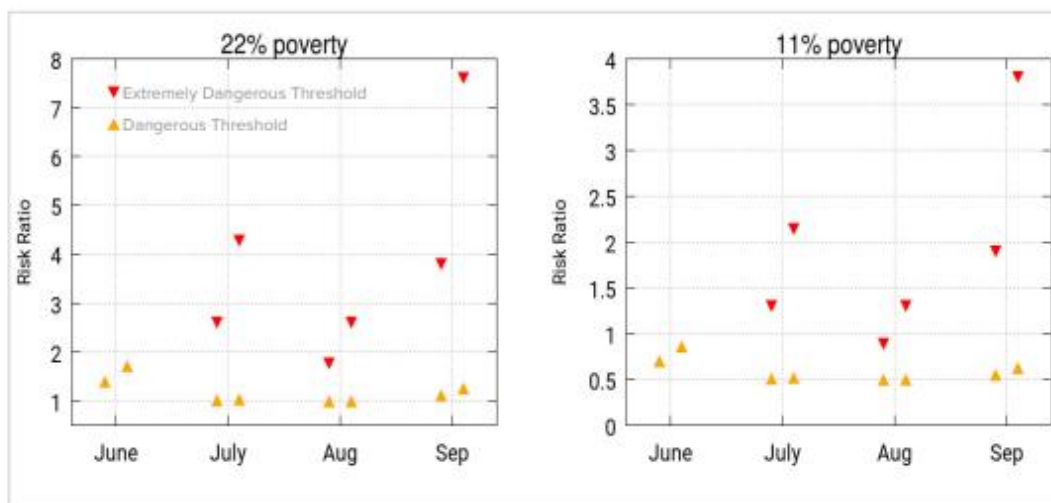


Figure 7. Risk ratios between the reference and the future warmer climate between June-September months at the poverty levels of 22% and 11% (MoE/UNDP/GEF, 2022)

These poor populations also include refugee populations, who represent a significant proportion of Lebanon's poor and displaced communities. Living in overcrowded settlements, often in temporary shelters with poor insulation and no access to cooling, refugees are at a heightened risk of heat stress and related illnesses. Their limited access to health care, clean water, and electricity further exacerbates their vulnerability during periods of extreme heat, making them one of the groups most exposed to the health impacts of climate change.

Beyond heat stress, the overcrowded and substandard living conditions of poor communities and informal settlements further heighten the vulnerability of poor and refugee communities to a range of climate-sensitive and communicable diseases. Limited access to clean water, sanitation, and

waste management services creates favorable conditions for the spread of waterborne and vector-borne diseases, particularly during periods of extreme heat and heavy rainfall.

Shelters of extremely poor communities, refugee camps, and informal tented settlements often lack proper drainage system, leading to the accumulation of stagnant water that serves as breeding grounds for mosquitoes and other disease vectors. This increases the risk of outbreaks of diseases, such as leishmaniasis, dengue fever, and West Nile virus, all of which have been reported in Lebanon in recent years. Additionally, inadequate solid waste disposal and contamination of water sources increase the risk of gastrointestinal illnesses, including diarrhea and cholera, particularly among children and the elderly.

Overcrowding also facilitates the rapid transmission of respiratory infections, such as influenza and pneumonia, as well as skin and parasitic infections resulting from limited hygiene options. These health risks are compounded by limited access to health care services, insufficient disease surveillance in informal settlements, and the growing strain on Lebanon's public health system.

Moreover, recent studies have shown that refugee camps are highly exposed to extreme weather events, particularly rising surface temperatures and pluvial flooding (Owen et al., 2023; Rafa, 2025). In Lebanon, informal tented settlements are often established on flood-prone plains or on steep, erosion-susceptible slopes (Rafa, 2025). These geographical characteristics make such areas particularly vulnerable to landslides, torrential rainfall, and surface runoff during heavy precipitation events (Fransen et al., 2024; Pollock et al., 2019).

f. Urban Populations

Approximately 89% of the Lebanese population resides in cities, with large sections of the capital's suburbs occupied by informal settlements housing refugees and low-income citizens. These settlements have inadequate quality of housing, resulting in poor health in residents (UN Habitat, 2022; Yassin, 2016). In Beirut, a large proportion of the population lives in poverty and in disadvantaged neighbourhoods across the city with limited access to services, including poor Lebanese, Syrian and Palestinian refugees, and migrants. The several shocks faced by the country, including the blast and the economic crisis, have deteriorated the situation in Beirut and reinforced structural patterns of economic and social division (UN Habitat, 2021).

The city faces several environmental and climatic threats that will impact its population, especially those living in informal settlements and disadvantaged neighborhoods. Deforestation has led to a reduced land capacity to absorb rainfall, contributing to frequent flooding and severe water shortages in the city. This is also exacerbated by the limited green spaces and lack of drainage systems. Additionally, Beirut's residents are exposed to high levels of air and noise pollution with concentrations of PM_{2.5} and PM₁₀ exceeding the WHO standards, which has implications for their health (UN Habitat, 2021). All of these factors increase the vulnerability of the city's population to climate change. These residents are already experiencing heat waves, droughts, storms, and flooding, which will increase in frequency and intensity over the years. Heat effects in Beirut will be exacerbated by heat island effects due to energy-inefficient buildings, loss of green cover, and density of asphalt. Sea level rise in the city, extreme events, and higher

temperatures will damage buildings and infrastructure, and increase groundwater salinity with consequent effects on health and the coastal capital capacity (UNHabitat, 2021).

g. Geographical vulnerabilities by type of climate hazard

Climate hazards vary across regions, with inland areas facing worsening droughts and flash floods, mountainous zones experiencing reduced snow cover and biodiversity loss, and coastal cities suffering from erosion, seawater intrusion, and flood damage (MoE/UNDP/GEF, 2022; MoE/UNDP/GEF, 2025). The table below summarizes the main climate hazards and the regions most affected across Lebanon.

Table 3. Climate hazards and vulnerable geographic areas across Lebanon (MoE/UNDP/GEF, 2022; MoE/UNDP/GEF, 2025)

Climate hazard	Vulnerable geographic areas
Drought / amplified drought conditions	Bekaa Valley, Baalbek-Hermel, Akkar plains
Flash floods / short-duration, heavy rainfall	Bekaa Valley, Baalbek-Hermel
Coastal flooding, erosion, sea level rise, and seawater intrusion into aquifers	Tyre, Beirut, Tripoli (coastal cities)
Seawater intrusion into aquifers	Beirut, Tripoli, Tyre (coastal cities)
Reduced snow cover / water stress	Mountainous regions
Wildfire risks	Chouf, Akkar, Mount Lebanon
Heightened heat stress	Urban centers (Beirut, Saida, and Tripoli)

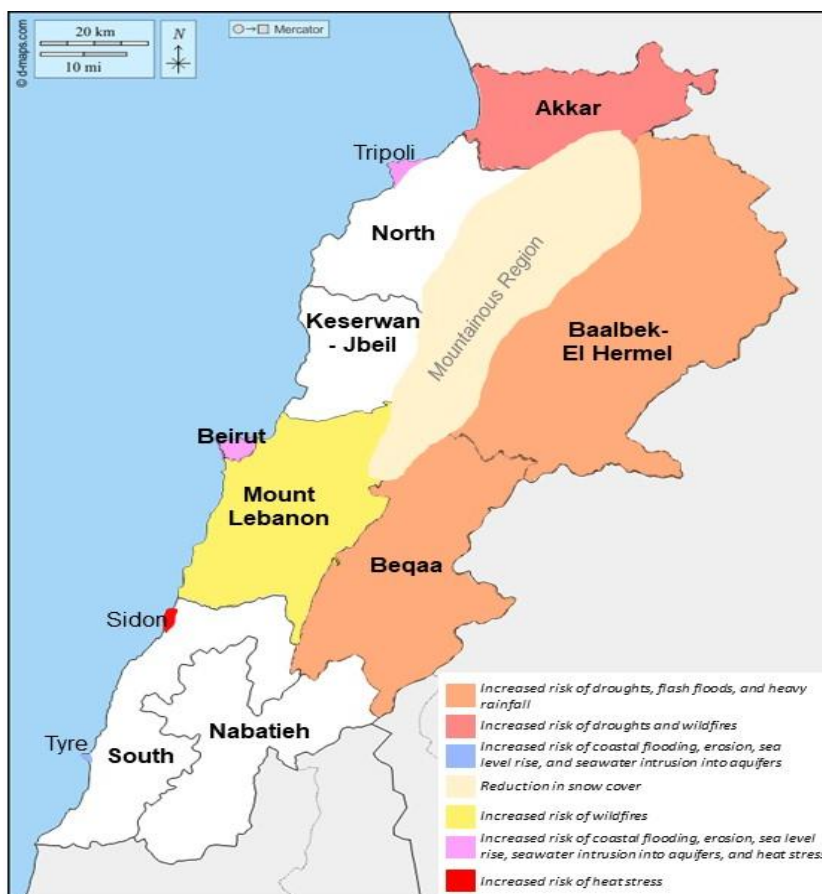


Figure 8. Climate hazards and vulnerable geographic areas across Lebanon

5. Overview of non-climatic drivers and their interactions with climate change and how they exacerbate risks

Beyond climatic factors, there are non-climatic drivers that impact climate resilience in Lebanon. These can be divided into 3 main drivers:

a. Socio-economic factors

i. Access to safe water and sanitation services

Ensuring sustainable access to safe drinking water and adequate sanitation remains a defining public-health challenge in Lebanon and a key driver of climate-related health vulnerability. Data from 2024 indicate that approximately 48% of Lebanon's population has access to safely managed drinking water, while only 20% have access to safely managed sanitation (WHO/UNICEF JMP, 2023). Additionally, the health burden from unsafe WASH services remains substantial. WHO 2019 report estimates a mortality rate of 2.4 deaths per 100,000 population attributable to unsafe water, sanitation, and hygiene (WHO, 2022). WHO also credited 36 diarrhoeal deaths and 7,082 diarrhoeal DALYs in Lebanon to inadequate water, sanitation, and hygiene services (WHO, 2022). Despite this existing situation, progress toward enhancing performance in the WASH sector in Lebanon is still constrained by various challenges such as (Korfali & Jurdi, 2009; Arab Ministerial Water Council, 2012; UNDP, 2013; ESCWA, 2015a,b; Jurdi, Nasr & Ajib; Hameed et al., 2019; Luomi et al., 2019; UNESCO, 2019; UNESCO WWAP, 2019; AFED, 2020):

- Water scarcity with rising demand driven by population growth, rapid urbanization, and climate change.
- Poor water-resources management and planning: weak governance of transboundary waters; limited monitoring and oversight of water quantity and quality in major surface and groundwater resources; systems overburdened by the large influx of refugees, exacerbating existing stresses; and donor-driven, projectized investments that neglect long-term, system-wide needs.
- Fragmented institutional coordination across water, environment, and health sectors, with limited stakeholder and private-sector participation.
- Chronic under-financing for infrastructure operation, maintenance, and rehabilitation, hindering continuous service and risk-based management. This leads to intermittent supply of water, reaching only hours per day in dry seasons and rural areas, leading to in-network quality deterioration and consequently the reliance on complementary poorly monitored sources (private wells, cisterns, etc.).
- Incomplete policy and regulatory enforcement, leaving water-quality management largely reactive rather than preventive (e.g., water-safety planning not systematized).
- Lack of climate change integration in planning, with strategies and investments that insufficiently integrate hydrological extremes and future climate risks.
- Inadequate wastewater management, with domestic and industrial effluents discharged to rivers and coastal waters without proper treatment, further straining the country's already-scarce water resources.

Limited access to safely managed WASH services significantly heightens Lebanon's vulnerability to the impacts of climate change. Rising temperatures, prolonged droughts, reduced snowfall, and irregular rainfall patterns due to climate change will likely increase uncertainty around water availability, placing further strain on already limited and poorly maintained WASH services (Wilbur et al., 2024). As a result, access to water resources will become increasingly constrained. Climate change further aggravates these challenges by damaging WASH infrastructure during extreme weather events. Studies indicate that climate change intensifies WASH inequalities, reducing access to safe water and sanitation and, in turn, increasing climate vulnerability (Wilbur et al., 2024). Additionally, the provision of reliable and sustainable WASH services is crucial for reducing exposure to waterborne pathogens and controlling infectious disease outbreaks (such as diarrhea, typhoid, cholera, etc.)—risks that are heightened by climate change (Wilbur et al., 2024).

Climate change is also linked to significant alterations in ecosystems, which in turn affect the distribution of disease vectors, population susceptibility, and exposure (LaKind et al., 2016). As a result, the risk of vector-borne diseases, including Malaria, Dengue and Dengue Hemorrhagic Fever, Yellow Fever, Chikungunya, Zika virus, West Nile fever, Lyme disease, and Leishmaniasis, is expected to increase in endemic areas and may emerge in regions that are currently free of these infections (Medlock and Leach, 2015). Similarly, the spread of rodent-borne diseases, such as leptospirosis and Hantaan virus, is likely to intensify, particularly following flood events (Pijnacker et al., 2016; Hansen et al., 2015; Campbell-Lendrum et al., 2007). These shifts in infectious disease patterns are closely tied to changes in vector ecology and are expected to increase the risk of food- and waterborne diseases.

Moreover, climate-induced migratory flows are likely to change the geographic distribution of susceptible populations, facilitating the emergence or re-emergence of zoonotic diseases in non-endemic areas such as Lebanon (Alam et al., 2022; European Academies Science Advisory Council, 2007; Gordon et al., 2016). These changes further compromise access to safe drinking water in some regions and accelerate the spread of microbial infections, including bacterial, viral, and parasitic diseases (Ghazali et al., 2018). In Lebanon, where WASH services, as indicated before, are highly challenged, this combination of environmental stressors due to climate change and inadequate infrastructure is likely to generate significant public health challenges. The lack of resilient WASH systems undermines communities' adaptive capacity (World Bank, 2024b). Households without consistent access to clean water and sanitation are less able to cope with or recover from climate-related shocks, leaving populations particularly vulnerable to the impacts of climate change (World Bank, 2024b).

ii. Access to health services

Currently, more than half of the Lebanese population lacks any form of health care coverage, which severely limits access to affordable and comprehensive health care services (Aoun et al., 2024; El-Jardali et al., 2023). The ongoing economic crisis has further strained the health care sector and undermined the ability of public funds to provide adequate social protection. The real coverage of public funds has become almost negligible due to currency depreciation. For instance, the National Social Security Fund (NSSF) now covers only 10% of health care costs, leaving beneficiaries to pay the remaining 90% (El-Jardali et al., 2023).

As a result, many individuals have turned to private insurance or out-of-pocket payments, which rose from 33.1% in 2018 to over 85% in 2022 (Aoun et al., 2024; El-Jardali et al., 2023). In fact, out-of-pocket spending on health has surged, now exceeding 85% of household income (El-Jardali et al., 2023). Access to essential medications has also been heavily impacted. Despite high pharmaceutical spending—accounting for more than 25% of health care expenditures—drug stocks have fallen by 50% since the start of the crisis, leaving over 70% of the population without access to critical medications (Aoun et al., 2024; El-Jardali et al., 2023).

Additionally, the conflict that began in October 2024 has further strained Lebanon's health sector and impacted people's access to health care. According to the WHO, 15 out of 153 hospitals have either ceased operations or are only partially functional (WHO, 2024). In Nabatieh governorates, approximately 40% of hospital bed capacity has been lost, illustrating the severe impact of the war on health care availability and access (WHO, 2024).

The challenges to improving health care accessibility in Lebanon are complex and interconnected (El-Jardali et al., 2023; Aoun et al., 2024; Bou Sanayeh et al., 2023), and are detailed later in this report. Limited access to health care facilities is closely linked to climate vulnerability. Climate change is likely to disrupt health care services, reducing people's ability to access essential care when it is most needed. Climate change threatens both the quality and continuity of care. More frequent and intense extreme weather events and natural disasters, together with hazards such as food- water- and vector-borne diseases, and degraded air quality, will expose facilities to escalating operational risks (Paterson, 2014). Climate change events can trigger public health

emergencies that overwhelm capacity, disrupt services, and damage infrastructure—endangering patients and staff.

At the same time, climate-related impacts—such as extreme weather events, heatwaves, flooding, and vector-borne disease outbreaks—are expected to increase the incidence of illnesses, infections, and injuries, thereby raising demand for health care services. Climate change intensifies both physical and mental health burdens and introduces populations to diseases they may not have encountered before. Established in 2015, the Lancet Commission on Health and Climate Change issues annual assessments that conclude climate change is already harming health, with projections warning of an unacceptably high—and potentially catastrophic—risk to human well-being. It would intensify the burden of disease and increase the morbidity and mortality rates of cardiovascular and respiratory disease, heat-related illnesses, waterborne disease and infectious outbreaks, and others (UNDP, 2022). This creates a compounding effect as the need for medical care grows, the already overburdened health care systems would face greater strain, which would further limit access and reduces the system’s capacity to respond effectively to climate-related health risks.

iii. Economic crises, poverty and inequality

Between 2011 and 2018, Lebanon’s annual real GDP growth averaged only 1.3%, while per-capita GDP declined by 0.3% annually (World Bank, 2024b). By October 2019, Lebanon had plunged into a financial and economic crisis, triggered by halted capital inflows, a banking sector collapse, and a currency crash (Figure 12). The crisis was compounded by the COVID-19 pandemic and the Beirut Port explosion, which together caused Lebanon’s nominal GDP to fall by more than 40%—from USD 55 billion in 2018 to USD 31.7 billion in 2020—marking one of the most severe global economic collapses in over a century (World Bank, 2020b). Between 2019 and 2023, real GDP continued to deteriorate, dropping 27% cumulatively (World Bank, 2024b).

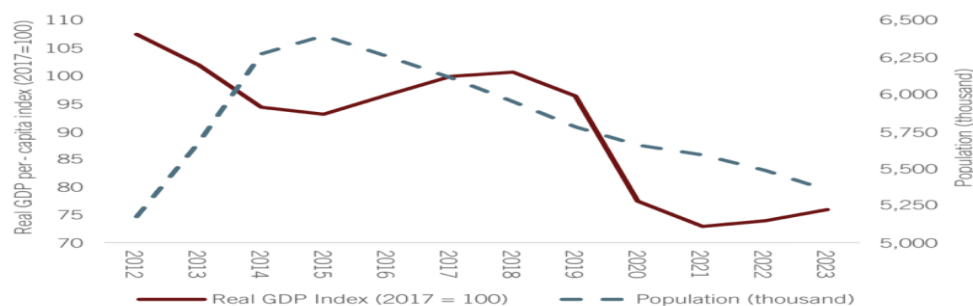


Figure 9. Lebanon’s per-capita GDP and population (2012-2023) (World Bank, 2024b)

This prolonged economic contraction has led to a sharp rise in poverty and inequality and has forced households to adopt coping mechanisms such as cutting back on food, health care, and non-essential expenditures, with serious long-term consequences. According to the World Bank Report (2024), poverty in Lebanon has more than tripled over the past decade, across five surveyed governorates (Akkar, Beirut, Bekaa, North Lebanon, and most of Mount Lebanon). The World Bank’s findings show that monetary poverty rose from 12% in 2012 to 44% in 2022, with significant regional disparities. In Akkar, poverty reached 62%, reflecting heavy reliance on low-

paying agricultural and construction jobs, while in Beirut, the poverty rate was just 2%. Moreover, not only has the proportion of poor Lebanese tripled, but they have also fallen deeper into poverty (Figure 13). The poverty gap—i.e., the financial amount needed to lift the poor to the poverty line—rose from 3% in 2012 to 9.4% in 2022.

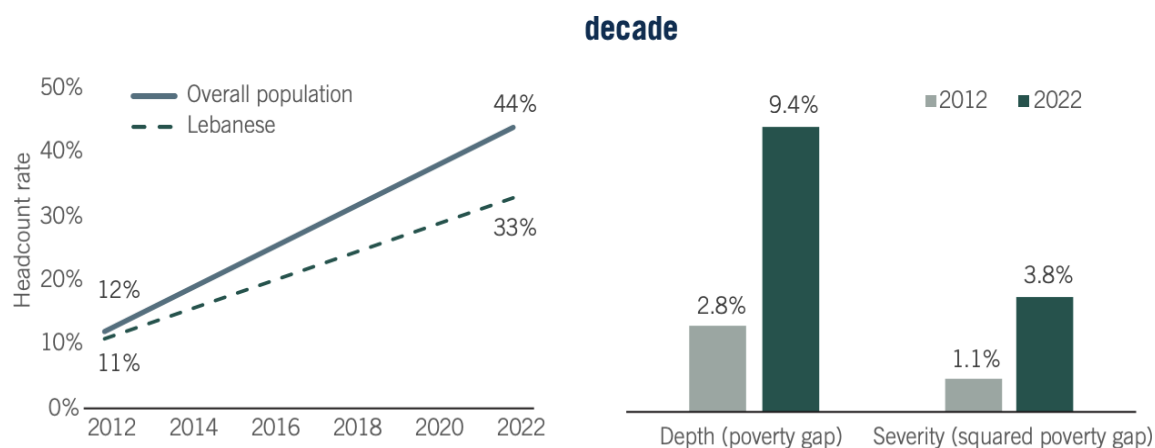


Figure 10. Poverty rate and depth of poverty in Lebanon (World Bank, 2024b)

And, although the South Governorate was not fully covered in the 2024 World Bank Study, poverty and inequality are expected to be equal or more severe given the ongoing conflict and instability since 2023. Additionally, another limitation is that the 2024 World Bank Study was unable to conduct in-person interviews in Baalbek-El Hermel, El Nabatieh, and South Lebanon, which together account for roughly 40% of the population. Still, data from 2012 indicate that while the poverty rate in the five surveyed governorates stood at 11%, it was 16% in the three uncovered regions: 13% in El Nabatieh and South Lebanon, and 23% in Baalbek-El Hermel. And, when compared nationally, El Nabatieh and South Lebanon ranked 5th and 6th respectively in terms of poverty prevalence.

Income inequality has also worsened, with agricultural and construction workers among the most impoverished groups. The crisis has widened the income divide between those earning in US dollars and those paid in Lebanese lira. With the rapid dollarization of the economy, households earning in dollars have largely maintained their purchasing power, while others have seen their real incomes eroded by inflation—prices have increased nearly fifteenfold over the past decade. However, remittances served as a crucial economic buffer, rising from an average of 13% of GDP (2012–2019) to around 30% in 2022, partly due to the shrinking size of the overall economy. These inflows increased 20% in nominal terms between 2021 and 2022, helping many households avoid deeper poverty (World Bank, 2024b).

The situation is even more severe for Syrian refugees, who are disproportionately affected by the crisis. Nearly nine out of ten Syrians were living below the poverty line in 2022 (World Bank, 2024b). Most working-age Syrians are employed in low-paying, and informal jobs. While the labour market initially absorbed the refugee influx through sectoral segmentation, currently, the post-2019 collapse pushed many Lebanese workers into low-skilled occupations due to the

scarcity of better-paying jobs. Figure 14 shows the poverty rate per governorate among Lebanese population and Syrian refugees in Lebanon.

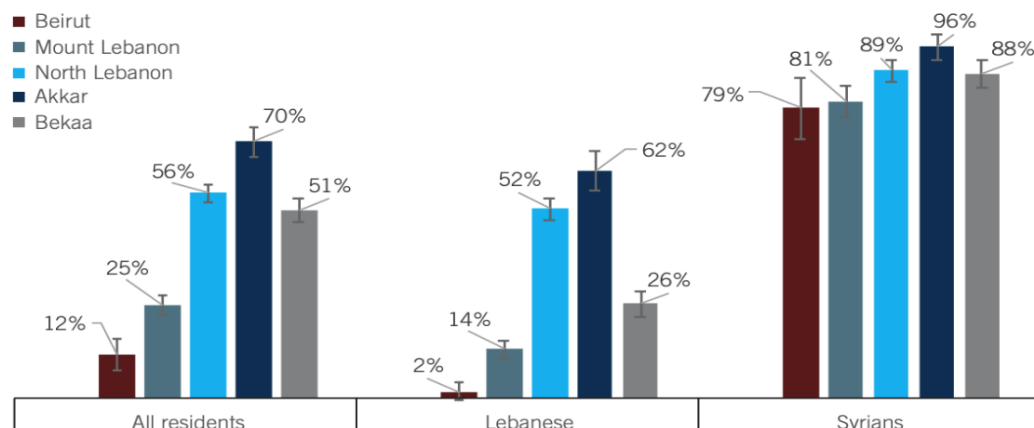


Figure 11. Poverty rates per governorate among Lebanese population and Syrian refugees in Lebanon (World Bank, 2024b)

In Lebanon, poverty significantly increases vulnerability to climate change. Low-income households often reside in hazard-prone areas, such as informal settlements in floodplains or unstable hillsides, exposing them to floods, landslides, and extreme heat. Limited access to safe water, sanitation, and health care reduces their capacity to cope with climate-related health risks, including waterborne and vector-borne diseases. Additionally, many poor communities depend on climate-sensitive livelihoods, such as small-scale agriculture, fishing, or daily outdoor labour, making them highly susceptible to droughts, irregular rainfall, and storms that disrupt income and their livelihood.

At the same time, climate change can exacerbate poverty as (a) extreme weather events destroy homes, crops, and infrastructure, pushing already vulnerable households deeper into poverty, (b) rising temperatures, irregular rainfall, and natural disasters can reduce agricultural productivity, increase food prices, and strain local economies, and (c) health impacts from climate change (heat stress, vector-borne diseases, malnutrition) can increase medical costs and reduce income-generating capacity. This not only exacerbates existing poverty but also deepens inequalities, reinforcing a cycle of vulnerability that leaves marginalized populations least able to adapt and recover.

iv. Food insecurity

Lebanon has been facing severe and escalating food insecurity, driven by the prolonged multi-crises and ongoing conflict affecting the country. The Integrated Food Security Phase Classification (IPC) Analysis Report, jointly conducted by FAO, WFP, and the Ministry of Agriculture, estimates that around 1.65 million people are now facing crisis or emergency levels of food insecurity (IPC Phase 3 or above) reflecting on a sharp increase from the total of 1.26 million before the recent escalation (Figures 15-16). Of this number, approximately 201,000 individuals are at emergency levels (IPC Phase 4) (FAO/WFP/Ministry of Agriculture, 2025).

Refugee populations remain among the most disproportionately affected by the crisis. Around 594,000 Syrian refugees (40% of the Syrian refugee population) and 89,000 Palestine refugees (40% of the Palestinian refugee population) are experiencing crisis or worse food insecurity levels (FAO/WFP/Ministry of Agriculture, 2025).

Additionally, a 2022–2023 survey conducted across five surveyed governorates (Akkar, Beirut, Bekaa, North Lebanon, and most of Mount Lebanon) revealed that 32% of poor households had unacceptable food consumption scores, indicating limited dietary diversity and poor nutritional quality (World Bank, 2024b). Nearly 83% of all surveyed households reported depending on less preferred or cheaper food at least once during the week prior to being interviewed (World Bank, 2024b). Additionally, poor households were found to be twice as likely as non-poor families to cut meal portions, skip meals, or borrow food, and four times more likely to have an adult restrict their intake so that children could eat (World Bank, 2024b).

Malnutrition has become a major public health concern, particularly among children, adolescents, and women. Recent assessments show that three in four children under five consume diets lacking diversity, heightening their risk of stunting and wasting (FAO/WFP/Ministry of Agriculture, 2025). Akkar, Baalbek, Beqaa, and South Lebanon governorates are currently the most affected by food insecurity, reflecting the combined effects of economic decline, conflict, and disrupted agricultural activity as presented in figure 15.

LEBANESE RESIDENTS - CURRENT ACUTE FOOD INSECURITY: OCTOBER – NOVEMBER 2024			SYRIAN REFUGEES - CURRENT ACUTE FOOD INSECURITY: OCTOBER – NOVEMBER 2024			PALESTINE REFUGEES - CURRENT ACUTE FOOD INSECURITY: OCTOBER – NOVEMBER 2024		
 928,000 24% of the population analysed People facing high acute food insecurity (IPC Phase 3 or above) IN NEED OF URGENT ACTION	Phase 5	0 People in Catastrophe	 579,000 39% of the population analysed People facing high acute food insecurity (IPC Phase 3 or above) IN NEED OF URGENT ACTION	Phase 5	0 People in Catastrophe	 84,000 40% of the population analysed People facing high acute food insecurity (IPC Phase 3 or above) IN NEED OF URGENT ACTION	Phase 5	0 People in Catastrophe
	Phase 4	100,000 People in Emergency		Phase 4	94,000 People in Emergency		Phase 4	10,500 People in Emergency
	Phase 3	828,000 People in Crisis		Phase 3	485,000 People in Crisis		Phase 3	73,500 People in Crisis
	Phase 2	1,557,000 People in Stressed		Phase 2	687,000 People in Stressed		Phase 2	84,000 People in Stressed
	Phase 1	1,379,000 People in Food Security		Phase 1	234,000 People in Food Security		Phase 1	42,000 People in Food Security

Figure 12. Food insecurity statistics among Lebanese and refugees in Lebanon (FAO/WFP/Ministry of Agriculture, 2025)

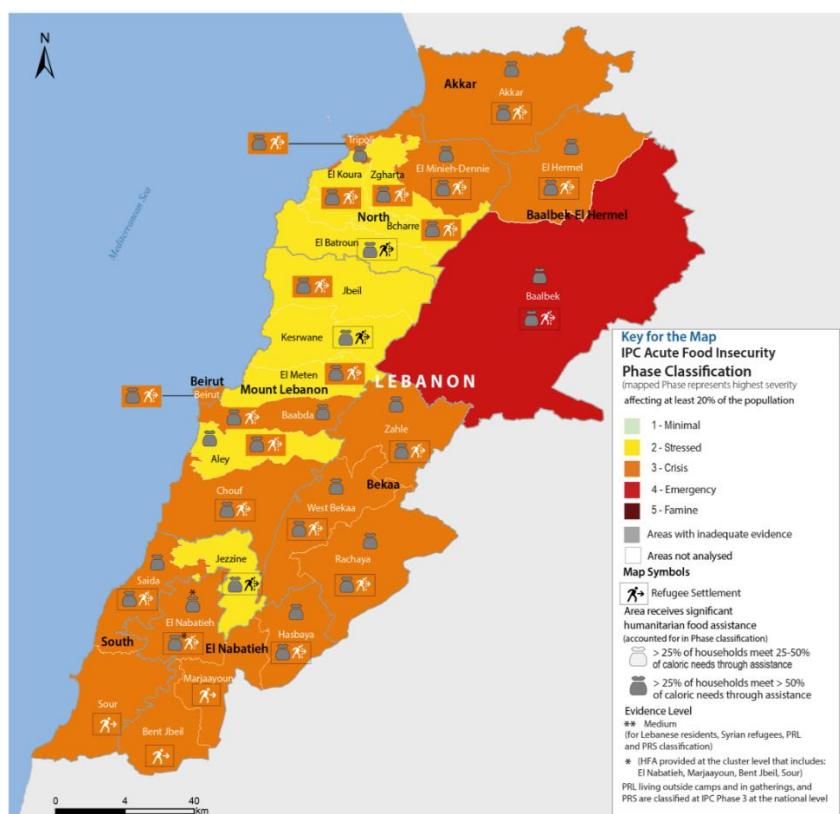


Figure 13. Geographic distribution of food insecurity in Lebanon (FAO/WFP/Ministry of Agriculture, 2025)

Lebanon's worsening food insecurity is the result of multiple, interconnected factors (FAO/WFP/Ministry of Agriculture, 2025):

- *Macroeconomic collapse and inflation:* The sharp devaluation of the Lebanese pound, coupled with the ongoing economic crisis and GDP contraction, has eroded household purchasing power. Soaring inflation has pushed food and essential goods beyond the reach of most families. The WHO 2024 Report showed that annual inflation has remained in triple digits since 2021, largely due to the collapse of the national currency, which by December 2023 had lost around 98% of its pre-crisis value. As food prices skyrocketed, many households were forced to reduce their food purchases and alter their diets, shifting toward cheaper and less nutritious options (WHO, 2024).
- *Escalation of conflict and displacement:* The conflict that erupted in October 2023 along Lebanon's southern border and intensified in September 2024 has drastically worsened humanitarian conditions. Initially confined to southern border areas, hostilities have spread to Baalbek–El Hermel, South and El Nabatieh governorates, Central Beqaa, and Beirut's southern suburbs. As of November 2024, conflict escalation had displaced 900,000 individuals internally, while over 600,000 crossed into Syria seeking safety. This large-scale displacement disrupted livelihoods, access to markets, and food production, further heightening food insecurity.

- *Labour market disruptions*: The combined effects of the economic crisis and conflict have destabilized the labour market. Lebanon has witnessed a decline in labour force participation, a rise in unemployment, and a shift toward informal and seasonal work with minimal security or income stability—all of which limit families' ability to afford food.
- *Insufficient social assistance funding*: Persistent funding gaps in social protection programs have constrained the government's ability to provide effective food or cash support to vulnerable households, leaving many without safety nets.
- *Decline in agricultural livelihoods*: Farmers, particularly in the southern districts of Bint Jbeil, Marjaayoun, and Sour, have been severely affected. According to an FAO rapid needs assessment (October 2024), 95% of households in these areas were displaced, with nearly all crop producers and 90% of livestock farmers unable to access their land due to insecurity. About 86% of households expressed fear of harvesting crops, while 47% were uncertain about planting for the next season, suggesting long-term risks to food production.
- *Destruction of agricultural assets*: The conflict caused widespread damage to agricultural infrastructure. Over half of surveyed households reported destruction to farmland, equipment, or irrigation systems. In Bint Jbeil, 97% of households reported severe damage, including the loss of over half of cropland and two-thirds of livestock farms. In Bekaa and Baalbek–El Hermel, around two-thirds of farmers expected severe losses this season, although many hoped to resume planting next cycle. In contrast, in southern regions, nearly all households anticipated major crop losses, deepening the threat to food security and livelihoods.

Climate change directly threatens food security by affecting all dimensions of food systems: availability, access, utilization, and stability. Rising temperatures, prolonged droughts, irregular rainfall, and extreme weather events reduce agricultural productivity, damage crops, and disrupt livestock and fisheries. This leads to lower food availability and higher prices, making it harder for vulnerable populations to access sufficient, nutritious food. Additionally, the increasing frequency and intensity of climate-related shocks—such as floods, heatwaves, and storms—destabilizes food supply chains, storage, and distribution, leaving households more vulnerable to food insecurity over time.

The agricultural sector is one of the most exposed and challenged to climate change. It poses significant challenges, affecting crop yields, livestock, and food security. As indicated before, rising temperatures, prolonged droughts, and irregular rainfall reduce soil moisture and stress heat-sensitive crops, leading to lower productivity (Pickbourn et al., 2022). Extreme weather events, such as floods, storms, and hail, can destroy harvests, while changes in precipitation and water scarcity strain irrigation systems (Pickbourn et al., 2022). Soil fertility is also threatened by erosion and degradation, further limiting long-term agricultural output. Additionally, shifting climatic conditions expand the range of pests and diseases, impacting both crops and livestock, while heat stress and reduced feed availability affect animal productivity (Pickbourn et al., 2022). These combined effects increase food insecurity, raise food prices, and reduce income for farmers, particularly smallholders who lack the resources to adapt, creating a cycle of vulnerability that threatens livelihoods and national food systems.

v. Longstanding refugee population and internal migration

Lebanon faces two major challenges related to migration: the protracted refugee crisis and internal displacement resulting from recent conflicts. The country continues to host one of the highest numbers of refugees per capita in the world. Following years of displacement resulting from the Syrian conflict, the collapse of the Assad regime in December 2024 triggered renewed instability and cross-border movements. Since then, over 105,000 new arrivals have been recorded, with the highest concentrations in Bekaa, Baalbek-El Hermel, Akkar, and the North (UNHCR, 2025). However, during the same period, crossing from or through Lebanon toward Syria has also been recorded. By the end of September 2025, 661,000 Syrians remained registered with UNHCR in Lebanon—though the actual figure is likely higher when accounting for unregistered individuals, reaching up to 1.5 million (UNHCR, 2025).

Simultaneously, the escalation of conflict within Lebanon during the last quarter of 2024 led to a major internal displacement crisis. A study estimates the forced internal displacement of 1.3 million people (Rizk, 2025). By February 2025 and following the ceasefire that took place in 27 November 2024, approximately 98,986 internally displaced persons (IDPs) remained in temporary locations, while around 890,830 had managed to return home (Rizk, 2025).

These cross-border and internal population movements have placed immense pressure on Lebanon's already fragile systems. Refugee-hosting communities face mounting challenges in health care, education, housing, and WASH services. Public hospitals and primary health care centres, a large proportion that are already underfunded, are struggling to meet increased demand on services. This has led to shortages of essential medicines, overcrowding in facilities, and deteriorating quality of care.

Additionally, the strain on WASH infrastructure has increased risks of water contamination, disease outbreaks, and service disruptions particularly in densely populated informal settlements. The competition for limited resources has also intensified social tensions between host communities and displaced populations, while the country's weak institutional capacity continues to limit coordinated and sustainable responses.

As such, climate change disproportionately impacts refugee communities and displaced populations, as they are more vulnerable due to existing challenges in accessing health care, education, adequate housing, and WASH services. Additionally, many reside in high-risk locations with greater exposure to climate hazards, and their livelihoods, often in outdoor construction or agricultural work, are particularly sensitive to environmental challenges. In turn, extreme weather events can lead to population displacement, creating so-called "climate refugees," with significant demographic and socioeconomic consequences for both the displaced populations and the host communities (Rataj et al., 2016).

vi. Political instability and conflict

The outbreak of intensified military activity in Lebanon which began in October 2023 escalated sharply in September 2024 when Israeli operations intensified (Rizk, 2025). Although a ceasefire

was agreed in November 2024, to this day, intermittent strikes have continued in southern governorates and the Beqaa region.

Beyond the immediate human toll and the political-geopolitical ramifications, this conflict poses an extraordinary burden for a country still reeling from the unresolved financial crisis that began in 2019; a collapse the World Bank describes among the most severe in recent history. Preliminary World Bank estimates place the combined economic losses and physical damage from the conflict at about US\$8.5 billion, roughly 40% of Lebanon's GDP (World Bank, 2024c). Physical destruction alone is valued at approximately US\$3.4 billion, with the housing sector representing about 82% of that figure (World Bank, 2024c). Damage is particularly acute in the south, where nearly 100,000 housing units have been reported as partially or totally damaged, notably in Tyre, Nabatieh, Saida, Bint Jbeil and Marjayoun (Rizk, 2025).

The conflict has disrupted production across almost every economic sector, with trade, tourism and the agrifood industries bearing roughly 77% of the overall losses (Rizk, 2025). The World Bank forecasts a 6.6% contraction in real GDP on top of five years of decline that have erased over 34% of GDP since 2019; this effectively wipes out around 15 years of economic growth (Rizk, 2025).

Further, already strained by the fiscal crisis, Lebanon's infrastructure is further challenged by the ongoing crises. Many basic environmental infrastructures such as potable water distribution networks and wastewater sewerage systems, energy networks, health care facilities, and other essential services have been damaged and directly hit by Israeli air strikes. Currently, these core services are experiencing severe interruptions, undermining the country's capacity to withstand ongoing shocks that are further eroding its resilience.

The ongoing political instability and economic crises in Lebanon are likely to heighten the country's vulnerability to climate change. With government priorities focused on addressing immediate political and economic challenges, effective climate adaptation strategies are deprioritized and overlooked by decision-makers. Simultaneously, the economic downturn limits the availability of financial resources for disaster preparedness, resilient infrastructure, and social support systems. This leaves communities, particularly marginalized and displaced, less equipped to cope with climate-related hazards. In effect, the combination of political fragility and economic strain is weakening progressively both preventive measures and emergency response amplifying the overall impacts of climate risk throughout the country.

b. Environmental factors

i. Solid waste management

Solid waste management (SWM) remains one of Lebanon's most pressing environmental and public health challenges. The sector continues to suffer from the lack of an integrated management approach encompassing waste reduction, recovery, treatment, and environmentally sound final disposal. Since the first solid waste crisis in July 2015 which left the streets of Lebanon overflowing with uncollected garbage, the country has repeatedly experienced nationwide solid waste management breakdowns. Although a national integrated solid waste management plan has

been drafted, its implementation remains stalled, leaving the country dependent on temporary, fragmented, and often unsustainable activities and projects.

This problem extends well beyond the municipal solid waste component to encompass hazardous streams, notably health care waste from hospitals, primary care centers and diagnostic laboratories including infectious, pharmaceutical, cytotoxic, chemical and short-lived radioactive wastes. The Recent conflict since October 2024 has also significantly increased the generation of construction and demolition debris, adding massive volumes of rubble that further exacerbates the solid waste management problem.

The barriers that continue to hinder effective solid waste management in Lebanon are multiple and interconnected, including (CDR, 2024):

- Lack of waste segregation at source and low public awareness of proper disposal practices.
- Reliance on landfilling and end-of-pipe solutions, rather than prioritizing waste reduction, reclamation and reuse.
- Limited financial planning and cost recovery mechanisms, which prevent sustainable long-term operation of facilities.
- Insufficient and fragmented data, constraining evidence-based policy and decision-making.
- Inadequate technical and financial resources at both national and municipal levels.
- Weak enforcement and poor governance, resulting from limited qualified personnel, and bureaucratic procurement procedures.
- Institutional weakness at the local level, including absence of regulatory tools.
- Public distrust and opposition, stemming from years of limited transparency and accountability, which have undermined acceptance of new waste projects and discouraged long-term planning.
- Political interference and lack of political will to implement an integrated national strategy.

The quantity, composition, and management of solid waste have also evolved significantly over the past decade. Prior to 2019, the system functionality was somewhat better (although highly deficient). However, the economic collapse, COVID-19 pandemic, Beirut Port Explosion, and ongoing political instability have further disrupted service continuity. The Draft National Integrated Solid Waste Management Strategy (CDR, 2024) estimated household waste generation at approximately 2.68 million tons per year (around 7,300 tons/day) in 2018. The financial crisis reduced purchasing power and consumption led to a 25% decrease in waste generation down to about 5,600 tons/day in 2022; a level not expected to rebound for several years (CDR, 2024).

Waste composition also shifted. In 2018, organic matter accounted for 52% of total waste, and recyclables for 37%. By 2021, these proportions had changed considerably as organic waste rose to around 70%, while paper/cardboard declined from 16% to 4%, and plastics slightly increased from 11% to 12%. This is clearly reflective of altered consumption patterns during the economic downturn and COVID-19 pandemic (CDR, 2024).

And, although Lebanon, theoretically, possesses a treatment capacity of 6,390 tons/day that is enough to handle the current waste volumes, only 440 tons/day (6.8%) of that capacity is operational (CDR, 2024). Consequently, only about 7.9% of waste is being properly treated, while the vast majority is disposed of in landfills or open dumps (CDR, 2024). In 2018, 77.3% of waste was landfilled or dumped but by 2022, that figure had risen to 98.7%. Overfilled landfills and widespread open dumping that is estimated at 2,377 tons/day have led to environmental degradation due to uncontrolled burning and resulting air pollution with over 1,000 active open dumps currently identified nationwide (CDR, 2024).

On the other hand, hazardous health care waste poses an additional layer of risk. Approximately 80% of health care waste is non-hazardous and can be treated as municipal solid waste, while the remaining 20% is hazardous and requires specialized handling (MoE/UNDP, 2024). The Annual generation includes 7,255 tons of infectious waste from hospitals and 4,941 tons from smaller health care providers, in addition to 275 tons of cytotoxic and pharmaceutical waste and around 300 kg/year of short-lived radioactive waste (MoE/UNDP, 2024). The key service providers such as *Arcenciel*, *Abbasiyeh*, and *AWM* collect and treat a portion of infectious waste. Yet, the combined treatment capacity of 6,808 tons/year remains well below the generated 12,194 tons/year (MoE/UNDP, 2024). As a result, a significant percentage of hazardous waste ends up in municipal waste streams, where it is either burned or dumped untreated exposing the public and ecosystems to serious environmental hazards.

At present, Cytotoxic, pharmaceutical, and chemical waste is typically exported by licensed firms such as *Solution*, *Treveria Environment*, and *Recyclamed* (MoE/UNDP, 2024). However, the high cost of international disposal and the logistical constraints often push smaller health care facilities toward unsafe practices including disposal alongside municipal waste.

As such, nationwide improper municipal solid waste and hazardous waste management contributes to severe environmental and public health risks. Open burning and uncontrolled dumping contaminate the air, water, and soil, releasing greenhouse gases, fine particulate matter, dioxins, and heavy metals into the environment. These pollutants are known to persist in ecosystems and accumulate in the food chain, particularly through contaminated crops, livestock, and coastal fisheries posing long-term exposure risks to the population.

In densely populated areas, such as Beirut and Tripoli, where waste is often burned near residential zones, residents are directly exposed to toxic fumes that exacerbate respiratory diseases, asthma, and cardiovascular conditions. The proliferation of open dumps also creates breeding grounds for disease vectors, including rodents, flies, and mosquitoes, which facilitate the spread of infectious and parasitic diseases.

Leachate from unmanaged landfills and illegal dumping sites further pollutes groundwater and surface water sources, increasing the likelihood of waterborne illnesses. Over time, chronic exposure to these pollutants has been linked to neurological disorders, reproductive issues, and various forms of cancer (SWEEPNET, 2010; WHO, 2011; Arcenciel, 2014; SWEEPNET, 2014b; El Baba, 2015).

The cumulative health burden is particularly concerning given Lebanon's limited capacity for environmental monitoring, weak enforcement of waste regulations, and inadequate public health infrastructure to handle resulting burden of disease. The health impacts resulting from improper solid waste management in Lebanon further exacerbate the population's vulnerability to climate change. Climate change intensifies these impacts, as rising temperatures, increased rainfall variability, and extreme weather events create favourable conditions for the proliferation of disease vectors, such as mosquitoes and rodents. Flooding and heavy rains can also disperse waste and contaminants, contaminating water sources and increasing the likelihood of waterborne diseases. Consequently, poor waste management and climate change interact synergistically, amplifying health risks and undermining community resilience. Additionally, extreme weather and climate variability disrupt waste systems, creating a feedback loop that worsens solid waste management practices in the country.

ii. Air quality

Lebanon is among the Eastern Mediterranean countries most severely affected by outdoor air pollution (CDR, 2018). Natural dust storms, particularly during the spring and autumn months, are a major source of particulate matter across the country. In addition, long-range transport of air pollutants such as sulfur dioxide (SO₂) from Central and Eastern Europe, combined with Lebanon's intense summer solar radiation, contributes to the formation of high concentrations of secondary particulate matter and ground-level ozone (CDR, 2018). Air quality degradation in Lebanon is further exacerbated by numerous anthropogenic sources of pollution including emissions from motor vehicles, airplanes, and marine vessels, industrial operations, residential heating, electricity generation including from communal and private diesel generators, open burning of solid waste as well as from construction, mining, and agricultural activities (MoE, 2019).

According to the 2024 National Greenhouse Gas Inventory Report, Lebanon's total greenhouse gas (GHG) emissions in 2022 were estimated at 20,519 Gg CO₂eq, representing a 32% reduction compared to 2019 levels (30,189 Gg CO₂eq) (Figure 17). This sharp decline is largely attributed to the country's prolonged economic and financial crisis, which began in 2019 and severely disrupted the energy supply system. The shortage of fuel for power generation, coupled with extensive electricity cuts and limited maintenance of aging infrastructure, substantially reduced energy consumption and related emissions (MoE/UNDP/GEF, 2024).

Despite the overall decrease, the energy sector (including transport) remained the dominant source of GHG emissions, accounting for approximately 77% of total national emissions in 2022. Within this sector, transport alone contributed 32.5% (around 6,662 Gg CO₂eq) mainly from gasoline use in passenger vehicles. Additionally, emissions from diesel-powered generators are a major source of GHG emissions and air pollution in Lebanon. Prolonged power outages and the government inability to provide a reliable electricity supply have made private and commercial generators widespread across the country. Most of these units operate without exhaust controls or regular maintenance and run on low-quality diesel, especially in dense urban areas such as Beirut. The result is elevated levels of combustion pollutants including particulate matter (PM), nitrogen oxides (NO_x), sulfur oxides (SO_x), carbon monoxide (CO), black carbon, and carbon dioxide

(CO₂), which degrade outdoor air quality and contribute to climate change (MoE/UNDP/GEF, 2024).

The industrial processes sector was the second-largest emitter, responsible for 12.6% (approximately 2,584 Gg CO₂eq) of total emissions in 2022. Major sources include cement manufacturing and fluorinated gases (F-gases) from refrigeration and air-conditioning systems (MoE/UNDP/GEF, 2024).

The Agriculture, Forestry and Other Land Use (AFOLU) sector contributed 3.8% of total GHG emissions, or about 778 Gg CO₂eq in 2022. Emissions from AFOLU remain sensitive to agricultural practices, land-use dynamics, and forest management policies. The waste sector accounted for 6.6% of total emissions, estimated at 1,347 Gg CO₂eq in 2022. Emissions mainly stem from solid waste disposal and wastewater treatment, resulting from the anaerobic decomposition of organic material in landfills and the treatment of municipal and industrial effluents (MoE/UNDP/GEF, 2024).

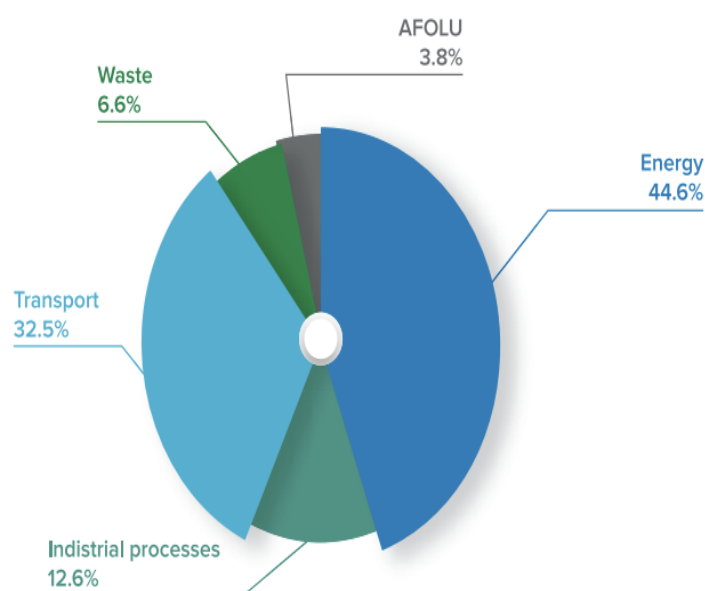


Figure 14. Lebanon's national greenhouse gas inventory by category in 2022 (MoE/UNDP/GEF, 2024)

Other studies estimated the annual mean PM_{2.5} concentration in Lebanon at 24.2 µg/m³ thus exceeding the WHO guideline by 142%. Air quality has further deteriorated since the onset of the economic crisis, and the PM_{2.5} concentrations in Beirut tripled compared to pre-crisis levels, surpassing safe limits by more than 3.5 times (Faour et al., 2022; AUB Environmental Health, Safety, and Risk Management, 2024). Further, WHO estimates that 100% of the population in Lebanon is exposed to PM_{2.5} levels exceeding WHO recommended values and that the total age-standardized mortality rate attributed to household and ambient air pollution is 58.6 per 100,000 population (WHO, 2019). Moreover, according to the WHO, Lebanon records the highest rate of air pollution-related deaths in the Eastern Mediterranean, and Beirut is consistently ranked among the world's most air polluted cities. The economic burden is also substantial, and the World Bank (2022) estimates the cost at about 3% of GDP.

The health implications of the pollution burden are severe but not thoroughly studied and well-documented. Chronic exposure to polluted air has been linked to respiratory illnesses, cardiovascular disease, and various forms of cancer. It can also impair neurological and reproductive systems, weaken immune function, lead to an increase in asthma and bronchitis cases, and cause developmental delays in children (MoE/UNDP/ECODIT, 2011).

Several epidemiological studies also confirmed strong correlations between elevated air pollution levels and increases in emergency room admissions and hospitalizations for respiratory diseases (MoE/UNDP/ECODIT, 2011). Evidence from multiple studies in Greater Beirut show a notable deterioration in cardiovascular health over recent years (Isma'eel et al., 2018). Research also indicates a dose–response relationship between air pollution exposure and hypertension (Salameh et al., 2018). Populations residing near high-traffic areas or diesel generator clusters face a significantly higher incidence of cardiovascular diseases (Nasser et al., 2015). Similarly, elevated daily concentration of PM₁₀ and PM_{2.5} have been directly correlated with increased hospital admissions for respiratory and cardiac emergencies in Beirut (Nakhleh et al., 2015). And chronic exposure to fine particulate matter and organic hydrocarbons also contributes to elevated cancer risks, with measured levels exceeding WHO safety thresholds by 40–60 times (Dhaini et al., 2017). Research conducted across six Lebanese regions of Beirut, Mount Lebanon, Bekaa, North, South, and Nabatieh found statistically significant associations between higher air pollution exposure and increased prevalence of stroke, cardiovascular disease, and hypertension (Salameh et al., 2018a; 2018b; 2019). In addition, prenatal exposure to air pollutants has been linked to a 15% higher risk of congenital malformations (Al Noaimi et al., 2021). Additionally, a recent study in 2025 found that diesel exhaust particulate matter (DEPM) taken from two midsize generators operating in Beirut consists of a wide panel of potent toxicants, notably genotoxic, carcinogenic, and endocrine disrupting compounds (Fakhri et al., 2025).

The health impacts arising from poor air quality are expected to intensify under climate change, further increasing population vulnerability. Air pollution caused by vehicle emissions, industrial activities, and the improper management of waste already contributes to respiratory and cardiovascular diseases, including asthma, chronic obstructive pulmonary disease, and heart disease. Climate change exacerbates these effects by increasing the frequency and intensity of heatwaves, which can trap pollutants close to the ground and amplify exposure. Additionally, rising temperatures and altered weather patterns can enhance the formation of ground-level ozone and particulate matter, while wildfires, more frequent under climate change, release large quantities of smoke and toxic aerosols. Together, these processes create a synergistic effect, where climate-driven environmental changes worsen existing air pollution, increasing the risk and severity of health outcomes, particularly among vulnerable populations such as children, the elderly, and those with preexisting conditions.

iii. Water scarcity and pollution

Lebanon's water sector has long struggled with mismanagement, driven by excessive exploitation of water resources, widespread pollution of freshwater resources, deteriorating infrastructure, and inefficient wastewater management systems (UNDP, 2021). Once among the Arab region's richest countries in freshwater availability, Lebanon is now facing severe and escalating water shortages.

Years of underinvestment in water treatment, supply, and storage infrastructure have left the sector unable to meet rising national demand (MoEW, 2012). Institutional weaknesses compound these physical and technical problems. The sector is governed by a fragmented framework of overlapping mandates, weak coordination, and limited oversight. A further obstacle is the lack of a unified national database containing long-term, high-quality meteorological and hydrological data necessary for sound water-resource planning and management (UNDP, 2021).

Rapid and unplanned urbanization has intensified pressure on water systems, making urban areas major sources of both point and non-point water pollution. Widespread contamination of surface and groundwater resources has become a defining feature of the sector. Water conservation efforts remain largely rhetorical, while access to safe and improved water sources is still limited (as discussed in Section 5.a.i above). Unconventional water sources, such as treated wastewater or rainwater harvesting, remain largely underutilized. Additionally, institutions continue to face financial and technical constraints (UNDP, 2021).

According to the World Bank (2024), roughly 70% of the population is currently affected by water shortages, forcing many households and institutions to turn to alternative sources such as privately drilled wells or cistern deliveries—options that are often unregulated with respect to both water quality and quantity. The estimated number of unlicensed private wells is almost three times higher than the number of licensed private wells (55,000-60,000 wells), making it challenging for authorities to regulate groundwater abstraction (UNDP, 2021). Additionally, the World Bank (2017) estimates Lebanon's renewable freshwater availability at approximately 704 m³ per capita per year, well below the water stress threshold of 1,000 m³ per capita per year, classifying the country as water stressed.

Beyond quantitative scarcity, water quality degradation further compounds the crisis. Pollution from industrial and domestic wastewater, agricultural runoff, and improper solid waste disposal has severely impacted Lebanon's rivers, springs, wetlands, and aquifers. Many water bodies receive pollutant loads far exceeding their natural carrying capacity, disrupting their ecological balance and ecosystem functions (UNDP, 2021). Microbiological contamination has been documented across all monitored rivers, confirming that untreated domestic wastewater remains the primary source of freshwater pollution in Lebanon (UNDP, 2021). The direct discharge of sewage has led to elevated biological oxygen demand (BOD) and reduced dissolved oxygen (DO) levels, particularly during dry seasons. Groundwater quality has also deteriorated due to both over-extraction and pollution. Saltwater intrusion (SWI) is widespread affecting coastal aquifers, while nitrate contamination, largely stemming from agricultural activities and sewage leakage, is a growing concern.

Addressing wastewater management, only about 8% of generated wastewater is treated, despite roughly 60% of the population being connected to sewage networks (MoEW, 2012). Most of these networks discharge raw wastewater directly into rivers or along the coastline, where over 53 outfalls are easily identified (MoE/UNDP/ECODIT, 2011). Regions not covered by sewerage systems rely on cesspools, which leak and contaminate groundwater.

The public health implications of water pollution in Lebanon are severe. Contaminated water is a major vector for waterborne diseases such as cholera, typhoid fever, hepatitis A, and various forms of gastroenteritis. High nitrate levels in drinking water can lead to methemoglobinemia (“blue baby syndrome”) in infants, while prolonged exposure to chemical and industrial pollutants increases the risk of chronic diseases, including liver and kidney disorders, as well as cancer. Poor water quality also compromises food safety through irrigation of crops with contaminated water and contributes to broader community health risks, particularly in areas lacking adequate sanitation and health care access.

The health impacts associated with water scarcity and pollution are expected to worsen by climate change, further heightening population vulnerability in Lebanon. Limited access to safe properly managed domestic water compromises hygiene and sanitation, increasing the risk of diarrheal diseases, skin infections, and other waterborne illnesses. Climate change exacerbates these risks by altering precipitation patterns, reducing groundwater recharge, and intensifying droughts, which collectively strain already fragile water infrastructure. At the same time, extreme weather events such as floods can overwhelm wastewater systems and contaminate drinking water sources with pathogens and chemical pollutants. Rising temperatures also promote the proliferation of waterborne pathogens, including cholerae, heightening the risk of disease outbreaks.

c. Institutional factors

i. Governance and institutional landscape

Several key entities play important roles in the climate–health sector, including those involved in public health, environmental health and climate change, as well as disaster risk management and preparedness. The main players and their roles are summarized in Table 4 (MoPH, 2025a; MoE, 1993; AUB IFI, 2009; Syndicate of Hospital, 2014; DRM, 2021; UNDP, 2021).

Table 4. Key players involved in climate-health sector

Key Entities	Roles
Ministry of Public Health (MoPH)	✓ Leads the public health response to climate impacts. ✓ Implements early warning systems. ✓ Leads responses to public health emergencies, including those exacerbated by climate change. ✓ Prepares the Ministry’s Plan of Action and related policy plans, including those covering health care facilities. ✓ Shares health data internally and externally; collects statistical data and prepares related reports. ✓ Conducts epidemiological surveillance and control, including monitoring health impacts linked to climate change. ✓ Develops communicable disease programs. ✓ Initiates epidemiologic surveillance and ensures primary health care delivery.

	✓ Trains health workers in the public and private sectors. ✓ Issues certificates for health facilities. ✓ Conducts quality control on medical facilities. ✓ Oversees drug industry management and control. ✓ Implements projects to enhance the preparedness of health care facilities for emergencies.
Ministry of Environment (MoE)	✓ Serves as the main governmental body responsible for climate policy formulation, national communications (e.g., NDC updates), and coordination with international partners on climate and environmental issues. ✓ Lead on the development and co-ordination of Climate change research and policy in Lebanon to inform a low carbon, climate-resilient Lebanon by 2030 and beyond. ✓ Oversees the development and implementation of the National Adaptation Plan (NAP) and ensures Lebanon meets NDC 3.0 targets, including strengthening public health outcomes and resilience of health care facilities. ✓ Responsible for supporting Lebanon in its reporting obligations under the UNFCCC ✓ Mobilizes international funding for climate change projects, including those aimed at climate-resilient health systems ✓ Prepares general environmental policies, projects, and long- and medium-term plans related to natural resource management. ✓ Develops detailed studies and plans to preserve the environment and combat pollution. ✓ Participates in disaster preparedness efforts, including preventive plans to address natural disasters (e.g., floods, torrents) and war-related pollution.
Primary Health care Centers and Hospitals	✓ Serves as the frontline defense against climate-related health impacts. ✓ Provide essential health care services during emergencies and disasters.
Syndicate of Hospitals	✓ Works to improve the quality and responsiveness of health care services. ✓ Strengthens the Syndicate's role in promoting performance improvement and quality care for the Lebanese population. ✓ Promotes partnerships with universities, health organizations, the MoPH, and other stakeholders to optimize resources and facilitate continuous knowledge transfer. ✓ Encourages collaboration with government and non-government entities to improve hospitalization services in Lebanon. ✓ Acts as the official negotiator with public and private institutions in the health care sector.

	Sets criteria for classification, assessment, and accreditation of hospitals.
Disaster Risk Management (DRM) Unit	✓ Serves as the national focal point for disaster risk reduction (DRR) efforts: Strengthens DRM capacities at national, sub-national, sectoral, and local levels. ✓ Provides technical and operational support to the National Disaster and Response Coordination Committee and the Government Emergency Committee. ✓ Coordinates between agencies and departments on disaster risk reduction programs.
National Committee for the Development of a Disaster Contingency Plan	✓ Functions as a cross-sectoral coordination body for disaster risk management across ministries and sectors. ✓ Supervises the implementation of the National Strategy for Disaster Risk Reduction (2021–2030). ✓ Updates and develops disaster contingency plans and the national response framework. ✓ Develops implementation work plans for national, local, and sectoral response strategies. ✓ Prepares national post-disaster recovery strategies. ✓ Establishes national standards to measure progress in DRR based on the Sendai Framework for Disaster Risk Reduction (2015–2030). ✓ Improves early warning systems at the national and local levels. ✓ Builds a national database for disaster risk management and coordinates risk assessment studies. ✓ Promotes awareness and capacity building at the national level.
Technical and Financial partners (UNDP, WHO, IOM, etc.)	✓ Provide financial and technical assistance to strengthen the climate resilience of health care facilities and the health sector overall. ✓ Support energy efficiency and renewable energy projects (e.g., solar systems), as well as needs assessments and capacity-building programs. ✓ Fund the development of national strategies and climate-related policy packages. ✓ Provide humanitarian and emergency support to affected communities during crises.
Council for Development and Reconstruction (CDR)	✓ Oversees the planning and implementation of infrastructure projects related to water supply, wastewater, and solid waste management ✓ Secures funds for projects ✓ Allocates funds to different government bodies
Ministry of Energy and Water (MoEW)	✓ Responsible for the development of the energy and water sector. ✓ Prepares the masterplan for water and wastewater, and evaluates and implements water and wastewater infrastructure project ✓ The MoEW's efforts directly influence the vulnerability and resilience of health facilities and communities to climate-related stresses such as droughts, floods, and water contamination.

Ministry of Agriculture (MoA)	✓ Formulates the national strategic vision for the agricultural sector and develop related policies and programs. ✓ Manages agricultural resources and addresses the effects of climate change on crop productivity and livestock health, which is directly linked to climate-health sector. ✓ Contributes to ensuring food security and reducing health risks associated with agricultural practices and climate-induced changes in food systems. ✓ Has a key role in the management of natural resources (agricultural land, irrigation water, forests and forestry, fisheries and rangelands)
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As shown in the table above, numerous stakeholders are involved and play important roles in the climate–health sector. Because of this wide range of actors, the institutional landscape at the climate–health interface in Lebanon is characterized by complexity and systemic weaknesses that constrain effective action. A key manifestation of this complexity is that mandates to address climate-related health challenges are dispersed across multiple institutions (including MoE, MoPH, DRM unit and others). Consequently, each actor often develops its own strategies and plans in isolation, working within “silos” without adequate coordination with others. This results in fragmented, overlapping, and misaligned interventions, which fail to provide a holistic response to what is inherently a multisectoral issue.

Addressing climate-related health challenges therefore requires strong multisectoral engagement and inter-ministerial collaboration among key stakeholders; however, such coordination remains limited. Information sharing and cooperation across ministries, health care facilities, the private sector, and international organizations are also insufficient, leading to gaps in both planning and implementation. Moreover, the lack of effective coordination between health care providers and the Ministry of Public Health (MoPH) further weakens the country’s capacity to manage natural disasters and respond to emerging climate–health risks.

Additionally, a key institutional challenge in managing climate–health emergencies is the limited integration of disaster risk reduction (DRR) measures into development projects, national strategies, and sectoral policies. Political divisions and Lebanon’s quota-based governance system have delayed the establishment of a unified and integrated disaster risk management framework (UNDP, 2017a). Coordination and information exchange across stakeholders continue to face significant barriers, and DRR measures are insufficiently mainstreamed across governorates and ministries. Moreover, technical capacity, resources, and business continuity planning remain inadequate to address systemic vulnerabilities effectively.

Another central constraint is the institutionalization of the Disaster Risk Management Unit (DRMU) within the Presidency of the Council of Ministers. As seen in table 4, initially funded by UNDP as the Disaster Risk Reduction Management Unit, the DRM Unit provides administrative, technical, and logistical support to the National Committee and is officially mandated to coordinate disaster risk reduction programs across all government agencies. Strengthening the unit’s institutional, technical, and administrative capacities—currently limited—is critical to delivering comprehensive support across all phases of disaster management, including prevention,

mitigation, preparedness, response, and recovery, for both governmental bodies and civil society organizations.

ii. Data availability and early warning signs

Overall, Lebanon's health information system remains fragmented, characterized by sporadic and uncoordinated initiatives. The system has limited capacity for the systematic collection, analysis, and interpretation of health data needed to inform strategic decision-making. Significant data gaps persist particularly regarding hospital utilization rates, response capacities, and geographic service hinder evidence-based planning and effective preparedness and response policies (UNDP/MoE/GEF, 2022).

Efforts to strengthen surveillance, early warning and health information have advanced, though capacity and coverage remain incomplete. The Ministry of Public Health (MoPH) has expanded its epidemiological and event-based surveillance since the 1990s and especially after 2006, creating systems that now cover a broad set of signals and syndromes and feed into a national communicable-disease platform (MoPH, 2012; Ambiss & Ammar, 2020).

The Epidemiological Surveillance Unit (ESU), established in 1994 and decentralized after 2005, now operates multiple subsystems including (i) ICU-based surveillance, (ii) hospital-based mortality, (iii) aggregate laboratory data, (iv) reporting from medical centers, (v) school absence reporting, (vi) national cancer registry, (vii) road traffic injury, (viii) snake bite surveillance, (ix) chemical surveillance, and (x) environmental surveillance (Ambiss and Ammar, 2020). It currently monitors 40 infectious diseases and syndromes plus cancer data (Saleh and Howard, 2023). ESU's additional core functions are to screen epidemiological alerts, detect and investigate outbreaks, train and sensitive on surveillance methods, and disseminate health information (Saleh and Howard, 2023).

In 2006, the MoPH established its first early warning alert and response system based on the DHIS2 tool focused on epidemic-prone diseases in primary care networks. The tool has then been expanded to include private providers, armed forces and regional observatories in Bekaa, North, South and Nabatieh (MoPH, 2012; MoPH, 2015). The surveillance system currently includes priority epidemic prone diseases in humanitarian emergencies; (a) acute watery diarrhea, (b) bloody diarrhea, (c) acute respiratory infections, (d) measles, (e) AFP and (f) viral hepatitis and is integrated within the central National Communicable Diseases Surveillance System (MoPH, 2012).

Strengthening the surveillance and response system has led to the recruitment of additional surveillance staff at central and governorate levels, formalizing disease notification through ministerial decrees, development and updating standard operating procedures and surveillance guidelines; expansion of laboratory diagnostics capacity, and training of health personnel across hospitals, PHCCs, civil defense, and security services. EU and other donor projects supported SOP updates and guideline development for dozens of priority conditions (MoPH, 2016). By 2025, the surveillance and response mechanisms are automated and strengthened to allow timely data collection and rapid response to public health threats (MoPH, 2025a).

Additionally, the MoPH has developed inventories of health facilities, laboratories, pharmacies and human resources and has begun rehabilitating and strengthening the Central Public Health Laboratory (CPHL). These inventories will support decision-making during emergency situations.

iii. Strategic and policy frameworks related to climate-health interface

At the climate–health interface, several strategic and policy frameworks exist and can be categorized as those related to (1) emergency preparedness of health care facilities, and (2) adaptation of health care facilities.

(1) Emergency preparedness of health care facilities

Several efforts have been proposed and undertaken by the MoPH and MoE to strengthen the preparedness of health care facilities during emergencies, including natural disasters that are expected to intensify because of climate change. The country’s response to the COVID-19 pandemic highlighted significant challenges and systemic weaknesses within the health care system, particularly in its capacity to manage large-scale emergencies. This experience has drawn greater attention to the urgent need for strengthening emergency preparedness and response mechanisms across the health sector.

Accordingly, the key policy frameworks and strategies that guide responses to climate-related health emergencies relate to the following:

✓ **Development of an evidence-based Epidemic Preparedness and Response Plan by MoPH to (MoPH, 2016) to:**

- Strengthen surveillance for communicable diseases, with universal case reporting at high-risk informal settlements,
- Standardize the procedure for early detection and laboratory confirmation of an outbreak,
- Manage cases properly in the event of an outbreak,
- Reinforce environmental control measures for outbreak response, and
- Stock piling of serums and medicines.

Increase in the burden of communicable diseases and disease outbreaks are major health consequences of climate change. As such, enhancing the national surveillance of communicable diseases and early warning sign systems, and providing contingency stocks to health care facilities can help reduce the vulnerabilities of health care facilities, when responding to pandemics and disease outbreaks, and ensure continuing of service

✓ **Establishment of the Public Health Emergency Operation Center:**

In 2023, in response to the hostilities in southern Lebanon, the MoPH established a Public Health Emergency Operation Center (PHEOC) that serves as a “nerve center for preparation and response to public health emergencies” (MoPH, 2023b). Its objectives are timely event-specific decision-making, communication and coordination with response partners, collection, analysis, and presentation of event data, acquisition and deployment of resources, preparation

of public communication and coordination, and monitoring financial commitments. Since its establishment, PHEOC coordinated multi-stakeholder responses to the cholera outbreak, the 2024 war on Lebanon, and other public health emergencies (MoPH, 2025b). The center is equipped with a DHIS2 system to allow the flow of information to the MoPH from peripheral health units.

✓ **Implementation of capacity building initiatives on emergency preparedness:**

Large-scale training programs, supported by WHO and partners, empowered thousands of health workers in surveillance, infection prevention and control, vaccine management, clinical case management, mental-health care, water quality monitoring, hospital waste management and other emergency functions (MoPH, 2012; Ambiss & Ammar, 2020). The Health Emergency Guidebook was disseminated to all PHCCs, hospitals, concerned Ministries, and NGOs. The guidebook proposes unified definitions, experience-based approaches, and describes Standard Operating Procedures for the preparedness and management of health response in emergencies.

Contingency, Preparedness and Management Plans were also developed for Avian Influenza Pandemic, H1N1 Novel Influenza Pandemic, and EBOLA in 2012. More than 3,000 health workers were trained then on: (a) Emergency Disease Surveillance and Response, (b) Infection control, (c) Vaccine management, (d) Primary Health Care Clinical Management, (e) Mental Health Care, (f) Integrated Management of Childhood Diseases, (g) Non communicable Diseases Early Detection and Care, (h) Water Quality Monitoring, (i) Food Safety Inspection, and (j) Infectious Diseases Transmission and Management (MoPH, 2012). The developed training and guidebooks have improved sectoral awareness and capacity, but routine operationalization and integration with national emergency command remain inconsistent.

✓ **Implementing International Health Regulations (IHR):**

Lebanon ratified the IHR and built governance mechanisms (national and technical IHR committees, a CBRN committee at the Prime Minister's office) to strengthen public-health security. IHR-related actions included, then, strengthening surveillance and case-reporting, preparing HAZMAT/CBRN teams with multi-agency membership, establishing PPE stockpiles, enhancing port/airport public-health capabilities, and training personnel at points of entry (MoPH, 2012).

The Joint External Evaluation process highlighted the progress attained but assigned modest scores for preparedness and emergency response operations (2/5 in the 2016 report). This pointed to weaknesses in comprehensive hazard/capacity analysis, multi-sectoral mapping of roles and resources, activation procedures for emergency operations, and alignment of facility-level plans with national response frameworks (WHO, 2016; WHO, 2017).

✓ **Development of the MoPH Emergency Health Contingency Plan:**

The MoPH Emergency Health Contingency Plan that was revised in 2012 focuses on natural human-made disasters preparedness and response arrangements addressing four major pillars: (i) health-needs assessment, (ii) outbreak prevention/monitoring/control, (iii) maintaining the

health-facility operational capacity, and (iv) partner coordination. The plan includes disease-specific contingency arrangements (e.g., cholera, influenza, Ebola) and outlines health-cluster roles and responsibilities.

Still, the contingency plan tends to prioritize communicable-disease scenarios and does not comprehensively embed strategic, short- and long-term actions for improving climate resilience of health care facilities (e.g., infrastructure retrofits, heat-wave protocols, continuous power and water resilience). Environmental health services (WASH, solid waste, vector control) are not always clearly assigned and often default to UN agencies in practice (MoPH, 2012; MoPH, 2015; Jurdi, 2021). The Emergency Health Contingency Plan, also, outlines a health cluster response plan strategy to reduce avoidable losses of life and the burden of disease and resulting disabilities in the Lebanese population by (MoPH, 2012):

- Ensuring an indispensable health information management system including rapid assessment,
- Providing essential monitoring and surveillance of key diseases,
- Coordinating humanitarian health assistance,
- Contributing to filling gaps in humanitarian health assistance, particularly to vulnerable groups, and
- Building on existing local capacities for emergency health response.

✓ **National Disaster Risk Reduction (DRR) strategy and governance:**

Lebanon adopted the Sendai Framework and advanced on national DRR planning. The Disaster Risk Management Unit (Presidency of the Council of Ministers), and The National Emergency Response Committee (NERC) were established to coordinate multi-hazard contingency planning across Ministries and Agencies. Recent DRM achievements include the development of a National DRR Strategy (2021–30), pending final adoption by the Council of Ministers, to strengthen multi-hazard mapping and early-warning systems. The proposed Strategy embeds risk assessment into planning, shifting emphasis from response to prevention, and piloting local DRR strategies in several governorates (DRM, 2020; Jurdi, 2021, DRM & UNDRR, 2018). Capacity constraints and financing shortfalls, however, have limited, to date, the full implementation of the mandate across the country.

(2) Adaptation of health care facilities

Regarding climate change adaptation and preparedness, limited direct efforts have been made to strengthen the capacity of health care facilities in Lebanon to withstand and respond to climate-related impacts. Existing initiatives have been largely fragmented and exploratory, focusing on identifying adaptation needs rather than implementing systemic resilience measures. A notable initiative is the MoE–UNDP–GEF 2022 project, Climate Change in Lebanon: Vulnerability and Adaptation of Health Care Providers and Lessons Learned from the COVID-19 Crisis, which sought to consolidate, analyze, and present the most recent data on vulnerabilities within Lebanon’s health sector and identified practical measures to address them. Another study,

undertaken by the Ministry of Public Health in collaboration with the International Organization for Migration (IOM), Seed Global Health, and the University of Melbourne, conducted a needs assessment for selected facilities and found that health workers lack essential training, tools, and institutional support—highlighting an urgent need for capacity building and investment to develop climate-resilient health systems (IOM, 2025). While these initiatives are a starting point, they remain insufficient to ensure comprehensive climate resilience across the health care sector. They could, however, serve as a basis for scaling up adaptation programs and strengthening preparedness within health care facilities nationwide.

Also, the recently published Climate Package by the MoE, which includes Lebanon’s Nationally Determined Contribution (NDC) 3.0, marks an important policy advancement in this context. One adaptation priority specifically addresses health care system resilience (Government of Lebanon, 2025): Adaptation Priority 6: Public Health “Integrate climate resilience and environmental sustainability into Lebanon’s health care system and facilities to strengthen preparedness and public health response to climate change”. Key actions under Adaptation Priority 6 include (Government of Lebanon, 2025) are detailed in Section D. And, the Health and Environment Strategy National Framework of Action (2021-2026) reaffirms Lebanon’s commitment to climate resilience and aligns health adaptation priorities with international frameworks (Sendai, SDGs, UNCCD, CBD). Priority actions are also detailed in Section D. Successful implementation would expand the health sector’s capacity to anticipate and manage climate risks.

Still, these initiatives indicate growing recognition of the link between climate change and health, systematic, institutionalized, and adequately funded mechanisms are still needed to ensure that Lebanon’s health care facilities are truly climate resilient.

iv. Health care facilities’ vulnerability to climate change

A 2022 report by the MoE/UNDP/GEF assessed the vulnerability of health care facilities in Lebanon using the 2020 WHO guidance on climate-resilient and environmentally sustainable health care, which identified key vulnerability areas, as follows (WHO, 2020):

1. *Health Workforce*: the provision of adequate number of skilled workers with decent working conditions, who are informed and able to respond to environmental challenges.
2. *Water, Sanitation, Hygiene and Health care Waste Management*: the sustainable and safe management of such services.
3. *Energy*: the provision of sustainable energy services.
4. *Infrastructure, Technologies, and Products*: the provision of appropriate infrastructure, technologies, products, and processes for efficient functioning of health care facilities.

To evaluate vulnerability and preparedness against these key vulnerability areas, the study reviewed existing accreditation and certification programs as proxy indicators for climate readiness. The analysis of Lebanese health care facilities against these accreditation and certification programs shows that overall preparedness for climate-related hazards is low. Critical vulnerability areas remain inadequately addressed, with 83.7% to 97.65% of facilities showing gaps in key domains. Adopting multiple accreditation systems, including ISO and OSHA certifications, provides limited improvement due to overlapping requirements and insufficient

focus on climate-specific risks. Among the accreditation systems, the Hospital Accreditation Standard 2019 and JCI Standards include components relevant to the four identified vulnerability areas. A detailed analysis of how key vulnerability areas and their subcomponents are addressed within these standards shows that most are covered only at a basic level, indicating incomplete preparedness and a medium-risk classification. A limited number of subcomponents are more comprehensively addressed, which helps establish certain systems to respond effectively, reducing vulnerability to a low-risk level. In comparison, the Primary Care Standards 2015 also touch on all four vulnerability areas, but coverage remains minimal, reflecting a lower level of preparedness. Overall, the evidence indicates that Lebanese health care facilities are highly vulnerable to climate change, with limited capacity to respond effectively to climate-related crises. There are several challenges hindering efforts to reduce the vulnerability of the health sector. Many of these challenges are interconnected with the factors discussed above and are discussed later in this report.

6. Impact chain

The interaction between climatic and non-climatic drivers is presented in Figure 23. It showcases how socio-economic, environmental, and institutional factors worsen the health impacts of climate change on the Lebanese population.

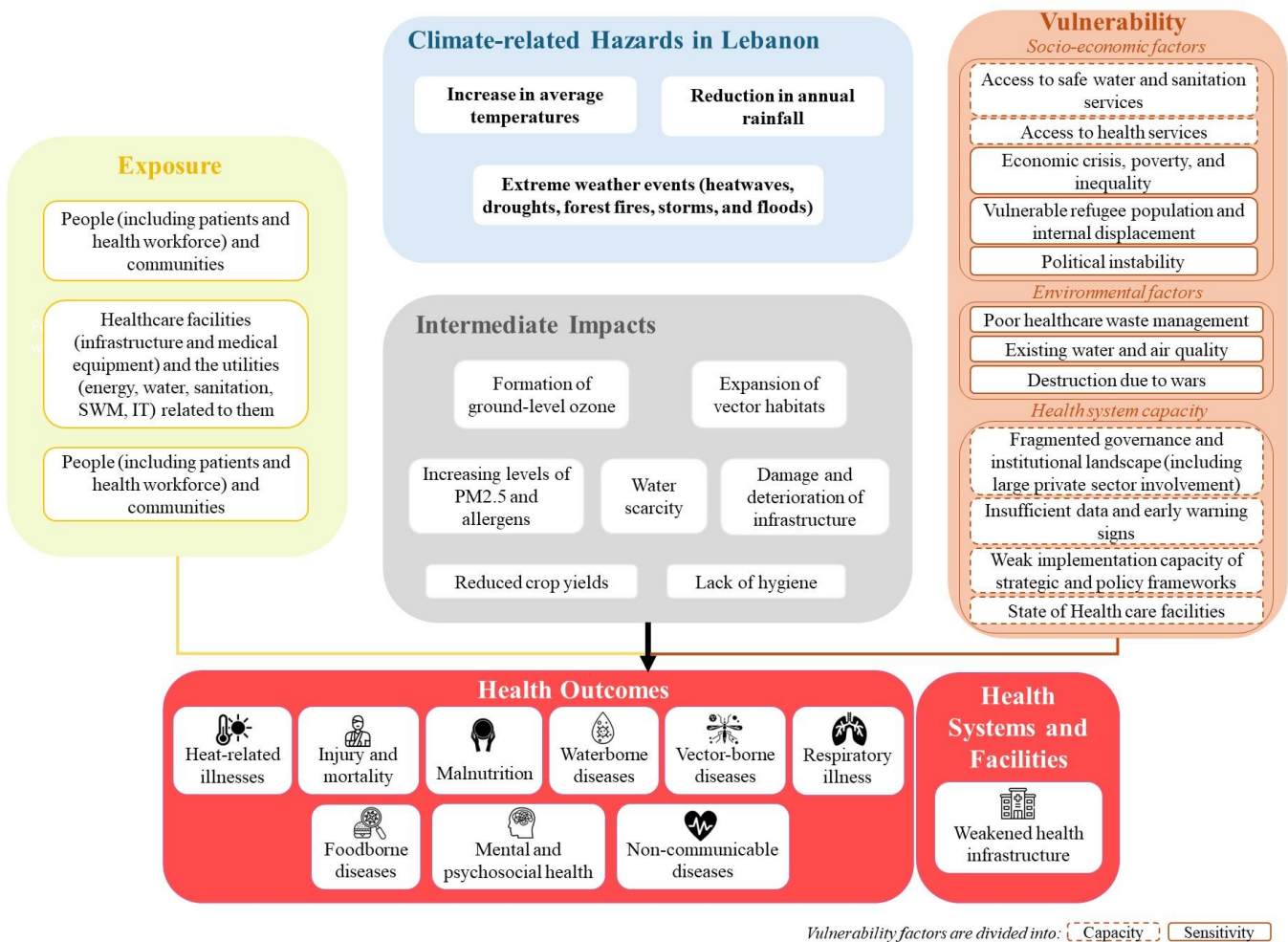


Figure 15. Impact chain illustrating exposure, vulnerability, and health risks associated with climate change in Lebanon, based on the framework presented in Harris et al. (2022) and Estoque et. al (2022).

B. An analysis of the overall climate risk of Lebanon’s health sector, including health impact assessment

The increased burden on health care facilities (primary health care centers and hospitals) from climate change impacts would be difficult to project due to the following factors: (a) the wide spectrum of disease entities associated with heat stress and short term fluctuations ranging from dehydration, rash, cramps, heatstroke, heat exhaustion, malnutrition, diarrhea and water- and food- borne diseases to respiratory and cardiovascular related diseases, etc. (b) type of effect (direct or long term), (c) intensity, duration and frequency of climate health risk and (d) preparedness of health care facilities to deal with disease output profile (Jurdi, 2022). Additionally, the lack of recent, up-to-date data on climate change, especially regarding the population's vulnerability and exposure, and the uncertainty and inadequacy of climate projections challenge the accurate assessment of the disease burden.

The costs of the potential increases in the risk of death due to heat stress, malnutrition, diarrhea, malaria, floods, and cardiovascular disease in Lebanon are estimated at 54.7 billion USD in 2040, and costs associated with potential increases in illness and disability at 194.3 billion USD, as presented in Table 6 (MoE/GEF/UNDP, 2016; Jurdi, 2021). Indirectly, the effects of climate change on other countries, manifested in a decrease in global food supplies, may increase the costs Lebanese households pay for food. Moreover, the cumulative effects of global GHG emissions are estimated to lead to an average annual cost per household of USD 13,100 in 2040 and USD 107,200 in 2080 (MoE/GEF/UNDP, 2015).

Table 5. Number and potential economic costs of climate-related risk of death and risk of illness or disability in Lebanon under the IPCC's highest-emissions scenario (MoE/ GEF/ UNDP, 2016)

	Year	Deaths			Disability Adjusted Life Years (DALYs)		
		2020	2040	2080	2020	2040	2080
Number	Heat stress	3,900	6,600	12,200	620	1,300	3,300
	Malnutrition, diarrhea, malaria, floods & cardiovascular disease	31,100	33,900	33,300	811,600	885,400	870,700
	Total	34,900	40,500	45,500	812,300	886,800	874,000
Economic cost	Heat stress (millions)	USD 5,200	USD 9,000	USD 16,400	USD 140	USD 300	USD 730
	Malnutrition, diarrhea, malaria, floods & cardiovascular disease (millions)	USD 41,900	USD 45,800	USD 45,000	USD 177,800	USD 194,000	USD 190,700

Alone, the reduced work hours caused by the exposure of workers to heat stress were estimated to cause a USD 1.36 billion loss in GDP in 2023, with the highest GDP loss in Beirut and Jounieh (Figure 24). Additionally, an estimated total of 110,000 jobs (Full-time Equivalent), 7% of total jobs in Lebanon, were lost due to heat stress that same year, with the highest impacts on workers from the agriculture and construction sectors. By 2100, climate change impacts are projected to cause up to 25% loss of productivity for low-intensity work and up to 40% loss of productivity for high-intensity work (MoE/UNDP, 2025).

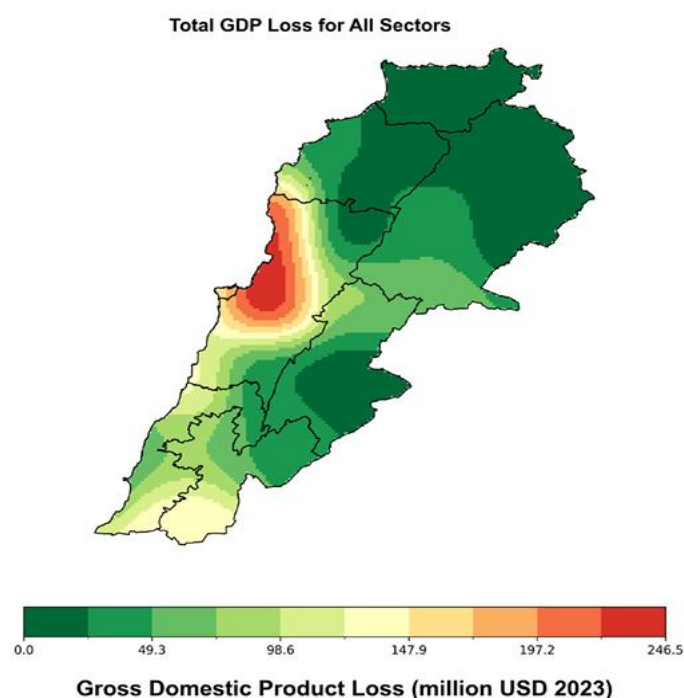


Figure 16. GDP lost (proxied from work hours lost due to heat stress) across Lebanon during 2023 for all sectors (MoE/UNDP, 2025).

WHO details examples of the expected health impacts of climate change and risk to health care facilities as presented in tables 6-8. Impacts result from: (a) direct effects, (b) effects mediated through natural systems, and (c) effects mediated by human systems. The increased frequency and intensity of many natural hazards will challenge the infrastructure, support systems, and supply chains that the health care facilities and their communities depend upon. For example, rise in sea level, rain and winds from hurricanes, cyclones, typhoons, and tropical storms, with increased intensity, would cause widespread and prolonged flooding. This would further disrupt vulnerable infrastructures and transportation systems, as well as the delivery of materials and food.

Physically and operationally, health care facilities cannot cope with climate-related risks, such as droughts, extreme temperatures, fires, and changed patterns of climate-sensitive diseases. In some countries similar to Lebanon, for example, water scarcity and accordingly, the decrease in water supply would increasingly affect health care facilities WASH services essential for infection prevention and control services. All climate change-associated risks can affect the functioning of health care facilities directly and would result in increased demand for their services. Flooding additionally, can damage hospital mechanical equipment while polluting available water sources. Strong and prolonged high winds can damage rooftop equipment and cause structural damage to buildings, electric transmission lines, and other public infrastructure. Moreover, the health workers, as first responders to emergencies, protecting the health of their communities before, during and after disasters, are also vulnerable to the impacts of extreme weather events (Jurdi, 2022; WHO, 2018; WHO, 2020; WHO, 2021).

Table 6. Sample of direct expected health impacts of climate change and risks to health care facilities (Jurdi, 2022: Adapted from WHO, 2020)

Climate change effects	Health risks	Health related impacts (IPCC rating)	Consequences for health care facilities (impacted areas)
Increased number of warm days and nights; increased frequency and intensity of heat waves; increased fire risk in low rainfall conditions	Excess heat-related mortality; increased incidence of heat exhaustion and heat stroke; exacerbated circulatory, cardiovascular, respiratory and kidney diseases; increased premature mortality related to ozone and air pollution produced by fires, particularly during heat waves	Greater likelihood of injury, disease and death due to more intense heat waves and fires (very high)	Infrastructure damage; increase in energy and water usage; threats to patients from heat and air pollution; sudden increase in community cases of heat stroke, asthma and other respiratory diseases overwhelming the facility's capacity; mental health impacts on facility staff (health workforce, energy, infrastructure, technologies and products)

Table 7. Sample of mediated (through national systems) expected health impacts of climate change and risks to health care facilities (Jurdi, 2022: Adapted from WHO, 2020)

Climate change effects	Health risks	Health related impacts (IPCC rating)	Consequences for health care facilities (impacted areas)
Higher temperatures and humidity; changing and increasingly variable precipitation; higher sea surface and freshwater temperatures	Accelerated microbial growth, survival, persistence, transmission; shifting geographic and seasonal distribution of diseases (such as cholera, schistosomiasis); ecological changes, droughts and warmer temperatures leading to cyanobacterial blooms, pathogen multiplication; extreme events leading to disruption of water supply system and contamination; insufficient or intermittent water access for health care practices; insufficient quality and quantity of water leading to poor hygiene; flood damage to water and sanitation infrastructures; contamination	Increased risks of food and waterborne diseases (very high)	Unexpected outbreaks of food- and water-borne diseases; heat stroke; lack of water or contaminated water in facilities; disrupted supply chain for essential supplies and medicines; issue of boil water advisories; disruption of food supplies; damage to medical equipment (water, sanitation and health care waste; infrastructure, technologies and products)

	of water sources through overflow		
Higher temperatures and humidity; changing and increasingly variable precipitation	Accelerated parasite replication and increased biting rates; prolonged transmission seasons; re-emergence of formerly prevalent diseases; changing distribution and abundance of disease vectors; reduced effectiveness of vector control interventions	Increased risks of vector borne diseases (medium)	Unexpected outbreaks of vector-borne diseases overwhelming response capacity; need for increased surveillance of climate sensitive diseases (health workforce, water, sanitation and health care waste)

Table 8. Sample of mediated (by human systems) expected health impacts of climate change and risks to health care facilities (Jurdi, 2022: Adapted from WHO, 2020)

Climate change effects	Health risks	Health related impacts (IPCC rating)	Consequences for health care facilities (impacted areas)
Higher temperatures and changes in precipitation Lower food production in the tropics	Lower access to food due to reduced supply and higher prices; combined effects of undernutrition and infectious diseases; chronic effects of stunting and wasting in children	Increased likelihood of undernutrition resulting from diminished food production in poor regions (high)	Increased number of patients (particularly children) with diseases related to, or made worse by, undernutrition (health workforce)
Higher temperatures and humidity	Outdoor and unprotected health workers obliged to work either in physiologically unsafe conditions or to lose income and livelihood opportunities	Consequences on workers' health include risks from lost work capacity and reduced productivity (high)	Risk to health care workers and patients from higher temperatures; mental health impacts on facility staff; power outages (health workforce; infrastructure, technologies and products)

C. Missing data and quality of existing data

The limited availability of recent and high-quality data constrained the preparation of this report. Hence, during the first steering committee meeting, we requested the data that is not publicly available to improve the climate rationale. A list of the incomplete data is presented in Table 10, highlighting the absence of some essential information. Moving forward, we aim to work on developing an evidence-based database to direct interventions and ensure sustainability, as detailed in Table 10.

Table 9. List of incomplete data, their availability, and ways to collect and integrate it.

Data	Availability	Existing data	If the data is not comprehensive, how could it be collected and integrated
Climate risk assessment of the health sector	Partial	Preliminary assessment of the vulnerability of health care facilities based on accreditation standards	Additional comprehensive data to be built based on all four climate change vulnerability areas in health facilities in Lebanon
Geographic vulnerability hotspots	Partial	Data available on geographic areas vulnerable to some climatic hazards	Complete profiling to be developed
Socio-economic relevance of health impacts of climate change	Outdated	Projections on the potential costs of climate change health risks dating to 2015.	Collected database to help update the socio-economic relevance of the health impacts of climate change
Health sector contribution to GHG emissions	Outdated	558 000 tons of CO ₂ in 2012 (UNDP, 2022)	Major component of the work to be conducted (e.g., establishing a primary baseline of data (GHG emission level) relevant to the health care facilities' carbon footprint).
List of donor-based projects addressing the climate–health nexus	Scattered	Available but scattered through different sources	Centralization is critical to ensure complementarity of investments

D. Alignment with national policies and strategies

Available national strategies and policies aligning with the climate-health nexus are presented in Table 11. And, while these initiatives indicate growing recognition of the link between climate change and health, systematic, institutionalized, and adequately funded mechanisms are still needed to ensure that Lebanon's health care facilities are truly climate resilient.

Table 10. Available national policies and strategies and their alignment with the climate-health nexus (DRM & UNDRR, 2018; GCF, 2024; Government of Lebanon, 2025a, 2025b; MoE/UNDP, 2024, 2025; MoE/UNDP/GCF, 2025; MoE/UNDP/GEF, 2022, 2024; MoPH, 2023, 2025b)

National Strategies/ Policies	Priority Aligning with the Climate- Health Nexus	Key actions	Preparedness/ Adaptation/ Mitigation	Remarks
<i>Strategies Directly Addressing the Climate–Health Nexus</i>				
Lebanon's Nationally Determined Contributions: NDCs 3.0 <i>Target year 2035 (2025)</i>	Adaptation Priority 6: Integrate climate resilience and environmental sustainability into Lebanon's health care system and facilities to strengthen preparedness and public health response to climate change	“1. Support community-based risk reduction initiatives focusing on health risks related to climate and environmental issues, stressors, and disasters 2. Assess population and public health vulnerability to climate change, identifying current and future health effects, as well as impacts related to the additional burden of climate change on health. 3. Determine the baseline of climate change resilience through assessing the facilities' vulnerabilities to climate change hazards; and develop a set of procedures for health care facilities to continuously implement and evaluate risk management programs and ensure the sustainability of existing health functions and services in relation to climate risk. 4. Enhance the Early Warning and Response System to health risks, including epidemic, climatic, and other risks	Adaptation	While the NDCs focus on adaptation in the health sector, the adoption of the key action will also contribute to climate change mitigation by reducing GHG emissions, promoting renewable energy and reducing pollution levels.

		through the full automation and operationalization of the One Health approach, while adopting a gender-responsive approach. 5. Ensure emergency preparedness and response capacity by developing high-quality, regularly stress-tested, and updated inclusive preparedness and anticipation plans, and structures complemented by community engagement with specific focus on vulnerable groups such as children, women, the elderly, persons with disabilities and internally displaced Lebanese persons. 6. Develop a health information system master plan with a decentralized data center with data disaggregated by sex, location and displacement for Lebanese citizens. 7. Enhance climate-resilient health infrastructure through targeted investments, including improvements in gender-inclusive WASH systems and renewable energy sources. 8. Develop and implement a MoPH gender-responsive climate and health adaptation plan in complementarity with the National Health and Environment Strategy Framework of Action 2021 - 2026. 9. Adopt and implement an integrated disease surveillance strategy, including indicator-based and event-based surveillance components, and incorporating new climate-related health outcomes through enhancing the Epidemiological Surveillance Unit (ESU). 10. Build gender-sensitive awareness and capacity for climate and health resilience through strengthening overall emergency management capacities within the Ministry, organizing training programs and workshops for MoPH and PHC staff and public awareness campaigns.		
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		11. Operationalize the climate change and health task force to coordinate climate action related to public health and health care systems, while ensuring effective coordination with key ministries and women's machinery."		
	Adaptation priority 7: Reduce disaster risk and minimize damage by mitigating and adapting to climate-related hazards and extreme weather	"1. Conduct multi-hazard risk assessments and analysis at regional and local scales, update/revisit flood, fire, and drought risk maps and identify priority areas/hot zones to be considered in strategic land-use planning and risk reduction actions. 2. Develop human-centered multi-hazard gender-sensitive early warning and early actions policies at all levels based on the conducted multi-hazards assessments, taking into consideration Gender-Based Violence prevention in emergency planning. 3. Build capacities to develop and implement response framework and response plans at all levels, including capacity building on standard operational procedures for various risk-vulnerable groups, including rural women. 4. Develop gender-responsive preparedness plans and recovery policies based on the principles of building back better at all levels (sectoral, national, regional, community). 5. Develop a gender-sensitive mechanism to assess, attribute, and categorize climate-related loss and damage in Lebanon that would feed into Lebanon's reporting under the Sendai Framework, and identify a risk insurance mechanism for loss and damage related to climate disasters.	Adaptation and Mitigation	Although not directly linked to health systems, it indirectly reinforces their resilience by reducing the impacts of climate-related hazards on the population and, consequently, on health systems.

		6. Strengthen disaster-resilient public and private investments by enhancing risk prevention in critical facilities, encouraging private-sector financing for disaster management, providing voluntary guidelines for homeowners, including women-led households, establishing mandatory standards for critical infrastructure, and promoting resilience through proper design, construction, retrofitting, and maintenance while considering economic, social, structural, technological, and environmental impacts.”		
National Adaptation Plan: NAP (2025-2035)	Public Health Adaptation Priority	Strategic Objective: “Enhance the health sector’s capacity to anticipate, prepare for, and respond to climate-related risks.” Strategic Outcome: “Public health systems are strengthened to manage climate-sensitive health risks and protect vulnerable populations” Prioritized interventions: “1. Support community-based risk reduction initiatives focusing on health risks related to disasters, water, waste, food, and air pollution. 2. Enhance the Early Warning and Response System to health risks, including epidemic, climatic, and other risks through the full automation and operationalization of the One Health approach. 3. Build the capacity of health sector professionals to identify and manage health impacts across sectors. 4. Enhance the climate resilience of healthcare facilities through targeted interventions, including risk management, energy management, and infrastructure adaptation.	Adaptation and Mitigation	These priority interventions primarily support climate change adaptation by strengthening health system preparedness, surveillance, and resilience to climate-related risks, while also contributing to mitigation through improved energy management in healthcare facilities, integrated planning, and reduced pollution-related health burdens.

		5. Promote coordination and communication among stakeholders to enhance awareness, policy coherence, and climate-adaptive health governance. 6. Assess population and public health vulnerability to climate change, identifying current and future health effects, as well as impacts related to the additional burden of climate change on health. 7. Upgrade epidemiological surveillance to incorporate new climate-related health outcomes and integrate climate data into the national health information system’.		
	Disaster Risk Reduction Adaptation Priority	Strategic Objective: “Strengthen disaster preparedness and risk reduction measures to address climate-related hazards.” Strategic Outcome: “Multi-hazard risk management and early warning systems are enhanced to reduce the impacts of climate-related disasters, strengthen preparedness, and mitigate future loss and damage caused by climate change.” “1. Develop a mechanism to assess, attribute, and categorize loss and damage in Lebanon. 2. Strengthen disaster-resilient public and private investments and promote resilience by enhancing risk prevention in critical facilities, encouraging private-sector financing for disaster management, providing voluntary guidelines for homeowners, and establishing mandatory standards for critical infrastructure while considering economic, social, structural, technological, and environmental impacts. 3. Update/revisit flood, fire, and drought risk maps, and consider all risk maps in strategic land-use planning. 4. Revise Lebanon’s response framework and establish	Adaptation and Mitigation	While these priority actions primarily target disaster risk reduction and multi-hazard preparedness, they indirectly strengthen the health sector by reducing population exposure to climate-related hazards, minimizing disaster-related health impacts, and alleviating pressure on health services through improved early warning, land-use planning, and resilient infrastructure.

		climate-hazards related response plans at all levels (sectoral, national, local, community). 5. Upgrade and develop an early warning platform for multi-hazards”.		
Long Term - Low Emission Development Strategy: LT-LEDS (2025)	Public Health Target: “Short-Term Actions (1-5 Years): Upgrade health care facilities to be climate resilient. Conduct nationwide health awareness campaigns on climate-related diseases. Develop robust health surveillance systems” “Long-Term Actions (5-15 Years): Ensure all public health infrastructure is resilient by 2040. Provide universal access to climate-resilient health care services by 2045. Implement preventive health care programs by 2040.” Additionally, health systems adaptation is also indirectly covered by two pillars: Pillar 2, objective 6: “Extend financial protection against climate-related disasters to 100% of the population living in poverty by 2035, including early warning systems”. Pillar 3, objective 8: “Deploy nature-based solutions to enhance resilience to fire, flood, and coastal erosion in 90-100% of risk areas by 2045”. Pillar 3, objective 9: Building resilience to heat-related diseases		Adaptation and Mitigation	Early warning systems, resilience to climatic hazards, and protecting workers from extreme occupational heat will, in turn, lessen the burden of diseases associated with climate change on health systems.

National Health Strategy: Vision 2030 (NHS 2023)	Strategic Direction (SD) 1: “Strengthened health sector governance and capacitated Ministry of Public Health to regulate and ensure essential public health functions”. Strategic Goal SG. 1.4: Ensure health security and other essential public health functions. - “Strengthening preparedness and public health response to disease outbreaks, natural disasters, and other emergencies” - “Performing surveillance and monitoring of health determinants, risks, morbidity, and mortality”. - “Reducing vulnerability to health threats at individual and collective levels” SD. 4: Health promotion and disease prevention. This strategic direction includes goals and objectives on addressing environmental issues, fighting communicable and non-communicable diseases, adopting the One Health approach, enhancing community engagement and awareness, and considering the needs of vulnerable populations. SD.5: Enhanced resilience and adaptability of the health system by strengthening its building blocks.	Preparedness à Adaptation/Mitigation	While the NHS does not explicitly mention climate change or climatic hazards, several of its strategic directions and goals address emerging environmental threats, which would include climate-related risks.
National Health Strategy: Vision 2030 Two-Year Review (2025)	The NHS was further updated to integrate climate resilience and environmental sustainability relating to (a) enhancing climate resilient infrastructure, (b) promoting sustainable practices in health care operations, (c) building awareness and capacity for climate resilience, and (d) laying the foundation for long-term sustainability.	Preparedness, Adaptation, and Mitigation	The review focuses on the health sector’s adaptation to climate change. However, mitigation measures are also mentioned mostly in relation to solarization projects, energy efficiency, and waste and emissions reduction.

National Disaster Risk Reduction (DRR) Strategy (2021-2030).	Priority 1: Understanding disaster risk “Axis 1: Developing a policy for the regular assessment of current risks and linking it to the interaction between science and policies, including the identification of physical, economic, social, environmental, and institutional factors that may increase (or reduce) the degree of exposure to risks, vulnerability, and risks, especially in vital facilities”. “Axis 3: Developing a public sector policy for the collection and analysis of disaster losses and linking it to the interaction between science and policies, including the collection of loss data (mortality, affected persons, direct and indirect economic losses, and disruption of basic services)”. Priority 2: Strengthening disaster risk governance “Axis 8: Improving sectoral planning mechanisms in all phases of disaster risk management”. “Axis 9: Revising the sectoral powers on disaster risk management so that they are in line with the best practices and lessons learned globally”. Priority 3: Investing in disaster risk reduction Priority 4: Enhancing disaster preparedness for effective response and “Building Back Better”	Adaptation and Mitigation	Other axes in this strategy also indirectly address the climate-health nexus by integrating climate adaptation into policies and raising awareness.
Health and Environment Strategy National Framework of Action (2021-2026)	Priority 6: Environmental Health Management in Emergencies 1. “Developing the capacities of the health sector to manage environmental health services throughout the life cycle of emergencies. 2. Providing adequate environmental health services in health care facilities during emergencies”. Priority 7: Climate Change and Health “Developing the Preparedness and Response capacity of the public health sector to manage the health effects of climate change”. This priority includes assessing health-sector vulnerability to climate change; strengthening environmental health services; building workforce capacity to	Adaptation and Mitigation	This strategy focuses on adaptation measures within the health sector to enhance its preparedness and response to climate emergencies. Yet priority 8 also addresses mitigation measures by targeting the efficient use of environmental resources.

	identify cross-sectoral health impacts; upgrading epidemiological surveillance to include climate-sensitive outcomes; and integrating climate data into national health information systems Priority 8: Sustainable Development and Health Greening of the health sector		
<i>Other Relevant Reports</i>			
Health care Waste Baseline (2024)	Baseline analysis recommendations relate to the need for: 1. Updating of the regulatory framework governing health care waste management 2. Increasing infectious waste treatment capacities 3. Establishing a collection, treatment, and disposal system of infectious waste for small generators 4. Properly managing cytotoxic, chemical, and pharmaceutical waste 5. Establishing a health care waste data system 6. Defining financing schemes	Adaptation and Mitigation	This report lists preliminary recommendations based on the assessment of health care waste. These adaptation and mitigation measures are yet to be further developed.
Biennial Transparency Report on Climate Change: BTR (2024)	Overview of the progress in implementing climate adaptation and mitigation measures.	Adaptation	The report highlights the impacts of climate change on several sectors, yet it only briefly addresses the health sector.

Green Climate Fund (GCF) country programme (2024)	“Assessing and Enhancing the Climate Resilience of Lebanon’s Health care System. Develop vulnerability and adaptation plans for health care facilities, promote and implement green resilient health facilities, including waste management and energy efficiency”.	Adaptation and Mitigation	The proposed GCF project has already been discussed with national stakeholders during consultations organized by the MoE to build a pipeline for priority projects for GCF funding for the period 2024-2027. The proposed project is referred to in the table page 34 of the country programme report, and a detailed idea note is presented in Table 16. The project objectives and outcomes reported in that table are aligned with the ones proposed in this project proposal.
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Lebanon's Fourth National Communication to the UNFCCC (2022)	Adaptation guidelines to climate change for health and health care facilities: 1. “Develop and implement a climate and health adaptation plan. 2. Assess the vulnerability of public health sector to climate change, identify the current and future health effects and establish early warning systems. 3. Identify associated potential health impacts, and populations and locations vulnerable to these health impacts. 4. Estimate or quantify the additional burden of health outcomes associated with climate change. 5. Identify the most suitable health interventions for the identified health impacts of greatest concern. 6. Develop health system response strategies, plans and projects and integrate them into national health strategies. 7. Evaluate periodically the impact of the plan and improve quality and effectivity of activities and measures”. Guidelines to building climate resilience: 1. “Direct interventions, at the micro level, that aims to develop set procedures for health care facilities to continuously implement and evaluate risk management programs to stay responsive to the facilities’ needs under climate change related emergency events. 2. Indirect, at the macro level, that aims to support health care facilities through strengthening health sector’s preparedness and response to emergencies”.	Adaptation	The mentioned guidelines aim at enhancing the preparedness, readiness, and response of the health sector to climate change.
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E. Available climate-health projects

Several donor-funded and multilateral projects have been implemented to enhance the adaptive capacity of health care infrastructure in Lebanon. A list of the available donor-based projects is detailed in table 12. And, although these interventions have improved resilience at specific facilities, they are typically pilot-scale, donor-driven, and lack institutional continuity. National-level scaling, maintenance financing, and integration into long-term policy frameworks remain major challenges.

Table 11. Donor-based projects in the climate-health nexus (AFD, 2020, 2024; Base, 2024; CEDRO UNDP, 2021; IOM, WHO, & UNDRR, 2025; MoPH, 2022; MoPH, 2024; MoPH & UNICEF, 2024; The Pandemic Fund, 2024; UNDP, 2021, 2024; UNOPS, 2023; WHO EMRO, 2024)

Project Name	Donors	Brief Description	Climate adaptation or mitigation	Link with project component	Budget	Goals	Period of implementation
CEDRO: Solarization of Primary Health Care Centers (PHCCs) in Lebanon.	The government of Germany (through KfW Development Bank) The United States Government	The solarization of 150 PHCCs is a joint initiative by the Ministry of Public Health (MoPH) and UNICEF. Completely solarized 150 PHCCs by May 2023 and 13 others by June 2023, leading to a total of 163 solarized PHCCs.	Adaptation and Mitigation	Component 2	40.5-million-euro grant	Ensuring the sustainability of immunization service delivery and other health care services. Helping maintain the cold chain for vaccines without using costly and polluting diesel generators. Benefiting admitted patients.	13 weeks, completed in 2023
CEDRO: Solarization of Saida Emergency Public Hospital (Turkish Hospital)	UNICEF and UNDP	MoPH, in partnership with UNICEF, inaugurated a 250 kWp solar power system comprising 448 high-efficiency solar panels at Saida Emergency Public Hospital (Turkish Hospital).	Adaptation and Mitigation	Component 2	-	Providing a stable and continuous electricity supply for essential medical services such as MRI, radiology, CT scans, emergency operations, and laboratory functions.	2024

Solar for Health (S4H)	UNDP project, funded by the German Government through KfW Development Bank	Assistance to 15 Lebanese public health care institutions following the COVID-19 pandemic to become more cost-effective, comfortable, and environmentally responsible, especially with respect to energy-use.	Adaptation and Mitigation	Component 2	\$4,000,000	Supply and Installation of Lighting Retrofit Solutions for 12 governmental hospitals, Solar Water Heating Systems for 10 governmental hospitals, PV Systems for 4 governmental hospitals, PV Systems for 5 governmental hospitals, PV Systems for RHUH, PV Systems for 5 governmental hospitals, Computerized Maintenance Management Systems for 10 governmental hospitals, HVAC-VFD Systems for 9 governmental hospitals, and Building Management Systems for 8 governmental hospitals	2021-2022
One Health-Pandemic Fund	Pandemic Fund	The grant aims to upgrade the preparedness and response capabilities of the country through a One Health approach.	Adaptation and Mitigation	Components 2 and 3	11.44 million USD Mobilizing additional US\$17.8 million in co-financing and US\$5.3 million in co-investment.	Strengthening the country's surveillance and early warning systems and resilience. Developing an accredited, resource-mapped laboratory network at the national and sub-national levels. Improving workforce capacity for pandemic prevention and response.	3 years, launched in 2025

Harnessing synergies between Climate Change Adaptation and Risk Reduction in Migrant-Inclusive Health System Responses.	UN Migration Multi-Partner Trust Fund (MMPTF)	Implementing partners are MoPH, the National Disaster Risk Reduction Committee, Ministry of Interior and Municipalities, and the MoE. The project supports integrating migrants and refugees into national climate adaptation and emergency health planning, improving disease surveillance, and training health workers to respond to heat stress, vector-borne disease changes, and climate-driven health emergencies.	Adaptation	Components 1 to 3	Up to date: 2,240,000.00 USD (70% of total grant) Grant: 3,200,000.00 USD	Directly benefits migrants, refugees, and displaced populations, as well as ministries of health and public health staff. This project included a pilot study on the “Assessment of the vulnerability of Healthcare facilities to climate change” in the Akkar Governorate.	Start: 11 January 2024 End: 3 January 2026
WASH Assessment in Health Facilities	WHO support (implemented by MoPH)	Assessments of climate and environmental conditions using the global WASH FIT tool in all public hospitals, PHC centers, and selected dispensaries (463 facilities).	Adaptation	Component 2	-	Water filters will be procured and standardized maintenance and monitoring SOPs will be developed according to assessment results Establishment of a national WASH platform at the PHEOC, serving as an alert system for	2024-2025

						waterborne disease outbreaks.	
Lebanon Health Resilience Project (LHRP) in Collaboration with the World Bank	World Bank (IBRD: USD 95.8 million & GCFF concessional financing: USD 24.2 million), with additional financing from the Islamic Development Bank	The project focuses on the response to the COVID-19 pandemic and access to quality health care for poor Lebanese and displaced Syrians.	Adaptation	Component 2	Main project budget: USD 120 million Additional parallel financing: USD 30 million	Strengthening emergency response systems Upgrading the capacity of the PHCCs and the skills of health workers to effectively manage the increased demand for health care while delivering quality care during and after the crisis.	Became effective: November 14, 2018 Closing date: June 30, 2023
Lebanon Green Investment Facility (LGIF)	UNDP (Climate Promise 2.0, funded by the Government of Germany)	LGIF is a platform that mobilizes finance for private-sector green projects in Lebanon and provides technical support to prepare these projects in line with international climate finance standards, including potential eligibility for Green Climate Fund (GCF) financing.	Adaptation and Mitigation	Components 1 and 2	-	Mobilize climate finance for low-carbon and climate-resilient projects, support Lebanon's NDC targets, enhance project readiness for international funding including GCF, and deliver social and environmental co-benefits.	2023-2025

UNOPS/Japan: Solar power installations in selected public hospitals	Government of Japan (implemented by UNOPS in partnership with MoPH)	The initiative involved the installation of solar energy systems in public hospitals, including Rafik Hariri University Hospital in Beirut, and the provision of critical medical equipment to 16 government hospitals.	Adaptation and Mitigation	Component 2	\$1.3 million project	Enhancing health care service delivery, reducing operational costs, and supporting over 570,000 vulnerable people, including Lebanese citizens and Syrian refugees.	Completed in 2022
Reinforcing the provision of care at Tripoli Governmental Hospital (TGH)	Co-funded by AFD and the King Salman Humanitarian Aid & Relief Center	The project is implemented by the International Committee of the Red Cross (ICRC) and aims to strengthen the health care services provided by Tripoli Governmental Hospital (TGH) and ensure vulnerable populations in North Lebanon have improved access to these services.	Adaptation and Mitigation	Component 2	AFD financing amount: € 21 100 000	The project aim to enhance the quality of and equitable access to healthcare through financing the upgrading of the hospital's infrastructure, including interventions in the emergency department and the neonatal and pediatric intensive care units, the provision of equipment, consumables and medicines, and staff capacity building.	4 years starting July 5 2022
Capacity-building project for the Rafik Hariri public hospital	AFD	Additional support of 5 million in 2020 to the 20 million project initiated in 2019 through an agreement with ICRC	Adaptation and Mitigation	Component 2	25 million Euros	Maintain the hospital's capacity to manage COVID-19, improve the patient journey in non-COVID emergencies through renovation works, cover medical equipment for neonatal and pediatric intensive care units, improve wound management through the	2019-2020

						provision of medical equipment and staff capacity-building, and improve the hospital's resilience to power shortages (replacing old electricity generators).	
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Beyond the health sector, several other climate-related projects exist targeting water/food security and waste management. These projects indirectly support the health of the population by improving environmental conditions and increasing community resilience.

F. Proposed project focus with adaptation and mitigation interventions and activities

The project focus presented in the inception report is detailed in the following table, which classifies activities by adaptation and mitigation. Some of these activities constitute preparatory work towards both adaptation and mitigation. Others are adaptation and mitigation activities that relate to coordination, preparedness, and response efforts to reduce vulnerability.

These activities have been framed based on (1) stakeholders engagement through person-to-person engagement (e.g., meetings), follow-up and discussion (e.g., meetings and emails), feedback and integration of input (e.g., written feedback through structured templates mapping existing and relevant activities, support needs, involved stakeholders, and suggested interventions), and workshop participation (e.g., participation in the kickoff workshop organized by AFD and hosted by the AUB on July 3, 2025) and (2) knowledge gaps identified in this report, and (3) alignment with national strategies and policies (in the section below).

The proposed adaptation and mitigation measures would be assessed following a multi-criteria analysis in the feasibility stage. These criteria, including efficiency, feasibility, flexibility, mainstreaming potential, track record, co-benefits, and cost effectiveness, would help prioritize measures. The feasibility study would also confirm the prioritization through a more in-depth assessment, including site visits. Table 13 also links each of the project's components to the available related strategies.

Table 12. Presentation of the project focus with a classification of activities by their adaptation and mitigation nature, and related available strategies

	Adaptation and/ or Mitigation	Related Available Strategy	Strategic directions/ orientations based on the knowledge gaps and climate risk assessment identified in the indicated sections of this prefeasibility report	Beneficiary and owner of the deliverables	Time period
Component 1 - Contribute to moving towards a climate-resilient health system in Lebanon through the production of evidence-based research to guide national policies, strategies and programs informed by climate change health stressors					
1.1. Design a Health National Mitigation Plan (HNMP)				MoPH: MoPH Primary Health Care Department, and MoPH Hospitals and Dispensaries Department; MoE; CNRS; DRM; and communities served by PHCs and hospitals throughout the	
➤ Establishment of a GHG emissions baseline for the health sector based on a representative sample of public and private health facilities and supply-chain entities.	Mitigation		III-C. Missing data and quality of existing data		Project implementation
➤ Identify priority mitigation opportunities by emission scope.	Mitigation				
➤ Define investment needs related to identified mitigation opportunities.	Mitigation				
➤ Generate operational recommendations to reduce GHG emissions.	Mitigation				

➤ Create financial leverage, particularly to support private-sector engagement.	Mitigation			Lebanese governorates.	
1.2. Design a Health National Adaptation Plan (HNAP) aligned with the UNFCCC/Paris Agreement Framework					
➤ Forming the team of expertise from the various institutions with relevant expertise, that will oversee producing the HNAP, that will undergo validation to ensure proper monitoring and implementation of the plan. Additionally, guidance from relevant HNAPs from similar countries that Lebanon could be compared to will be explored. These countries could be part of the list of six relevant countries chosen by the MoE elaborate the NAP (Albania, Armenia, Bosnia and Herzegovina, Bulgaria, Moldova, and Turkey).	Adaptation and Mitigation	NDC 3.0 DRR Strategy Health and Environment Strategy Fourth National Communication			Feasibility phase
➤ Proposing a feasible calendar, a drafted version of Terms of References (ToRs) and the financial and technical partners that could, along with AFD and GCF, support the Government of Lebanon to produce a HNAP in coherence with the country NAP. Within the ToRs, a specific chapter will	Adaptation and Mitigation	NDC 3.0 DRR Strategy	III-Climate Context: III- D. Alignment with national policies and strategies, III- E. Available climate-health projects		Feasibility phase

present the data available to diagnose the health systems vulnerabilities and explore opportunities for action in Lebanon.					
➤ Conducting a comprehensive summary on the main vulnerabilities and climate risks the health system is exposed to in Lebanon. This could include:	Adaptation and Mitigation	NDC 3.0 DRR Strategy Fourth National Communication	III-Climate Context: III- A. Review of existing knowledge and data, III- B. Analysis of the overall climate risk of the health sector, III- C. Missing data and quality of existing data		Feasibility phase into project implementation
• Mapping the health resources available to cope with the additional burden of climate change on health.	Adaptation and Mitigation				Feasibility phase into project implementation
o Reviewing the existing climatic projections to evaluate the potential impacts of climate change on the exacerbation of current hazard exposure and vulnerabilities.	<i>Mitigation</i>				<i>Feasibility phase</i>
o Mapping resources and supply chains resilience, such as pharma warehouses, oxygen plants, fuel depots and hospital backup power, to assess resilience to outages.	<i>Adaptation</i>				<i>Feasibility phase and early phase of project implementation</i>
o Identifying overlaps and gaps in mandates between MoPH, LRC, Civil Defense, CNRS-L, and municipalities.	<i>Adaptation</i>				<i>Feasibility phase and early phase of project implementation</i>

o Evaluating the existing surveillance systems (MoPH DHIS2, LRC dispatch, CNRS-L Lebalerts).	<i>Adaptation</i>				<i>Feasibility phase and early phase of project implementation</i>
o Evaluating the interoperability of Emergency Operations Centers (EOCs) across ministries and agencies.	<i>Adaptation</i>				<i>Feasibility phase and early phase of project implementation</i>
o Evaluating the existing efforts related to the simulation exercises and drills at governorate and municipal levels, and testing health response to multi-hazard scenarios.	<i>Adaptation</i>				<i>Feasibility phase and Project implementation</i>
o Reviewing the comprehensive health facilities geo-database that was validated against the MoPH directory, by a consortium involving the National Council for Scientific Research - Lebanon (CNRS-L), the Disaster Risk Management Unit (DRMU), and the Lebanese Red Cross (LRC).	<i>Adaptation</i>				<i>Early phase of project implementation</i>
o Reviewing the geospatial accessibility assessments of health facilities, incorporating road infrastructure, travel-time modeling, and accessibility under crisis or hazard conditions to be able to link the geo-	<i>Adaptation</i>				<i>Early phase of project implementation</i>

database and accessibility analysis results into dashboards.					
o Assessing the efforts to integrate multi-hazard layers including heatwaves, cold waves, air quality, and flood risks into the geospatial framework to support risk-informed planning.	<i>Mitigation</i>				<i>Early phase of project implementation</i>
o Evaluating Disaster Risk Management (DRM) of the health sector to predict, detect, prepare, and respond to climate risks and disaster.	<i>Adaptation</i>				<i>Early phase of project implementation</i>
o Assessing the exposure of hospitals and PHCs to floods, landslides, wildfires, heatwaves, and other extreme weather events.	<i>Adaptation</i>				<i>Early phase of project implementation</i>
o Assessing the emergency preparedness levels of hospitals and PHCs (backup power, water supply, fuel reserves, evacuation routes).	<i>Adaptation</i>				<i>Early phase of project implementation</i>
o Reviewing the surge capacity (beds, ICU units, oxygen availability) during climate-related disasters.	<i>Adaptation</i>				<i>Early phase of project implementation</i>
o Harmonizing and standardizing data schemas to make sure that different datasets (MoPH facility lists, CNRS-L geospatial layers,	<i>Adaptation</i>				<i>Project implementation</i>

LRC emergency coverage) use the same formats, fields, coding standards, and spatial references.					
o Reviewing DRM frameworks, laws, and strategies (e.g., National DRM Strategy, MoPH emergency plans, LRC response protocols).	<i>Adaptation and Mitigation</i>				<i>Project implementation</i>
o Assessing the integration of climate risks (heatwaves, floods, storms, wildfires, epidemics) in the health-sector DRM.	<i>Adaptation</i>				<i>Project implementation</i>
o Evaluating efforts relating to the integration of population vulnerability (refugee settlements, elderly, poor households, pregnant women, etc.) using CAS, UNHCR, and MoPH data.	<i>Adaptation</i>				<i>Project implementation</i>
▪ Systems integration expertise to connect the CNRS-L dashboard and applications (LebAlerts) with existing operational platforms (LRC's dispatch, MoE's monitoring networks).					<i>Project implementation</i>
o Assessing the integration of climate hazard alerts (heatwaves, floods, storms) into health early warning protocols.	<i>Adaptation</i>				<i>Project implementation</i>
o Establishing/revising community DRM plans (through	<i>Adaptation and Mitigation</i>				<i>Project implementation</i>

CERTs and local DRR committees).					
o Evaluating the Model DRR to connect communities with Caza and governorate DRM plans.	<i>Adaptation</i>				<i>Project implementation</i>
o Developing a DRM scorecard for the health sector, with performance indicators (predict, detect, prepare, respond) based on hospital specialty and capacity (technical guidance from WHO on international DRM and health performance indicators.).	<i>Adaptation</i>				<i>Project implementation</i>
• Developing GIS-based vulnerability assessment models highlighting high-risk areas/populations in Lebanon.	Adaptation and Mitigation				Feasibility phase into project implementation
o Reviewing existing national datasets (hazards, exposure, adaptive capacity), and defining indicators for the vulnerability dimensions (population density, proximity to hazards, age, health conditions, infrastructure resilience, access to health care...)	<i>Adaptation and Mitigation</i>				<i>Feasibility phase and early phase of project implementation</i>
o Reviewing the modelling scenarios with climate projections (RCP4.5, RCP8.5) to show future high-risk zones	<i>Adaptation</i>				<i>Feasibility phase and early phase of project implementation</i>

o Evaluating the produced ranking of cazas/municipalities by vulnerability to guide prioritization, including communities with overlapping risks (e.g., refugee camps in flood-prone Bekaa, elderly populations in heatwave-exposed Beirut).	<i>Adaptation</i>				<i>Early phase of project implementation</i>
o Evaluating interactive real-time dashboards and GIS portals at CNRS-L/MoPH that display alerts, hazards, and response actions for decision-making (MoPH, CNRS-L, municipalities).	<i>Adaptation</i>				<i>Project implementation</i>
o Building on the efforts to represent vulnerability and risk data to develop a roadmap to community resilience (R2CR) through digitalized tools.	<i>Adaptation</i>				<i>Project implementation</i>
o Building on the efforts to map and monitor trends of climate-sensitive diseases (e.g., water-borne illnesses) in high-risk areas.	<i>Adaptation</i>				<i>Project implementation</i>
o Building on the existing data collection tools, predictive analytics, and predictive modeling support to forecast hotspots before hazard season (anticipatory action).	<i>Adaptation and Mitigation</i>				<i>Project implementation</i>

o Sustaining the Multi-Hazard Platform: a GIS tool that visualizes all eVCA data collected by DRR, including health facilities and their capacities; health facility, medico social sector activities, and mobile vaccination units.	<i>Adaptation</i>				<i>Project implementation</i>
o Creating a tag system to be added to Multi Hazard Platform detailing the capacities and specialties of health facilities (specialty in burning, ICU availability, etc...).	<i>Adaptation</i>				<i>Project implementation</i>
o Standardizing the methodology linking climate hazards with public health risks through technical support from MoPH and involved UN agencies to ensure health–climate linkages are properly represented.	<i>Adaptation</i>				<i>Project implementation</i>
o Providing training to municipal planners to be able to use vulnerability maps for decision-making.	<i>Adaptation</i>				<i>Project implementation</i>
o Building on the efforts to conduct R2CR via enhanced vulnerability and capacity assessment (eVCA) in target communities.	<i>Adaptation</i>				<i>Project implementation</i>

➤ Determining all criteria related to all social, economic, demographic, etc. that will support the Government of Lebanon in all the governorates (MUHAFAZAT) where the projected AFD and GCF investments could finance a climate and health project.	Adaptation and Mitigation	NDC 3.0 DRR Strategy			Feasibility phase into early phase of project implementation
➤ Mapping financial & technical & logistical resources available and partners that could be interested in joining these efforts in all the governorates (MUHAFAZAT).	Adaptation	NDC 3.0 DRR Strategy	III-Climate Context: III- E. Available climate-health projects		Feasibility phase and early phase of project implementation
• Mapping governmental resources, specifically municipalities and union of municipalities as well as major NGOs associated with political leadership and inter-agency organizations active in these areas.	<i>Adaptation</i>				Feasibility phase and early phase of project implementation
• Mapping economic support resources such as banking systems, industrial sectors, agricultural cooperatives, international climate financing for health system resilience projects (e.g. the Global Environment Facility, Adaptation Fund), etc.	<i>Adaptation</i>				Feasibility phase and early phase of project implementation

➤ Conduct climate vulnerability assessment and adaptation plans in collaboration with communities and local actors to ensure proper data collection.	Adaptation and Mitigation	NDC 3.0 NAP NHS DRR Strategy Health and Environment Strategy Fourth National Communication	III-Climate Context: III- A. Review of existing knowledge and data, III- B. Analysis of the overall climate risk of the health sector		Project implementation
➤ Proposing a mechanism for evaluating the impact of climate adaptation to improve the quality and effectiveness of activities and measures based on findings, to strengthen governance and direct policy frameworks. This is to ensure health adaptation measures are integrated into broader national and sectoral policies.	Adaptation	NDC 3.0 DRR Strategy Fourth National Communication			Project implementation
➤ Leveraging Governorate-Level Climate and Health Task Forces through the establishment of multi-sectoral committees in each governorate to oversee V&A planning and implementation.	Adaptation	NDC 3.0 NHS Two-Year Review	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change		Project implementation

Component 2 - Investing in facilities' infrastructures, procedures and workforce to enhance environmental sustainability, preparedness and response.				
2.1. Implement targeted and prioritized infrastructure/technological interventions in energy, water, sanitation and waste of healthcare facilities across all governorates.				
➤ Reviewing existing laws and regulations currently addressing the management of health care waste to identify gaps and recommend corrective measures.	Adaptation and Mitigation	Health care Waste Baseline (2024)	III-Climate Context: III- D. Alignment with national policies and strategies	MoPH: MoPH Primary HAhealth Care Department, and MoPH Hospitals and Dispensaries Department; MoE; and communities served by PHCs and hospitals throughout the Lebanese governorates.
➤ Examining/developing policies that support health care facilities' green procurement.	Adaptation and Mitigation	NHS Two-Year Review Health and Environment Strategy	III-Climate Context: III- D. Alignment with national policies and strategies	Feasibility phase and early phase of project implementation
➤ Elaborating ToRs on technical feasibility and environmental and social studies for these investments including clean and renewable energy, energy efficiencies measures, waste management including pharmaceutical and cytotoxic components, expired drugs, and	Adaptation and Mitigation	Health care Waste Baseline (2024)		Feasibility phase and early phase of project implementation

water and sanitation management. Special attention should be focused on the opportunity and feasibility of investing in clean drug incinerators that would be socially acceptable and that could be financially sustainable. In that sense, integrating community supervision of the study will be a key issue.					
➤ Developing a sustainable process for health care facilities to continuously implement and evaluate risk management programs to stay responsive to the needs of climate change-related emergency events.	Mitigation	NDC 3.0 DRR Strategy Fourth National Communication			Project implementation
• Establishing regular reporting on emissions to identify means for reduction.	<i>Mitigation</i>				Project implementation
➤ Determining the carbon footprint of health structures with priorities and funding and action plan, for health care operations, to promote health care facilities' resilience to climate risks at all levels from primary health care to secondary and tertiary care, including emergency management protocols.	Adaptation and Mitigation		III-Climate Context: III-C. Missing data and quality of existing data		Project implementation

➤ Developing governorate-level surveillance systems to monitor water quality, track vector patterns, and address related illnesses, and update SOPs and build capacities for sampling and testing.	Adaptation	NDC 3.0 LT-LEDS NHS	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change		Project implementation
2.2. Adapt internal processes and care protocols to increase climate and environmental resilience					
➤ Evaluating the safety of the health workforce's working conditions and identifying social and economic stressors that affect their health, mental health, and performance.	Mitigation		III-Climate Context: III-C. Missing data and quality of existing data		Project implementation
➤ Evaluating the sufficient capacities and skills of the health care workforce to address the health risks of climate change.	Adaptation		III-Climate Context: III-C. Missing data and quality of existing data		Project implementation
➤ Assessing training and HR management needs, support in terms of SOPs at health facility level.	Adaptation		III-Climate Context: III-C. Missing data and quality of existing data		Project implementation
➤ Directing training needs to cover climate sensitive illness management, eco-sensitive	Adaptation	NDC 3.0 NAP			Project implementation

organizations in a One Health approach, as promoted by WHO.		NHS Two-Year Review			
• Developing and delivering a national risk-informed training program on climate and health resilience for MoPH and PHC staff.	<i>Adaptation</i>				Project implementation
• Developing a continuous professional certification program on climate-health topics, including modeling of disease outbreaks and environmental exposure forecasting	<i>Adaptation</i>				Project implementation
➤ Recommending the utilization of various tools and models of formal and on-job training, based on existing conditions.	Adaptation				Project implementation
➤ Drawing an action plan by governorate and identify key stakeholders and concrete One Health projects that could be supported, such as WASH and medical care waste management and estimate a preliminary budget to support local One Health initiatives.	Adaptation	NHS	III-Climate Context: III- E. Available climate-health projects		Project implementation

➤ Empowering health care workforce to play a leading role in communicating, coordinating and increasing awareness related to climate resilience and environmental sustainability among health workers, patients, visitors, target communities, and other sectors.	Adaptation	NDC 3.0 LT-LEDS NHS NHS Two-Year Review			Project implementation
2.3. Enhance mitigation and adaptation contributions of health-related supply chains					
➤ Determining the baseline of health care facilities' environmental sustainability and climate resilience to develop procedures, action plans, and standard operating procedures (SOPs) to enhance health workforce interventions, energy interventions, water, sanitation and health care waste interventions, as well as infrastructure, technology and products interventions. This is critical to develop an infrastructure for environmentally sustainable and climate-resilient primary, secondary, and tertiary health care facilities.	Adaptation and Mitigation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data, III- B. Analysis of the overall climate risk of the health sector, III- C. Missing data and quality of existing data, III- E. Available climate-health projects		Project implementation
• Mapping and classifying health facilities according to climate vulnerability tiers (high,	<i>Adaptation and Mitigation</i>				Project implementation

medium, low) to guide climate adaptation investments.					
Aligning with and mainstreaming climate change risk and response in health care centers (PHC) and hospital accreditation standards, to ensure sustainability and the standardization of health care provision at the national level.	<i>Adaptation</i>				Project implementation
Drafting and institutionalizing a standard operating procedure (SOP) for climate-related risk preparedness and response in health care settings, covering structural, WASH, and service continuity components.	<i>Adaptation and Mitigation</i>				Project implementation
Examining the feasibility of the use of clean and renewable energy for health care facilities' infrastructure, as well as the adoption of plans/procedures for solid health care waste, including pharmaceutical and cytotoxic components, and water and sanitation management.	<i>Adaptation and Mitigation</i>				Project implementation
Examining the adoption of small-scale renewable solutions, such as microgrids (in addition to solar photovoltaic panels).					<i>Project implementation</i>

o Examining plans/procedures to establish water-saving devices to reduce resource consumption.					<i>Project implementation</i>
o Examining plans/procedures to upgrade resilient water infrastructure resistant to extreme weather events.					<i>Project implementation</i>
o Examining plans/procedures to implement strict segregation of hazardous and non-hazardous health care wastes, and proper disposal.					<i>Project implementation</i>
o Examining the adoption of low-carbon technologies and retrofit measures (Heating, Ventilation, and Air Conditioning (HVAC), lighting, as well as medical equipment to energy-efficient) throughout the health supply chain, including fleets and low-carbon medicines and equipment.					<i>Project implementation</i>
• Conducting a national WASH-FIT and environmental health audit of health care facilities to evaluate exposure to flooding, heatwaves, energy outages, and drought. Supporting efforts related to working with schools, local authorities, PHCs, etc., to assess and address WaSH-related risks.	<i>Adaptation and Mitigation</i>				Project implementation

Cross-cutting
-
**Construction/
Retrofitting:**
40,000,000

Component 3 - Empowering the inclusion of evidence on health threats related to pollution and climate change preparedness and response.

3.1. Map and identify gaps that challenge health systems' preparedness to handle priority disease groups, such as waterborne diseases, foodborne diseases malnutrition associated with food insecurity, health effects of heat waves and extreme cold conditions, respiratory and other diseases linked to air pollution, and vector-borne diseases.	Adaptation		III-Climate Context: III- A. Review of existing knowledge and data, III- B. Analysis of the overall climate risk of the health sector	DRM; CNRS; MoE, MoPH: Epidemiological Surveillance Unit (ESU), MoPH Primary Health Care Department, MoPH Statistics Department, MoPH Hospitals and Dispensaries Department; and communities served by PHCs and hospitals throughout the Lebanese governorates.	Feasibility phase and early phase of project implementation
3.2. Upgrade early warning systems and epidemiological surveillance to integrate climate-related health data.					
➤ Linking public health (MoPH/DHIS2) and environmental (MoE, CNRS-L) data streams into a single automated platform, which will support in linking health resource data with early warning systems.	Adaptation and Mitigation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with		Project implementation

			climate change, III- D. Alignment with national policies and strategies		
➤ Developing and disseminating One Health SOPs that define who acts, how, and within what timeframe once an alert is issued.	Adaptation and Mitigation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
➤ Linking it with LRC dispatch systems, MoA labs, and MoE monitoring stations for coordinated interventions	Adaptation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with		Project implementation

			climate change, III- D. Alignment with national policies and strategies		
➤ Equipping DRM offices with mobile response kits for climate-related health risks and building the capacities of environmental health offices.	Adaptation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
➤ Re-establishing critical public health functions, including the central public health lab (through a network of national reference labs), antimicrobial surveillance and a national infection prevention and control program.	Adaptation and Mitigation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with		Project implementation

			climate change, III- D. Alignment with national policies and strategies		
➤ Working towards the full automation and operationalization of the One Health approach in collaboration with WHO.	Adaptation and Mitigation	NDC 3.0 NAP NHS	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
➤ Adopting and implementing an integrated disease surveillance strategy, including indicator-based and event-based surveillance components, and incorporating new climate-related health outcomes through enhancing the Epidemiological Surveillance Unit (ESU)	Adaptation	NDC 3.0 LT-LEDS NHS	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their		Early phase of project implementation into project implementation

• Evaluating in collaboration with MoPH on Community Based Surveillance (CBS) systems already in place to monitor the emergence of cases.	<i>Adaptation</i>		interactions with climate change, III- D. Alignment with national policies and strategies		Early phase of project implementation
• Developing AI scenario-based simulations for combined health-climate shocks (e.g., Lichmenia outbreak during heatwave, Hepatitis A breakouts after flood, etc.).	<i>Adaptation</i>				Project implementation
• Updating national surveillance protocols to include climate-sensitive diseases (e.g., dengue, leishmaniasis, respiratory illnesses), using both indicator- and event-based surveillance.	<i>Adaptation</i>				Project implementation
• Enhancing the ESU organigram to enhance coordination between central and peripheral units and assign focal points per governorate.	<i>Adaptation</i>				Project implementation
• Developing capacity building programs to train ESU teams in geospatial mapping, environmental sampling, and event verification, and equipping them with mobile data collection kits.	<i>Adaptation</i>				Project implementation
• Updating and integrating climate-related diseases into the national surveillance list and	<i>Adaptation</i>				Project implementation

protocols, while enhancing information systems to incorporate climate-related data and enable real-time reporting.					
Component 4 – Support community-based risk reduction initiatives focusing on health risks related to climate risks and crises at the governorate level					
4.1. Support community-based risk reduction and emergency response capacity building initiatives at the governorate level.				DRM; CNRS; MoE, MoPH: Epidemiological Surveillance Unit (ESU), MoPH Primary Health Care Department, MoPH Statistics Department, MoPH Hospitals and Dispensaries Department; and communities served by PHCs and hospitals throughout the Lebanese governorates.	
➤ Developing communication lines connecting health facilities to local DRM committees and community response mechanisms.	Adaptation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
➤ Developing national coordination mechanism to standardize climate-health data formats and promote real-time data exchange between MoPH, MoE and meteorological services.	Adaptation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of		Project implementation

• Developing an interactive dashboard/real-time digital reporting tools on climate change related indicators at health care facility and community level (such as particulate matter, temperature, humidity, etc.) and associate it with total mortality and mortality associated with climate-related pathogens, supported by automated data visualization dashboards.	<i>Adaptation</i>		non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
• Developing a dashboard on excess mortality related to climate change.	<i>Adaptation</i>				Project implementation
• Developing an emergency system to report diseases: Establishing a notification system to direct the purchase of vaccines, drugs, and other commodities for diseases, such as animal-related diseases.	<i>Adaptation</i>				Project implementation
➤ Developing an application/dashboard (or integrate into existing MoPH app) of a public-facing online dashboard for rapid risk awareness decision-making, such as an application for mayors and physicians to report diseases related to climate change, including cases of mortality. The	Adaptation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with		Project implementation

app will be ICD10 enabled. This will be outside the framing of public and private hospitals, where it has already been done. This can be done in the form of a communication system occurring in the community to notify the MoPH. It can also be linked to the provision of awareness and capacity building to the physicians who are part of the community, to be able to report correctly on diseases.			climate change, III- D. Alignment with national policies and strategies		
➤ Developing a health information system master plan with a centralized data center.	Adaptation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
• Drafting a digital health information system master plan including modules for climate-health data, emergency alerts, and facility vulnerability indexing.	<i>Adaptation</i>				Project implementation
• Establishing a centralized data center with cloud storage, District Health Information Software 2-based reporting, and integration with national meteorological and hydrological datasets.	<i>Adaptation</i>				Project implementation
• Integrating artificial intelligence (AI) capabilities into the health information system to	<i>Adaptation</i>				Project implementation

enhance data analysis and early warning, while strengthening data processing capacity, interoperability, and the overall efficiency of data management and reporting systems.					
➤ Diagnosing community contribution to the climate resilience and environmental sustainability of health care facilities and identification of legitimate representatives of the community by governorate and according to health facilities that have been identified as potential beneficiaries.	Adaptation and Mitigation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data, III- B. Analysis of the overall climate risk of the health sector, III- D. Alignment with national policies and strategies, III- E. Available climate-health projects		Early phase of project implementation
➤ Conducting a baseline multi-hazard vulnerability and needs assessment of communities, focusing on health-related climate risks and service gaps across water, food, waste, and air quality. The Community-based vulnerability and capacity	Adaptation and Mitigation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data		Early phase of project implementation

assessment mapping by CERTs & DRM committee already includes exposure of health resources to hazards.					
➤ Developing a roadmap to improve and update disaster risk management plans at governorate or caza level with key actors and funding costs per year and the coordination mechanisms between these plans and mass casualties and contingencies plans designed by health facilities	Adaptation and Mitigation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
➤ Building on the community-level contingency planning already addressing hazards like floods, wildfires, and extreme weather events.	Adaptation and Mitigation	NDC 3.0 NAP	III-Climate Context: III- A. Review of existing knowledge and data		Project implementation
➤ Developing community resilience plans at local/government levels based on VCA data.	Adaptation and Mitigation	NDC 3.0 NHS	III-Climate Context: III- A. Review of existing knowledge and data		Project implementation

➤ Supporting efforts working on collaborating with local municipalities to integrate health-related climate risks into local disaster mitigation plans.	Adaptation and Mitigation	NDC 3.0 DRR Strategy	III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change, III- D. Alignment with national policies and strategies		Project implementation
➤ Building on Youth-focused initiatives & “WHAT NOW” key messages dissemination app to include youth-specific climate-health communication interventions.	Adaptation and Mitigation		III-Climate Context: III- A. Review of existing knowledge and data		Project implementation
➤ Establishing community-based risk-reduction programs for addressing climate-related and environmental risk.	Adaptation and Mitigation	NDC 3.0 NAP NHS	III-Climate Context: III- A. Review of existing knowledge and data		Project implementation
➤ Developing health-resilient capacity building programs to train local community health response teams, including community health workers and	Adaptation and Mitigation	NDC 3.0 LT-LEDS NHS NHS Two-Year Review	III-Climate Context: III- A. Review of existing knowledge and		Project implementation

municipal responders, to deliver risk communication, early warning dissemination, and basic health interventions.			data, III- B. Analysis of the overall climate risk of the health sector		
➤ Developing and rolling out localized emergency preparedness plans co-designed with communities, integrating One Health and WASH-FIT tools to ensure climate-resilient practices across public health domains.	Adaptation and Mitigation	NDC 3.0	III-Climate Context: III- A. Review of existing knowledge and data, III- B. Analysis of the overall climate risk of the health sector, III- D. Alignment with national policies and strategies		Project implementation
➤ Assessing options for community coordination and collaboration with key local actors such as municipalities, unions of municipalities, and the private sector (including corporate sponsors, private hospitals, health care providers, tech firms, and insurance companies).	Adaptation and Mitigation	NDC 3.0 NHS	III-Climate Context: III- A. Review of existing knowledge and data, III- D. Alignment with national policies and strategies		Project implementation

➤ Establishing community models for the management of climate-related crises.	Adaptation and Mitigation		III-Climate Context: III- A. Review of existing knowledge and data, III- D. Alignment with national policies and strategies		Project implementation
➤ Developing a national network of community-based providers to cater for the sector's shortage in energy supplies (including fuel, generators, batteries, filters...) and throughout the supply chain.	Adaptation and Mitigation		III-Climate Context: III- A. Review of existing knowledge and data: 5. Overview of non-climatic drivers and their interactions with climate change		Project implementation

In conclusion, in addition to the evidence-based data generated from the abovementioned components to be covered in the project, it is to emphasize that the project aims at achieving the following:

Knowledge, relevant national policies, strategies, processes and guidelines in Lebanon are enhanced for effective mitigation and adaptation responses to the risks of climate changes and crises.

- ✓ Developing a functional mechanism for the prioritization of climate actions (both mitigation and adaptation) that have positive potential on job creation, poverty alleviation and/or general economic impacts.
- ✓ Showcasing how the project adds to national policies, strategies and/or frameworks.
- ✓ Mainstreaming climate change response into all national and local planning regimes, to ensure that policies, strategies, legislation, regulations, and plans include climate change considerations.
- ✓ Developing strategies to implement post-disaster needs assessment and risk assessment to identify damaged health infrastructure, determine losses from reduction in health service delivery, and quantify community needs (recovery).
- ✓ Operationalizing the climate change and health task force to identify, analyze, forecast, monitor, prevent, and respond to climate-related public health threats and strengthen the resilience of health care systems and communities, while ensuring effective coordination and data sharing with the MoE, particularly for monitoring and mitigating water-related diseases.
- Operationalizing and institutionalizing the public health taskforce established under the NDC committee to guide climate-health monitoring and response.
- Designing an efficient coordination and communication mechanism for the public health TF to enhance awareness, policy coherence among relevant ministries, and climate-adaptive health governance, by adopting the One Health approach and International Health Regulations (IHR).

Climate resilience and environmental sustainability of health care facilities is improved across Lebanon and health service delivery able to manage and respond to climate related health risks and associated diseases.

- ✓ Integrating climate resilience plans into health care infrastructure projects and preparedness to mitigate the impact of extreme weather events on health care facilities.

Health information systems, health system monitoring and responses, epidemiological surveillance are improved through automation, advance technologies, and knowledge inclusion to incorporate climate-related health data to effectively reduce and manage the increased burden of disease, in close collaboration with communities for direct early response to climate changes and crises

- ✓ Developing a clear system for mainstreaming science-policy interface and knowledge to ensure that climate-change response decisions are informed by the best available information with stronger cooperation with the academic sector.

- ✓ Developing strategies for building climate-informed surveillance and early warning systems.

Implementation (including rehabilitation) and capacity-building

- ✓ Working with the MoPH Primary Health Care Department to develop set procedures for continually evaluating and implementing risk management programs to stay responsive to the needs of health care facilities under climate change and related emergency crises.
- ✓ Working with the MoPH Primary Health Care Department to expand accreditation requirements to include addressing the key vulnerability areas of the health care workforce, WASH and management of health care waste, energy, infrastructure, technologies, products, and processes.
- ✓ Building the capacity of health sector professionals (technical staff, authorities, and policymakers) to prepare for and respond to climate change-related disease burden.
- Building a national roster of trained facilitators and evaluators to reduce reliance on external experts and ensure sustainability.
- Training-of-trainers (ToT) programs provided by WHO, UNDRR, INSARAG, and UNDP to certify national experts.
- Developing standard training curricula (simulation design, after-action reviews, evaluation techniques).
- Creating a management mechanism (e.g., housed at CNRS-L or DRM Unit) to update, monitor, and deploy the roster.
- ✓ Building the capacity of health sector professionals to identify health impacts from other sectors (e.g., transport, energy, food, water, housing, urban development) that affect health.
- ✓ Enhancing health workforce climate resilience by conducting capacity building regarding climate-sensitive illness management, eco-sensitive organization.
- ✓ Developing a technical environmentally sustainable and climate resilience health care toolkit.
- ✓ Directing capacity building to focus on the One Health approach to promote a holistic approach to health systems that reflects the interplay between human, animal, and environmental health issues.
- ✓ Raising awareness among health care staff and the community on sustainable practices.
- ✓ Enhancing community awareness about hazards through different methodologies and campaigns (social media, billboard etc.)
- Building on ongoing efforts on public awareness campaigns and workshops on climate and health hazards (water, climate, etc, including promoting safe water, sanitation, and hygiene (WASH) practices), including those related to youth engagement campaigns (MHPSS, PGI, games, YADAPT, ChildrenResilienceProgram, YouthResilienceProgram, community events).
- ✓ **Supporting efforts to implement community-based first aid training with modules on climate-related illnesses/injuries**

- ✓ **Supporting efforts related to first aid and community emergency response training adapted to climate-sensitive emergencies**
- ✓ Setting selection criteria for health facilities that will benefit from these investments and for the implementing entities that will be in charge of the tenders that will be launched for these investments in health facilities to be handled efficiently and to be sustainable. Criteria could include the type and sustainability of the governance of health facilities (public/private cooperation), accreditation of facilities, type of services, coverage of services, and patient load, etc.
 - Transforming one or more of the primary health care centers and/or governmental hospitals in each of the 25 administrative units in Lebanon, and the capital Beirut, into a model unit for climate resilience and environmental sustainability.
 - Conducting national simulation exercises to stress-test hospital systems under compound hazards.

IV. Roadmap for the next steps (i.e., full feasibility phase)

This section outlines the remaining preparatory steps required in the short and medium terms to finalize the Concept Note for submission to the GCF, and to prepare the ground for full proposal development.

A. Short-term next steps

➤ Pre-feasibility validation

A national validation workshop will be convened in week of December 10, 2025 to consolidate stakeholder feedback and confirm all preliminary analytical work (pre-feasibility study) completed to date.

➤ Preparation and finalization of the Concept Note and submission to the GCF Project Preparation Facility (PPF)

Following the validation workshop, the Concept Note will be finalized, including refining the content and the structure to align with the GCF Concept Note template requirements.

A final review with the National Designated Authorities (NDA)/the project preparation steering committee will ensure national endorsement.

A communication channel, including support in the discussions between the AFD and the GCF, will then be opened with the GCF to receive feedback on the concept note, and steps will be initiated to submit a proposal to the GCF PPF. The PPF request will consist of elements described below in the section “completion of feasibility package”.

B. Medium-term next steps: completion of feasibility package

An open tender bid will be launched to hire a consortium which will be in charge of developing the funding proposal. The consortium will work on project/programme summary, project/programme information, financing information, expected performance against

investment criteria, logical framework, risk assessment and management, in alignment with GCF policies and standards, and required annexes.

Additional data collection may be required to solidify the climate rationale, and facilities prioritization. The analysis will also require detailed beneficiary calculations using cross-referenced facility catchment data, epidemiological trends, and socio-economic indicators. This data will help ensure that interventions are targeted, equitable, and linked to the highest risk areas, and will also help quantify the impact of the project activities and estimate their efficiency and effectiveness.

The project is expected to contribute to three GCF Adaptation Result Areas: Livelihoods of people and communities; Health, food and water security; and Climate-resilient Infrastructure and built environment. The following indicators are expected to form part of the Integrated Result Management Framework (IRMF), and will be refined during the feasibility stage and PPF-supported activities:

☒ Livelihoods of people & communities:

- Expected total number of direct beneficiaries: populations across Lebanon's governorates, reached through health care facility upgrades, early warning systems, and community resilience plans.
- Expected indirect beneficiaries: Up to 6 million people, representing the wider population benefiting from improved surveillance, national health adaptation plans, and climate informed health services.
- Percentage of beneficiaries from vulnerable or marginalized groups: Up to 50% of direct beneficiaries are from vulnerable groups (elderly, women, children, low-income families).
- Number of communities with climate and health risk reduction plans developed and ready for implementation. The number will be defined by the hotspot maps that will be produced by CNRS.
- Number of climate hotspots (Bekaa, Hermel, South, coastal zones) with reduced vulnerability of populations (linking the hotspots with reported burden of disease) through early warning, facility resilience, and improved access to care. The number will be defined based on the surveillance studies and the reporting of climate sensitive diseases by healthcare facilities.

☒ Health, food & water security:

- Number of policies and national strategies revised or adopted with climate health integration (1 National HNAP, 8 Governorate V&A plans, and 1 National Disaster Preparedness Strategy).
- 8 multi-sectoral climate and health task forces/committees are established in each governorate to oversee V&A plan implementation.
- Climate indicators are integrated into the national health information system to track

temperature, air pollution, vector distribution, water quality, etc.

- National adaptation indicators on climate related illnesses and deaths (heartstrokes, respiratory problems, water-borne diseases, etc.)
- Early Warning and Response System (EWRS) combining meteorological and epidemiological data is operationalized.
- Number of health workforce trained to interpret and use climate and health data/to respond to climate-related health emergencies.
- Number of municipal staff and community actors trained to interpret and use climate and health data/to respond to climate-related health emergencies.
- A least one awareness campaign and community engagement activity on climate-related health risks in every governorate (through Training-of-trainers (ToT)).
- One consortium (academic and national and local institutions, including the MoPH, CNRS, universities, and municipalities) engaged in generating and disseminating climate-related health data to the health workforce.
- One consortium (academic and national and local institutions, including the MoPH, CNRS, universities, and municipalities) engaged in generating and disseminating climate-related health data to community actors.
- One consortium of academic and national and local institutions.

☒ Infrastructure & built environment:

- Percentage of assessed facilities with climate resilience infrastructure upgrades (target: 100 facilities assessed and 50 retrofitted).
- 100% of retrofitted facilities adopting low carbon technologies (solar energy, efficient water systems, medical waste treatment, etc.).
- At least 50% reduction in energy and/or water use intensity across upgraded facilities.
- 100% of retrofitted facilities capable of functioning during climate extreme events or disease waves.

The project will also address the following:

➤ **Gender assessment**

A gender assessment will be undertaken to identify gender-specific vulnerabilities to climate-related health risks, and differential access to services. The results will inform gender-responsive approaches, training design, and the development of inclusive community resilience plans. Furthermore, safeguarding risks will be integrated into the project.

➤ **Maps**

The feasibility package would also include integrated hazard, vulnerability, epidemiological

and infrastructure maps to assist in prioritizing high-risk areas and facility sites. GIS analysis could support planning for early warning, surveillance coverage, and community engagement strategies.

➤ **Identification of deliverables per activity**

Each activity under the project will generate specific deliverables which should be clearly defined and listed in the final project proposal package, including but not limited to:

- HNAP, governorate V&A plans, SOPs for emergency preparedness
- Facility vulnerability assessments, engineering designs, and upgrade packages
- Climate-health training curricula
- EWARS modules, dashboards, and data integration protocols
- Community climate-health resilience plans
- Knowledge products, policy briefs, and operational guidelines
- Full M&E Plan and Results Framework.

The proposed adaptation and mitigation measures would be assessed following a multi-criteria analysis in the feasibility stage. These criteria, including efficiency, feasibility, flexibility, mainstreaming potential, track record, co-benefits, and cost effectiveness, would help prioritize measures. The feasibility study would also confirm the prioritization through a more in-depth assessment, including site visits.

➤ **Budget and cost-benefit analysis**

To enable accurate budgeting and feasibility assessment, preliminary quotations and cost benchmarks should be gathered for:

- Facility retrofitting and infrastructure upgrades
- Renewable energy systems, water efficiency technologies, and waste management solutions
- Equipment needed for surveillance, data systems, and diagnostics
- Training programs, workshops, and capacity-building activities
- Technical assistance inputs, consultancy fees and project management staffing.

These estimates will feed into the full budget and implementation plan and will support the cost-benefit analysis.

➤ **Monitoring & Evaluation, learning and knowledge management**

The project will adopt a monitoring and learning system aligned with GCF requirements, national context and proposed arrangements for the project implementation. This includes:

- A project-wide M&E plan with dedicated indicators, baselines, and data sources

- Continuous monitoring of results through field visits, reports, and digital systems
- A mid-term review and final evaluation
- Learning loops to adapt implementation based on evidence
- Dissemination of lessons learned through national platforms, health and climate sectoral working groups, and possibly South-South international exchanges.

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Appendix I

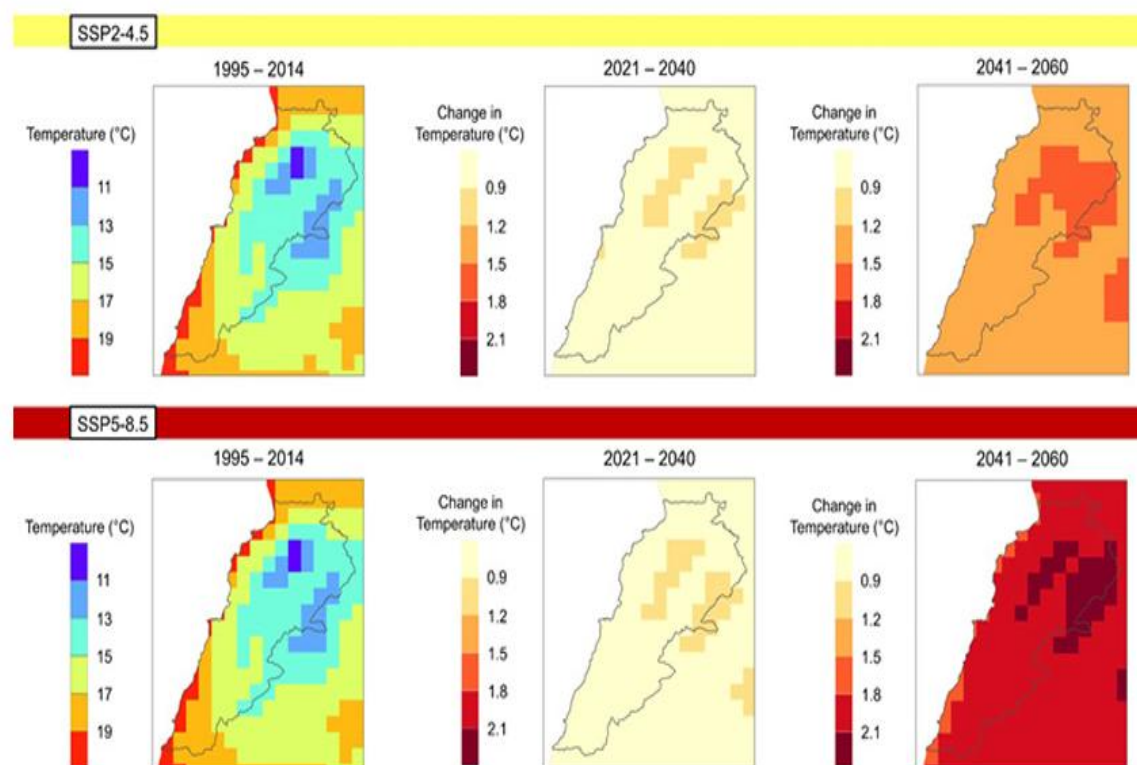


Figure A 1: Projected changes in temperatures in Lebanon (ESCWA, 2024; MoE/UNDP/GEF, 2024)

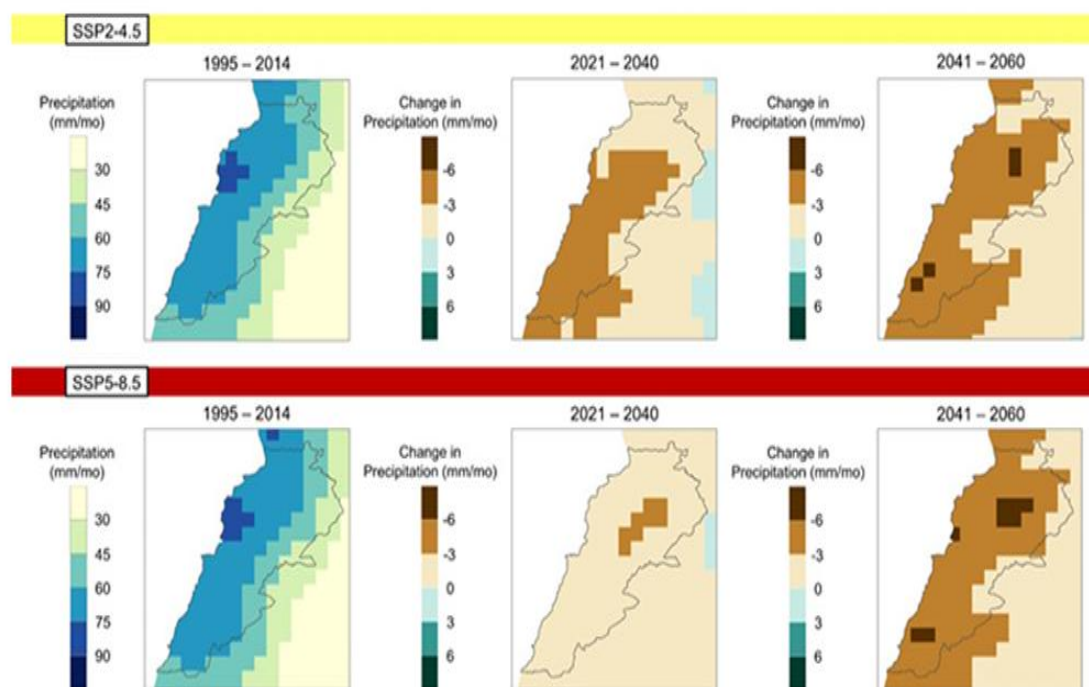


Figure A 2: Projected changes in precipitation levels in Lebanon (ESCWA 2024; MoE/UNDP/GEF, 2024)

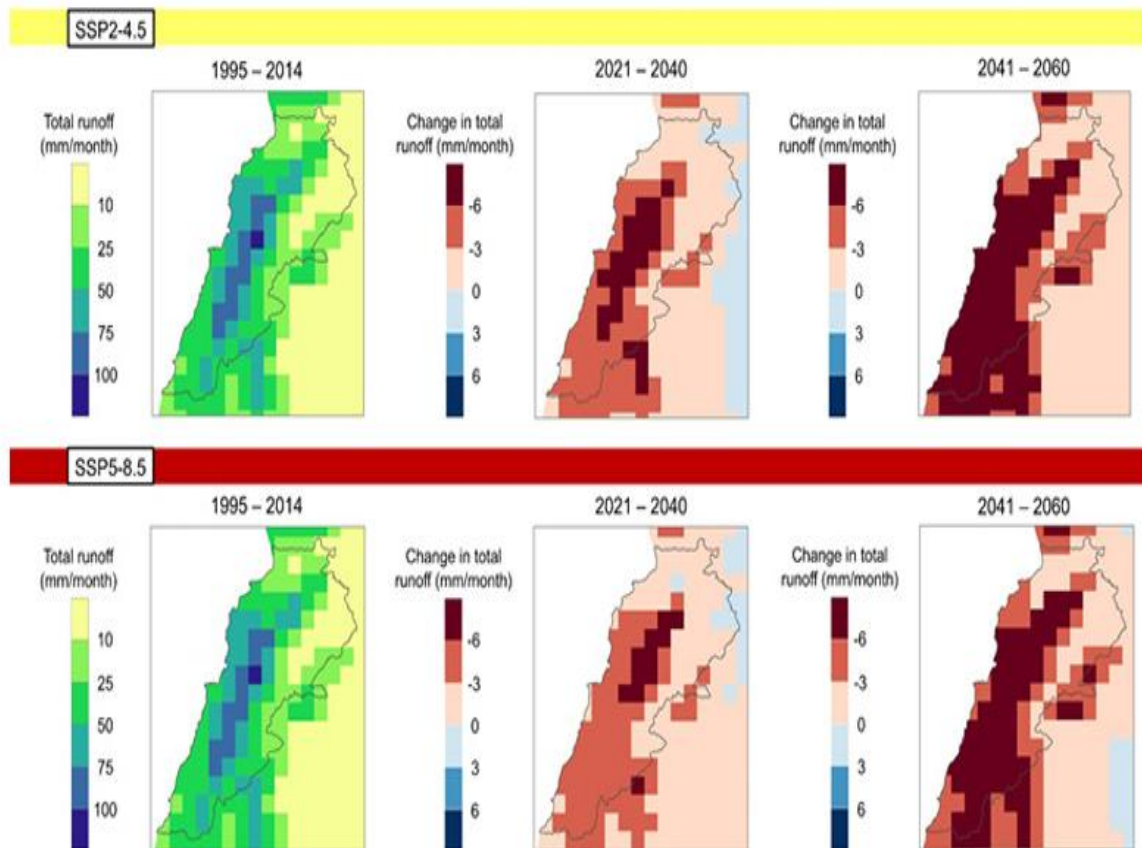


Figure A 3: Projected changes in total runoff in Lebanon (ESCWA 2024; MoE/UNDP/GEF, 2024)

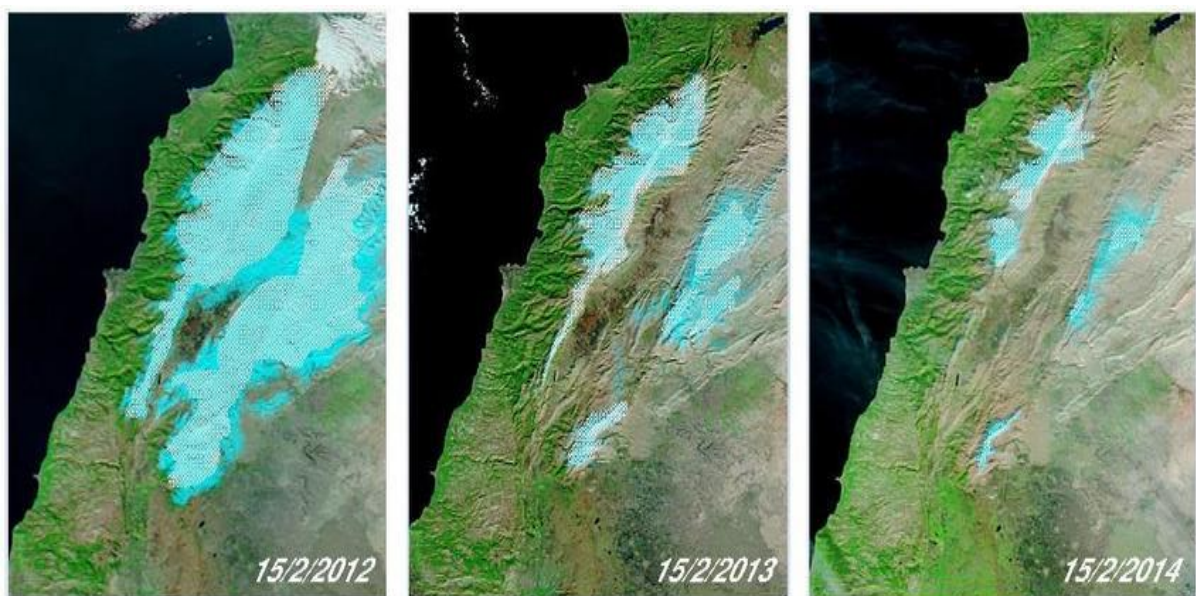


Figure A 4: Images of snow cover in Lebanon from 2012 to 2014 using MODIS-Terra (Shaban, 2017)

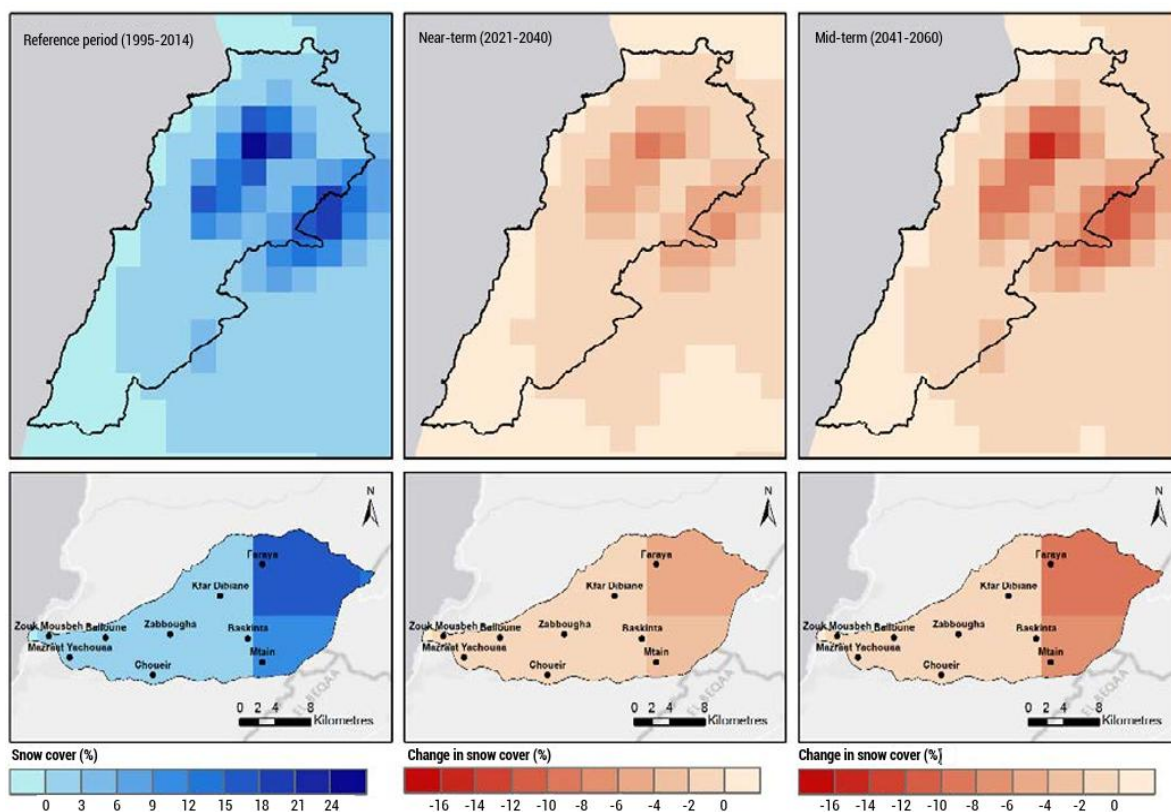


Figure A 5: Projected changes in annual snow cover based on six models from Euro-CORDEX, RCP 8.5 (ESCWA et al., 2022)

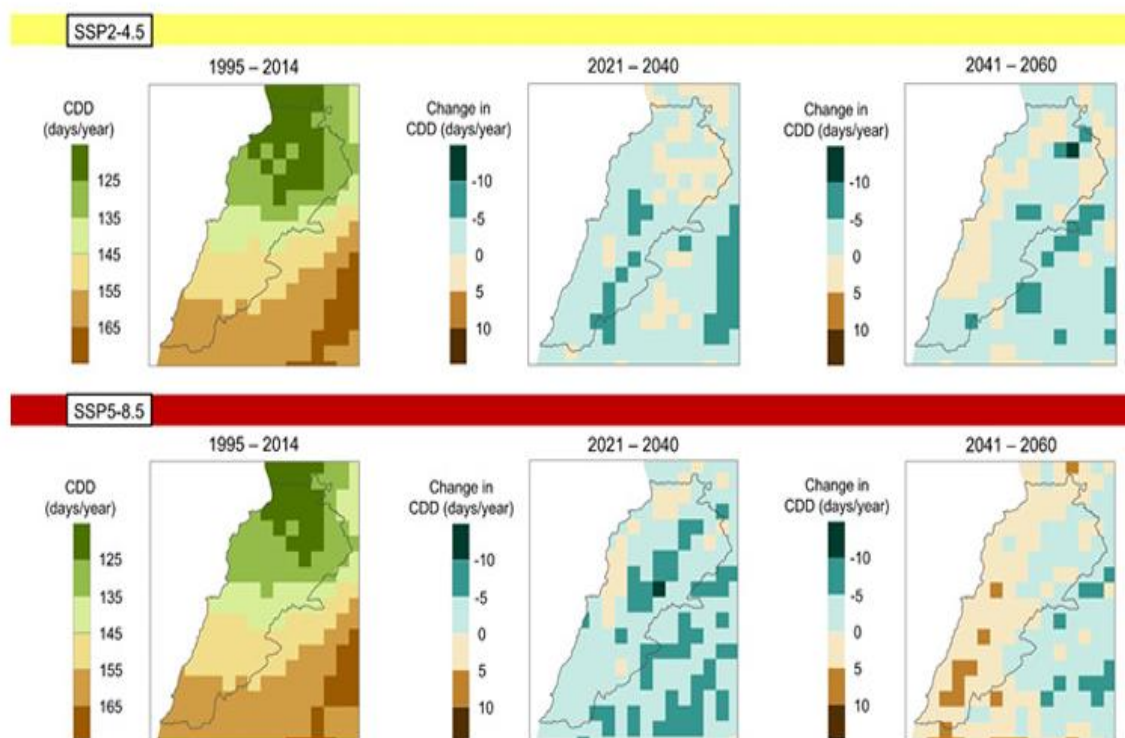
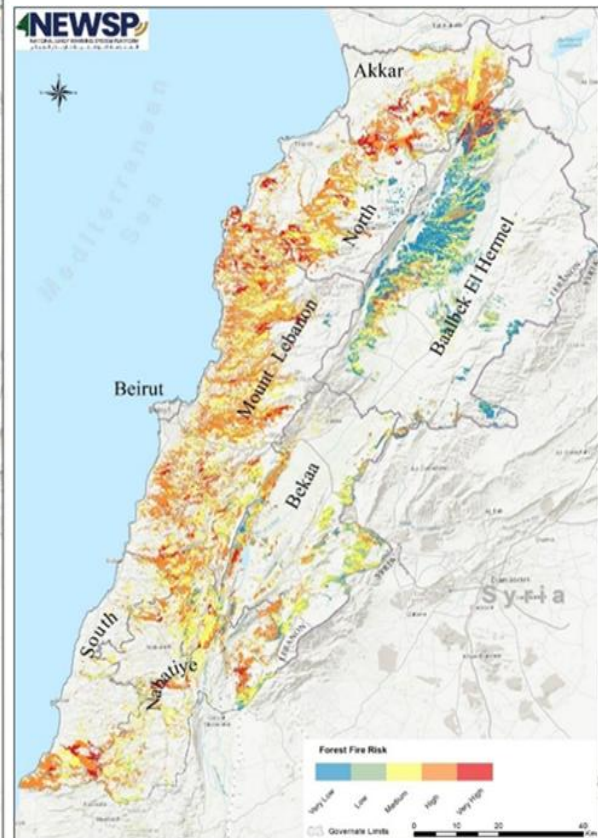
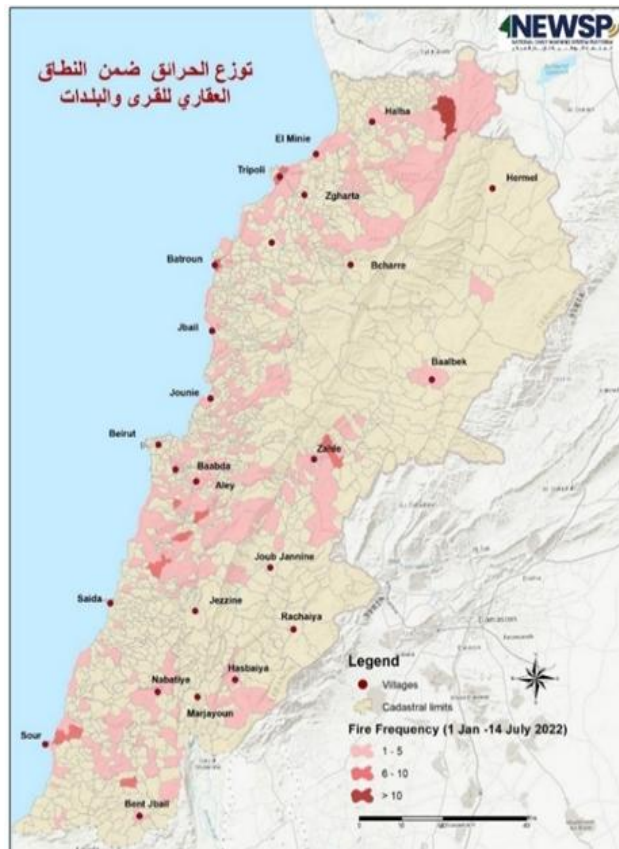
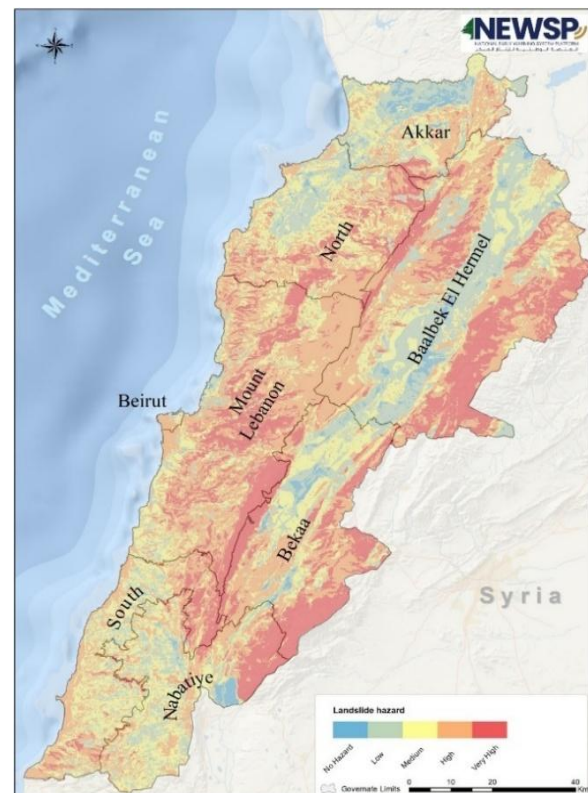
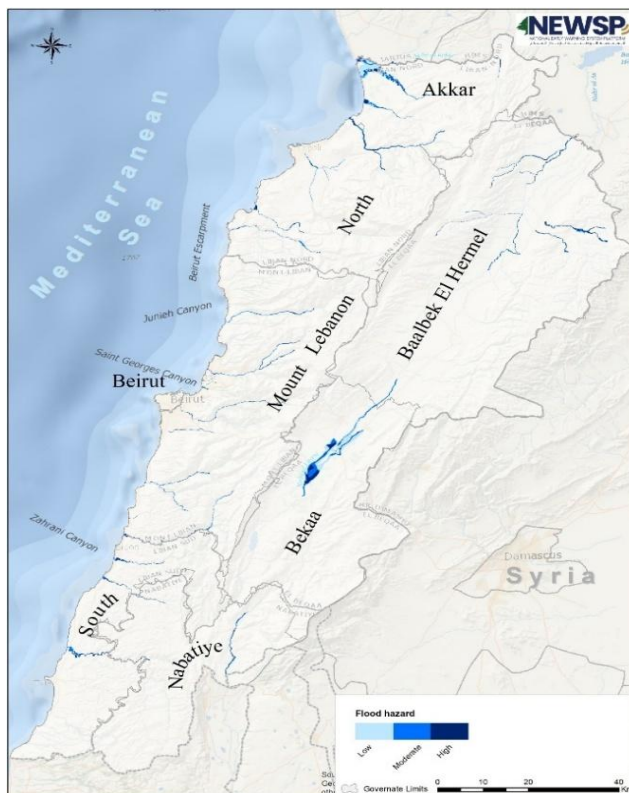


Figure A 6: Projected changes in Consecutive Dry Days (CDD) in Lebanon (ESCWA 2024; MoE/UNDP/GEF, 2024)



(a) (b)
Figure A 7: (a) Fire frequency in 2022 and (b) fire risk in Lebanon (NEWSP, 2022)



(a) (b)
Figure A 8: (a) Flood hazard and (b) landslides risk in Lebanon (NEWSP, 2022)

Table A 1. Summary of sectoral impacts of climate change in Lebanon (MoE/UNDP, 2025; Jurdi, 2022: Adapted from MoE/UNDP/GEF, 2016; USAID, 2016; Netherlands Ministry of Foreign Affairs, 2018)

Type of impact	Climate stressors	Projected risks
Reduced water availability	• Increased temperatures • Reduced rainfall and snow cover • Increased drought incidences • Rise in sea level	○ Altered seasonal water regimes; and a 30% increase in winter floods (up to 30%). ○ Reduced river flows leading to increased strain on limited groundwater sources in the dry season. ○ Increased evaporation of surface water. ○ Increased saltwater intrusion/salinization of coastal aquifers. ○ Annual water availability projected to decrease by 5.7% under RCP 4.5 and 9% under RCP 8.5. ○ Dry season water availability is projected to decrease by 42% under RCP 4.5 and 54% under RCP 8.5.
Less snow	• Increased temperature • Reduced rainfall	○ The number of snow days is expected to decrease, with 6 fewer days in 2030 and 38 fewer days in 2050 under RCP 4.5, and 9 fewer days in 2030 and 50 fewer days in 2050 under RCP 8.5. ○ Reduced snow cover by 40%. ○ Shifts in snowfall from 1,500 m to 1,700 m by 2050, and to 1,900 m by 2090. ○ Decreased snow residence time from 110 to 45 days.
Less agriculture productivity	• Increased temperature • Reduced rainfall and snow cover • More frequent droughts • More frequent heat waves and fewer frost days • Sea level rise	○ Reduced land productivity of irrigated crops by 0.3% to 8.7%. ○ Reduced productivity of rain-fed crops by 3.5% to 7.5%. ○ Declined soil moisture (high temperatures / reduced precipitation / higher evapotranspiration) impacting agricultural yields. ○ Migration of mountain fruit production to higher elevations.

		○ Decreased crop quality (particularly wine grapes). ○ Increased infestation (fungi and bacterial diseases). ○ Shift in grazing areas and periods for livestock. Increased pumping for irrigation needs.
High energy demand	● Increased temperatures	○ Increased demand for cooling (1.8% increase in electricity consumption for a 1°C increase, and 5.8% for a 3°C increase).
Sea level rise	● Increased rise (3060 cm in 30 years- 2mm/ year)	○ Increased seawater intrusion into aquifers. ○ Increased risk of coastal flooding and inundation. ○ Increased coastal erosion altering coastal ecosystems in natural reserves and elsewhere.
Forests at risk	Increased temperatures	○ Increased adverse effects on forests suffering from fragmentation, pest outbreaks, forest fires, and harmful practices.
Increase in morbidity and mortality	● Increased temperatures ● More intense and frequent heatwaves ● Increased extreme weather events	○ Increased outbreaks of infectious diseases. ○ Increased morbidity and mortality from heat and other extreme weather events. ○ Increased malnutrition from droughts and floods. ○ Increased rates of water-borne, rodent-borne, and vector-borne diseases.
Reduced tourism activities	● Increased temperatures ● More intense and frequent heatwaves ● Sea level rise ● Reduced precipitation/snow	○ Impact on outdoor winter tourism. ○ Shortened skiing season. ○ Increased losses of natural attractions (e.g., public sandy beaches). ○ Increased structural damage to the country's archaeological heritage.



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PEEB Med supports countries in improving **both energy efficiency in buildings and resilience** to extreme climate events, economic crises, and energy scarcity. Thanks to funds delegated by the European Union, the programme uses a unique combination of **technical assistance** and **investment grants** to bring ambitious projects to scale and achieve long-lasting sector transformation. PEEB Med is available in **7 partner countries**: Algeria, Egypt, Jordan, Lebanon, Morocco, the Palestinian Territories, and Tunisia.

Technical assistance for project owners through grants

Technical support granted by AFD to project owners at all phases of a buildings project:

Feasibility	Procurement	Detailed design	Construction / Renovation	Capacity building
• Feasibility and market studies for a building's construction or renovation project	• Support in the tendering process for recruiting architects and/or contractors	• Support in the integration of sustainability practices in the project's detailed design	• Support in the implementation and ensuring that best construction or renovation practices are integrated	• Trainings to project owners, financial intermediaries, and contractors to sustain integrated measures in the O&M phase

Expertise mobilised by AFD as part of the technical assistance includes:

Audits / Bioclimatic design / Construction materials / Efficient cooling and heating systems / Economic and financial analysis / Resilience to climate and health risks (extreme heat, floodings, cyclones, seisms, asbestos) / Assistance for green building certification / Buildings O&M / Renewable energy assessment / Social and gender studies / Carbon footprint calculation / Procurement expertise

Complementary approach with the Enabling Facility implemented through MeetMED:

AFD will deploy PEEB Med in close coordination with the Mitigation Enabling Energy Transition in the Mediterranean region project (MeetMED II) to disseminate knowledge and unlock synergies between policy support and financing.

Financial support for the construction of energy-efficient projects

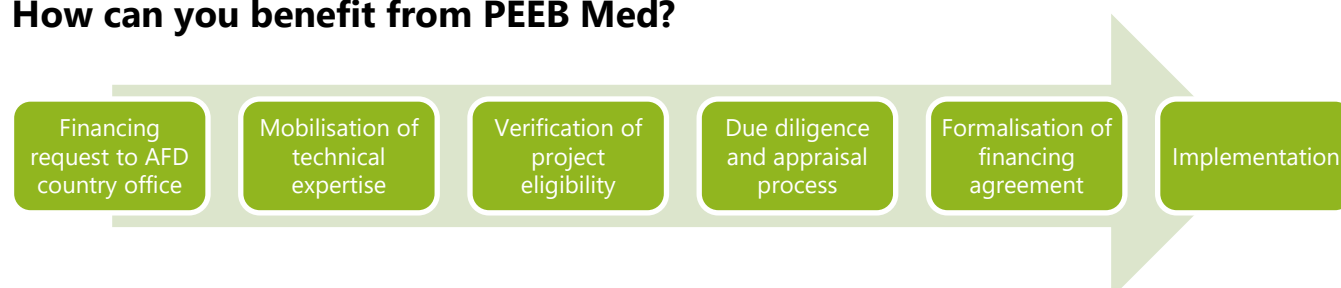
Loans with the conditions of an international development bank to the benefit of public and private project owners, provided by **AFD group**.



Investment grants which are cumulative with AFD Group financing. To assess the eligibility of each project, PEEB Med conducts an energy performance study at an early stage to evaluate the potential energy savings through proposed measures such as passive design strategies, efficient cooling systems, lighting etc. The Investment Grant will partially subsidise the additional costs linked with these energy efficiency solutions implemented by project owners. A minimum of a 30% improvement in energy performance compared to the baseline performance is required for each project to receive PEEB Med support.

EU contribution to energy efficiency (EE) investment costs per project	Improving energy performance	EU contribution to the costs of EE measures
	30 %	50 %
	35 %	60 %
	40 %	70 %
	45 %	80 %

How can you benefit from PEEB Med?



About the Partnership for Energy Efficiency in Buildings (PEEB)

PEEB Med is a programme of the Partnership for Energy Efficiency in Buildings (PEEB). Visit <https://www.peeb.build/fr/peebmed> for more information.

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For more information
Contact: info@peeb.build
Visit: www.peeb.build

Author
PEEB Secretariat

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