

Toward the Integration of Climate Change Action into Health Programs in the Eastern Mediterranean Region

An Operational Guide



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List of Acronyms

EMR- Eastern Mediterranean Region

EU- European Union

GEF- Global Environment Facility

LMIC- Low- and Middle-Income Countries

MENA- Middle East and North Africa

SDG- Sustainable Development Goal

SLR- Sea Level Rise

UN- United Nations

UNFCCC- United Nations Framework Convention on Climate Change

UNICEF- United Nations International Children's Emergency Fund

WASH- Water, Sanitation, and Hygiene

WHO- World Health Organization

Introduction

As the climate crisis intensifies, so do the impacts on public health worldwide. With rising temperatures, floods, droughts, sea-level rise (SLR), and extreme weather events, communities residing in climate-vulnerable settings globally face threats to both food and water security alongside the increased risk of non-communicable diseases and (re)emergence, spread, and changing risk profile of communicable diseases¹.

The Eastern Mediterranean Region (EMR) is particularly vulnerable to climate change owing to a combination of geographic, socioeconomic, demographic, and sociopolitical factors². There are estimates that in a 2 °C warming scenario, annual water discharge (already critically low) would drop by another 15–45%; this, in combination with unusual heat extremes, would affect about one-third of the land area with consequences for local food production². Pressures on food and water resources exerted by climate change would be further compounded by the population growth in the EMR, which is expected to double by 2070².

As climate change wreaks extreme havoc on socioecological and biophysical systems in the EMR, public health consequences have become notable. This has spurred a deepened recognition of the need for climate adaptation in the health sector at regional, national, and local levels². Also noteworthy is the need for regional cooperation on climate adaptation, particularly in the health sector, considering the number of transboundary water resources and the high potential for disease spread across borders as climate-related displacement and migration spurs unprecedented levels of regional mobility.

Yet a practical, region-specific framework for the integration of climate change risks, hazards, and actions into public health policies and programs is non-existent. Developing such an operational framework, as needed to support national and local health adaptation planning, requires a clear understanding of the risks that climate change poses to public health across the Region and beyond and the outstanding gaps to progress on health sector adaptation. As such, the following sections summarize these areas of interest to provide a starting point for a discussion on a regional framework for the Integration of climate change action into health programs, which GHD|EMPHNET can support through leveraging its unique capacities, expertise, and partnerships, derived from its well-established position within the Region's public health policy realm. This document follows and is linked to an earlier document (GHD|EMPHNET's Operational Guide on the Implementation of One Health Approach) due to the interconnectedness between humans, animals, and their shared environment.³ A growing environmental footprint of the human population impacts animals' health which, in turn, backlashes at humans' health. For example, if human actions result in climate change or negatively affect or endanger wildlife conservation, biodiversity, and environmental stability, then the health of humans will directly be threatened or even affected vice versa in a devastating manner. This

interconnectedness calls for the integration of climate action into our current health programs, policies, and actions.

Climate Change Impacts on Public Health in the Region and beyond

Heat-Related Morbidity and Mortality

As climate change increases the incidence of extreme heat waves, populations spanning the region suffer from rising heat-related morbidity and mortality. According to some projections, by the end of the century, 80% of the most populated cities in the EMR are expected to be under heat wave conditions for at least 50% of the days during the warm season¹. Scientists warn that this rise in frequency will coincide with an increase in the mean and maximum intensity of heat waves, further amplifying risks of heat exhaustion as temperatures exceed biological cooling thresholds⁴.



While the evidence remains limited due to a scarcity of well-designed studies, some researchers have investigated the impacts of extreme heat on mortality rates in the region and validated the concerns of public health stakeholders. In one study, results showed that the mortality risk in the Region would increase by the end of the century to 8–20 times higher than that of a historical comparison period if no climate change mitigation measures are implemented⁵. The coastal regions of the Red Sea, Arabic Gulf, and the Mediterranean Sea have been identified as the most vulnerable due to high humidity levels. At the same time, mortality risk over land is estimated to increase most in the southwestern parts of the Region^{5,6}.

Due to the urban heat island effect, cities will be particularly affected. At the same time, the pressure on and demand for cooling infrastructures will increase across already resource-constrained low- and middle-income country (LMIC) settings. This is particularly concerning in light of endemic housing shortages, rapid urban growth rates, and expanding informal/slum settlements across both Africa and the Middle East, the latter of which is characterized by high-density, compact living conditions ill-equipped to modulate extreme temperatures⁴.

Considering that the EMR is already among the hottest regions on the planet, the further rise of temperature extremes also poses threats to the viability, health, and safety of outdoor labour. The evidence suggests an imprecise but positive relationship between climate change and occupational heat strain in outdoor workers, with the most likely symptoms including dehydration, fatigue, dizziness, confusion, reduced brain function, loss of concentration, and discomfort⁷. These risks are particularly present in the Middle East, where outdoor labour by migrant workers is a major economic activity. Indeed, high mortality rates have already been reported across migrant construction workers in the region^{8,9}. In a study specifically conducted on

outdoor workers in Jizan, Saudi Arabia, 97% of participants expressed that heat exposure at work is a major concern to their health, wellbeing, and productivity⁹. Within the most vulnerable age categories, extreme heat symptoms, including sweating, exhaustion, rash, fainting, moodiness, sleeplessness, nausea, dizziness, headache, and cramps, were found to be significantly more prevalent compared with the average population⁹.

Air Pollution

Both outdoor and indoor air pollution—a consequence of poor access to clean energy and continued heavy reliance on fossil fuels (despite some positive recent developments)—are major health threats in the EMR. Indeed, air pollution is reported as one of the most severe environmental problems in the region¹⁰. According to some reports, air pollution levels in Region’s largest cities are among the highest in the world. The average urban resident breathes in air that exceeds by more than ten times the level of pollutants considered safe by the WHO¹¹. Research shows this contributes to 270,000 deaths per year. The average resident in the region is ill for at least 60 days in his/her lifetime due to exposure to elevated air pollution levels¹¹. Much of this morbidity and mortality stems from the consequences of air pollution on cardiovascular and respiratory disease risks, alongside certain types of cancer and other non-communicable diseases¹².



Reducing the public health burden of air pollution in the region will undoubtedly require heavy investment in renewable energy technologies and stronger emissions regulations (and their enforcement), which many LMICs will need sustained climate financing to support. From an adaptation perspective, however, steps can be taken to reduce indoor air pollution levels through rural connection to energy grids and increased access to clean cooking solutions—a trend currently underway but which will need further investment and effort to reach the scale needed¹³.

Water Security and Waterborne Diseases

With its pre-existing climate and scarce freshwater resources, the EMR is among the most vulnerable regions to water insecurity-related threats owing to climate change-driven reductions in precipitation, prolonged drought, and sea level rise (SLR). As the most water-stressed region in the world, water insecurity in the EMR has been a point of focused concern for decades¹⁴. While the average water availability per person in other geographical regions is about 7000 m³/year, water availability is merely 1200 m³/person/year in the EMR, with per capita water availability expected to reduce to alarming proportions in the coming decades¹⁵.



While this challenge is closely linked to geopolitical, economic, and demographic pressures in the region and is therefore not solely a function of geographic vulnerability, climate change can be seen as a threat multiplier in relation to pre-existing water resource constraints since it further exacerbates ongoing shortages

through various hydrological system disturbances. Declining precipitation and increased temperatures associated with climate change, for example, have been identified as contributors to the ongoing reduction in flow rates of the Tigris and Euphrates Rivers. As this trend has been associated with increasing water salinity levels, the safety of drinking water from these rivers, which serve major populations across Iraq, Syria, and Turkey, has been severely compromised¹⁶. Simultaneously, the salinization of coastal aquifers due to SLR has reduced freshwater availability across the region, particularly in parts of North Africa such as El Jadida, Annaba, Korba, Sfax, and Gabès (located across Morocco, Algeria, and Tunisia), which have been identified as the most affected¹⁷.

The health impacts of water insecurity in the EMR are far-reaching. On a direct level, water scarcity can have the effect of increasing the concentration of pollutants in surface and groundwater bodies, reducing the functionality of water-based toilets, and compromising the viability of wastewater treatment services, all of which impact access to safe water and sanitation^{18,19}. According to recent reports, around 66 million people in the MENA lack basic sanitation services, while a very low proportion of wastewater in the region is adequately treated²⁰. With untreated sewage being released into the environment, more frequent outbreaks of cholera and other waterborne diseases are occurring²⁰. In the Gaza strip, for example, the pollution of groundwater by raw sewage has led to widespread nitrate pollution, which was linked to an increased incidence of methaemoglobinaemia, or blue baby syndrome, among Gazan infants in one WHO study²⁰.

Excessive rainfall can also wash away animal/human excrement into sewerage systems that eventually get into local water bodies that can be used for drinking. Also, warmer temperatures promote the growth of fecal pathogens. The spread of infected faeces through water sources has also been identified as a contributing factor towards polio in the Middle East²⁰. Meanwhile, over-extraction of deep groundwater because of declining freshwater reserves has increased fluoride concentrations and led to skeletal fluorosis in children in Yemen and rural Iran, which can cause permanent disability^{21,22}. High concentrations of arsenic, nitrates, and radioactive elements in groundwater have also been highlighted as a major health concern for children in the region, particularly as groundwater is increasingly relied upon for irrigation and other purposes as net annual rainfall declines²⁰.

On an indirect level, regional water insecurity has long been linked to the conflict in the region, which can drive displacement, disrupt healthcare access, and in cases of war, lead to widespread destruction of essential health infrastructures. Indeed, conflicts, migration, and displacement in both Yemen and Syria have been linked to water-related resources pressures and have, in turn, precipitated a collapse of local healthcare systems and a deterioration of public health standards across large swaths of the population^{23,24}. Undoubtedly, other factors have helped drive such trends, but according to a growing evidence base, the further strain that climate change places

on regional freshwater resources amplifies risks of both conflict and displacement, with resultant consequences for public health²⁵.

Food Security

Water insecurity in the EMR is a large driver of the similarly dire challenge surrounding food security in the region. Reduced precipitation, drought conditions, drying rivers, and, in some cases, flooding impact agricultural production, further complicating efforts to meet local population food needs in an already food-insecure region. Such consequences leave the poorest families most vulnerable; one study shows that people living in urban areas under the poverty line spend up to 75% of their budget on food alone ²⁶. In the same way, climate change acts as a threat multiplier in relation to other drivers of water insecurity, climate change can be similarly seen to amplify existing food security risks, particularly in the most resource-scarce, conflict-affected EMR countries, and in the large number of EMR countries which already rely upon agriculture as a major pillar of their economy.



Food Security

With regard to early childhood development, researchers have warned that climate change will add pressure to an already difficult stunting situation in the EMR by further reducing the capacities of vulnerable households to meet minimum dietary needs²⁷. These prospects are particularly concerning for countries like Yemen, where approximately 2.2 million children under the age of five suffer from acute malnutrition, according to the most recent UNICEF reports²⁸, and where further depletion of water resources is expected to reduce agricultural productivity by up to 40 percent²⁹. Research conducted across Algeria, Egypt, Morocco, Syria, and Yemen has further revealed that climate change coping strategies among affected households often involve shifting food consumption habits, such as eating less chicken or beef or eating one less meal, which can adversely affect child nutrition during peak development windows³⁰.

In Egypt, where 95% of agricultural irrigation comes from the Nile River's water supply, the impacts of climate change on Nile flows are of vital importance³¹. Numerous models have projected decreases in Nile River flows over the coming decades. It has been estimated that temperature rise alone will reduce the production of major crops such as rice by 15 % by 2050 and by 36 % by 2100³¹. Other climate change-driven threats, such as higher frequency flash floods in certain regions, will have equally concerning impacts on agricultural production and food security. In Afghanistan, for example, researchers have found that exposure to flooding during a 12-month period decreased daily calorie consumption by approximately 60 kcal while increasing the probability of iron, vitamin A, and vitamin C deficiency by 11, 12, and 27 percentage points, respectively³². Other parts of the Region are also becoming increasingly vulnerable to flooding³³, despite historically dry climates, expanding the spectrum of possible risk pathways through which local food security may be eroded.

Extreme Weather Events

As in other regions of the world, extreme weather events in the EMR are increasing in frequency and intensity with climate change. While the region may not be a global hotspot for tropical storms, it is disproportionately vulnerable to drought, extreme heat waves, and dust storms, with some locations also facing heightened risks of flash floods. In recent years, such events have become a growing driver of migration, with heightened mobility posing challenges to accessing healthcare and, in some cases, driving conflicts that may have downstream health consequences³⁰. Research on the EMR has warned that virtually all socio-economic sectors will be critically affected by the projected climate disruptions, with human health and well-being affected through many highly direct risk pathways³⁴.



One particularly direct extreme weather-related health risk in the EMR pertains to the health hazards posed by dust storms. As climate contributes significantly to the number of surface soil particulates that are aerosolized and their ability to move long distances through the atmosphere, climate change is projected to drive an increase in dust storms across the Sahara and the Middle East³⁵. Already, dust storms have been shown to mobilize biological agents, minerals, and chemicals that increase risks of respiratory diseases, cardiovascular diseases, and cardiopulmonary diseases, as well as injuries and deaths from transport accidents caused by poor visibility³⁵. According to studies conducted in the Middle East specifically, the incidence of respiratory and cardiovascular mortality and hospital visits have historically increased dramatically following dust storm exposure³⁵.

With regards to flooding, the main source of vulnerability stems from the sheer lack of preparedness that exists in many regions that were not historically flood-prone. Along with the recent floods in Pakistan which hit global headlines, in the past several years, many Arab cities such as Cairo (2020), Kuwait (2018), Riyadh (2016), Casablanca (2016), Alexandria (2015), Doha (2015), Guelmim (2014), and Muscat (2007) have experienced flash floods despite their highly arid and semi-arid climate³³. In places like Yemen which have long benefited agriculturally from regular, albeit controlled, flooding, more recent flash floods have destroyed harvests and led to widespread crop losses²⁹. Without sufficient stormwater infrastructure, flood controls, and drainage systems, contamination of drinking water, reduced access to sanitation, and consequent spread of diarrheal diseases will afflict communities across the EMR to a degree not seen in the absence of such climate disruption³⁶.

Extreme weather events are also associated with concerns around diseases. Naturally occurring in soil and commonly affecting domestic and wild animals, anthrax is an important global disease of livestock with high animal mortality and spillover to humans. Anthrax spores can persistently remain dormant yet viable for decades in the soil or animal products such as dried or processed hides and wool. As a consequence of disruptions induced by extreme weather (e.g., flooding, torrential rains, landslides), anthrax spores may resurface and cause serious outbreak concerns, while, through

affecting livestock, anthrax may also result in concerns about food safety and security. Moreover, *Bacillus anthracis* has always been high on the list of potential agents with respect to biological warfare and bioterrorism making this disease highly relevant from several aspects.

Vector-Borne Diseases

Across the EMR, early research shows that climate-related environmental changes are affecting the density of vector populations, their transmission patterns, and infection rates, creating new epidemiologic trends of potential public health concern. One significant factor has been the stress placed on water supplies amidst disrupted precipitation cycles, which has led to new dam and irrigation canal constrictions, particularly in regions such as Egypt, which are heavily dependent on rainfed agriculture^{37,38}. Such developments, however, have offered new mosquito breeding grounds, resulting in the emergence (in previously unaffected areas) and re-emergence (in previously endemic areas) of diseases such as malaria, dengue fever, Rift Valley fever, and West Nile virus, among others^{37,38}. Rift Valley fever, for example, typically associated with high-rainfall conditions, has emerged in dry and low-rainfall areas such as Egypt and the Arabian Peninsula³⁹.



Extreme heat has also exacerbated the burden of such diseases, with outbreaks of West Nile virus erupting in several eastern Mediterranean countries over the last decade. This is due to heat conditions which had significant impacts on the mosquito vector populations and establishing the virus in new areas⁴⁰. Temperature changes have also been identified as a contributing factor toward the recent establishment and rapid spread of *Aedes. Albopictus*, one of the two mosquito species responsible for the spread of Dengue, chikungunya, and Zika, in several countries of the EMR, including Turkey, Syria, Lebanon, Palestine, and Jordan^{38,41}. Malaria is another good example. Warmer temperatures alter the growth cycle of the parasite in the mosquito, enabling it to develop faster, increasing transmission, and thus having implications on the burden of disease⁴².

Climate change is also considered one of the many factors that play a role in tick abundance and distribution, which is of concern to several livestock-abundant countries across the EMR. In one study, researchers found 55 tick species on livestock in the region, including camels, cows, goats, and sheep, from which 15 tick-borne pathogens were identified, many with the potential to cause human illness if transferred⁴³. Meanwhile, Cutaneous Leishmaniasis, which is already endemic in the EMR, has seen a rise in cases in places such as Iraq and Syria, where the biting of sandflies and *Leishmania* parasites may be increasing in concurrence with rising temperatures^{38,44}, as well as CCHF in Iraq (WHO, weekly epidemiological monitor, Volume 14; Issue no 49; 05 December 2021).

Mental Health

The mental health implications of climate-related displacement and migration remain understudied and poorly documented, particularly in the EMR. Yet, early evidence published by other migrant health researchers indicates high rates of trauma and mental health issues among populations displaced across the EMR, whether it be in the context of climate-related drivers (e.g., drought, extreme weather, natural disasters) or local conflicts, the risk of which has been amplified by climate disruption⁴⁵⁻⁴⁸. Even in cases of rural-urban labour migration driven by livelihood erosion due to impacts of climate change on agriculture, fishing, herding, and other natural resource sectors, research has found that departure from traditional life can have severe mental health consequences, particularly for indigenous populations such as nomadic tribes with a heavy attachment to the land⁴⁹.



Mental Health

As climate change is expected to increase the pace and scale of migration and displacement across the region, the demand for adequate mental health, trauma, and psychosocial support services will increase in the years to come²⁵. This will occur against high levels of pre-existing conflict and displacement across the region, the consequences of which have yet to be fully addressed through a still largely underdeveloped mental healthcare system.

Figure 1 below summarizes the previously cited literature on climate change in the EMR and beyond the region, specifically with regard to key environmental hazards and related public health implications.

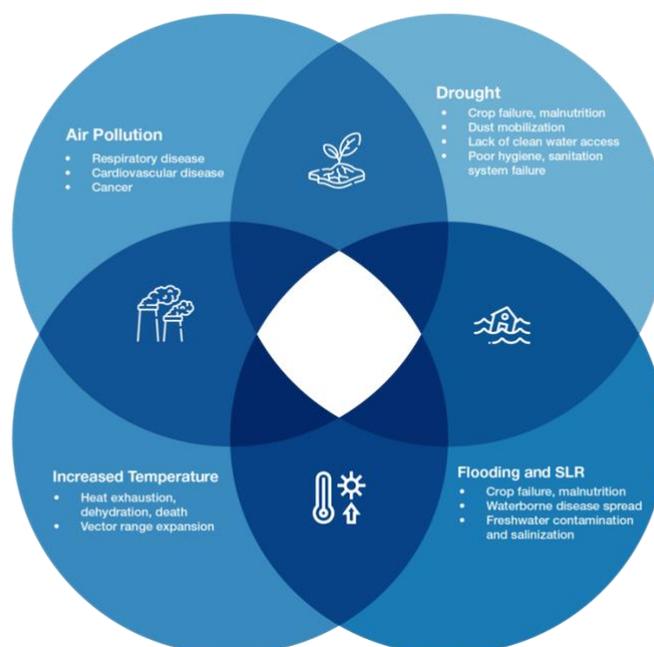


Figure 1: Summary of Climate Change Hazards and Health Risks in the EMR and Beyond

Climate-Health Integration in the Region: Progress and Gaps

A review of current progress on climate-health integration—that is, adaptation to climate change in the health sector—across the EMR reveals a picture of building momentum, particularly in the policy space, yet an outstanding failure to act in a manner commensurate with the scope and scale of the region’s climate-health crisis. As highlighted in other assessments, health adaptation in the region is in a relatively early stage, and less than 50% of the countries bordering the Mediterranean Sea have completed a “climate change and health vulnerability and adaptation assessment”⁵⁰. Of the countries that have completed one (Albania, Algeria, France, Greece, Italy, Morocco, Spain, and Tunisia), the majority fall into the upper middle- or high-income country category⁴⁵. As health vulnerability assessments are key to identifying key determinants of exposure, sensitivity, and adaptive capacity and developing needs-responsive programs and policies at the climate-health intersection (Figure 2), shortcomings in this domain can pose a significant constraint to national advancement in the adaptation process.

A specific examination of the 15 countries EMPHNET has deeply rooted collaborations in—which include countries both within and outside the EMR, namely Afghanistan, Egypt, Iraq, Jordan, Lebanon, Oman, Qatar, Libya, Morocco, Pakistan, Somalia, Sudan, Tunisia, Yemen, and Bangladesh—reveals similar trends. Of these 15 countries, four (Iraq, Libya, Morocco, and Pakistan) have yet to publish a National Adaptation Plan (NAP) or a National Adaptation Programme of Action (NAPA) equivalent, despite current and seemingly promising support provided by the UN Environment Programme in some cases. Of the eight countries that have produced formal NAPs or NAPAs, three (Afghanistan, Tunisia, and Yemen) do not articulate clear health sector adaptation actions, even where health vulnerabilities and needs are acknowledged⁵¹⁻⁵⁸.

While there are EU-funded regional frameworks that focus on climate resilience, such as Climate ADAPT Mediterranean area that covers countries mainly north of the Mediterranean, and ClimaSouth, which covers Algeria, Egypt, Jordan, Lebanon, Libya, Morocco, Palestine, and Tunisia, human health is not a central feature of these programs⁴⁵. Similarly, the major ecosystem-based adaptation project currently underway in the Mediterranean region, entitled “Enhancing Regional Climate Change Adaptation in the Mediterranean Marine and Coastal Areas” and executed under the Mediterranean Action Plan of the UN Environment Programme, does not include health under its priority SDG focus areas, despite the well-documented evidence that ecosystem-based adaptation can play an important role in advancing health objectives^{59,60}.

Given the increasing urgency of the climate crisis, leaders across the EMR seem to be mobilizing new resources and efforts towards adaptation planning, offering more encouraging prospects for regional climate-health integration. Some significant recent

developments were spurred by a first-time workshop held in January 2020 on climate change, health impacts, and adaptation over the Eastern Mediterranean, which assembled scientists from six countries working on climate science, public health, and policy formulation and encouraged discussions and collaborations under the umbrella of the Regional Climate Change Adaptation Center⁶⁰⁶¹. Some important outcomes resulted, such as the identification of key health vulnerability domains and the need for more interdisciplinary collaboration on public health adaptation to climate change in the region. The efforts and support offered by regional coordinating bodies like EMPHNET, however, will be key to translating this agenda into practice.

Research needs and gaps can also be discussed in more depth in this section as it fuels action. In MENA, there are questionable sources of data, inappropriate study designs, and poor assessment of exposure and outcomes. You can refer to [“Air pollution and Health Outcomes in the Eastern Mediterranean Region: Knowledge and Research Gaps and Need”](#).

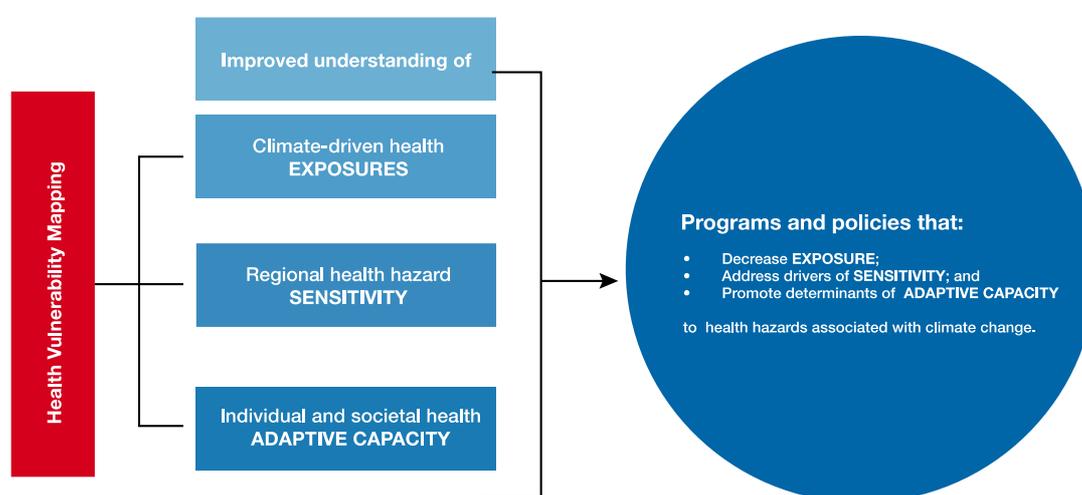


Figure 2: Importance of Health Vulnerability Mapping

Purpose and Objectives

Considering the far-reaching public health consequences of climate change in the Region and beyond and the outstanding gaps in regional progress on climate adaptation in the health sector, this document is intended to serve as an operational guide for the integration of climate change action into health programs in the Region and beyond, with a focus on the supportive role that GHD|EMPHNET and other partners can play in advancing this agenda. Specifically, this document aims to:

- 1) Identify and map the current network of regional players active in the climate-health space to support the establishment of new partnerships and synergies for climate-health integration in the EMR and beyond.

- 2) Outline a concrete strategy for supporting and collaborating with partners and regional policy actors on mainstreaming climate resilience planning into public health governance frameworks; and
- 3) Detail precise action steps for supporting and collaborating with local health authorities and on-the-ground field partners on actions to reduce local, national, and/or regional vulnerability to the health impacts of climate change.

These objectives fit with the overall Environmental Health Strategy of GHD|EMPHNET, which centers upon support for EMR countries in implementing essential interventions to decrease morbidities and mortalities resulting from environmental exposures. Specifically, this operational guide will accelerate GHD|EMPHNET's action on health adaptation to climate change, one of the 12 strategic objectives articulated in its Environmental Health Strategy.

GHD|EMPHNET's Capacity to Support Regional Efforts in Climate-Health Integration

With its history of work, current approach, areas of expertise, and expansive scope of engagements, GHD|EMPHNET is positioned to contribute valuably to the advancement of both policy and practice on climate-health integration in the Region and beyond.

GHD|EMPHNET adopts a comprehensive approach to health systems strengthening, where it works at different levels to identify and respond to health challenges. Importantly, it works at regional, national, and sub-national levels, tailoring solutions to local contexts and drawing upon a proactive learning approach to bringing about effective problem-solving and ownership of outcomes. Under this model, change is initiated at a grassroots-level, and health systems strengthening efforts are coordinated through bottom-up governance. This is rooted in a theory of change whereby action planning and program management are transformed at the peripheral level, thus producing national-level change.

GHD|EMPHNET also focuses heavily on research to generate information that can link policy to practice. Specifically, it focuses on engaging in operational research that contributes to countries' efforts to reach SDG targets through knowledge synthesis. Not only does GHD|EMPHNET collaborate with governments to operationalize new knowledge on best practices, but it employs a network of experts and professionals to produce practical training materials, toolkits, and guidelines.

GHD|EMPHNET's grassroots, bottom-up, learning-driven, and research-informed model of catalyzing health systems change is highly compatible with the required approach for bridging climate change and health agendas at regional, national, and sub-national levels. Because the impacts of climate change on health are particularly localized and contextually nuanced, any public health governance framework aimed at addressing them must be similarly tailored to local circumstances. This creates an

essential need for working closely with local actors and offering flexibility at the local level for initiatives to be spurred and coordinated by those most familiar with the evolving challenges and circumstances.

GHD|EMPHNET fosters coordinating mechanisms with Ministries of Health, International partners, and other institutions to improve population health outcomes. It serves the region by supporting national efforts to promote policy development, assure a competent workforce, enhance communication and networking, and monitor and evaluate programs and other related services.

As many individuals and institutions seeking to address the health impacts of climate change at a systemic level may lack prior knowledge and experiences to draw upon, there is a need for early learning to inform program and policy design through an iterative process. This strengthens the value of support from institutions like GHD|EMPHNET, which can cater to this learning agenda and facilitate the adaptability needed to pivot when new knowledge is unveiled.

GHD|EMPHNET's contributions towards research and knowledge sharing also position it to offer tactical assistance in articulating and refining a first ever agenda on climate adaptation in the health sector at regional, national, and sub-national levels across the Region. The paucity of evidence on climate change and health in our Region creates a knowledge gap that institutions like GHD|EMPHNET are well-positioned to work on filling through their capacity to generate and synthesize evidence and learnings at the regional level. Such contributions also represent an important next step to consolidating evidence-based guidelines to inform practice at the newly acknowledged but highly salient intersection between climate change and health.

Other areas of expertise held by GHD|EMPHNET, and their relevance to work on climate-health integration, are summarized in Figure 3 below.

01	Capacity Building	Needed to empower public health workforce with knowledge and skills for responding to health impacts of climate change.
02	Monitoring and Evaluation	Needed for supporting establishment of integrated early warning systems and surveillance programs for climate-sensitive diseases.
03	Data for Action	Needed for ensuring a strong evidence base on regionally applicable climate-health intersections to inform strategic planning on adaptation.
04	Technical Assistance	Needed to forge fruitful collaborations at the regional level for joint action on climate adaptation in the health sector while addressing knowledge gaps which may impede policy implementation.
05	Information and Communications Technology	Needed for gathering real-time data when monitoring performance of newly established climate-health programs, as needed to inform iterative planning within uncharted areas of practice.
06	Logistics and Operations	Needed for mobilizing new human resources and establishing supply chains to support operationalization of policies which transcend the agendas and budgets of single ministries.

Figure 3: Value-Add of GHD|EMPHNET Areas of Expertise in Climate-Health Integration

Strategy Outline for Supporting Regional Efforts in Climate-Health Integration

The strategy framework that can be operationalized by GHD|EMPHNET in its efforts to advance regional progress on climate-health integration is structured according to certain objectives. These objectives include articulating GHD|EMPHNET's role in shaping regional climate-health policy, shaping regional climate-health practice, and building regional climate-health partnerships. Ultimately, actions in each domain are needed to produce a favorable legislative, programmatic, and institutional environment for enhancing resilience against the health consequences of climate change in the EMR and beyond.

Objective 1: Shaping Regional Climate-Health Policy

To positively shape regional policy on climate-health integration—that is, help mainstream climate resilience planning into public health governance frameworks across the region—GHD|EMPHNET will:

- *Support national governments in articulating a clear public health strategy within their National Adaptation Plan (NAP)*
 - For countries that currently lack a NAP (or NAPA equivalent), collaborate with the UN Environment Programme in facilitating a nationally led process of NAP development, offering key resources and inputs to inform planning on health sector adaptation initiatives and ensuring public health objectives are featured in the national adaptation roadmap
 - For countries that have already published a NAP (or NAPA equivalent), provide technical and analytic support in assessing the strength of health sector adaptation plans and in updating documents, where necessary, to ensure proposed actions are commensurate with current and projected health risks
 - Considering the climate-health challenges which transcend the EMR and beyond, the focus should be placed on ensuring that NAPs incorporate the following key elements, in addition to other nationally tailored action items:
 - A situational analysis that outlines the current strategies adopted by the healthcare sector in dealing with emergency preparedness and in mapping health outcomes
 - A SWOT analysis that identifies the strengths, weaknesses, opportunities, and threats in the health sector
 - A stakeholder analysis that defines the roles and responsibilities of each party (i.e., government, private sector, civil society organizations, the public, as well as others) in health sector adaptation activities. GHD|EMPHNET Stakeholders' Mapping and Analysis Tool [Citation⁶²] can be used for the identification, mapping, analysis, and engagement of all relevant stakeholders.



- A plan to update practice guidelines and standard operating procedures relevant to the prevention, detection, and treatment of climate-sensitive diseases across various levels of health care (i.e., primary, secondary, tertiary, and specialized care)
 - A plan and mechanism for iterative review of health vulnerability and adaptation options at both national and subnational levels
 - Support surveillance capacities,
- *Support the creation of regional, national, and subnational working groups for interdisciplinary and cross-jurisdictional coordination of responses to climate- health risks*

 - Regional platforms should focus on cross-boundary climate change threats in the health sector, including but not limited to:
 - Containing epidemics and infectious disease outbreaks
 - Maintaining resilient food, water, and critical resource supply chains amidst extreme weather shocks
 - Defining and actualizing a shared public health research agenda
 - Multisectoral coordination among health sector representation, and water planning, public works, natural resources, meteorology, and environment sectors, which are jointly needed to conduct environmental risk assessments and monitor environmental health threats during extreme weather events
 - Where possible, agreements (e.g., Memoranda of Understanding) should be established between health ministry contacts and other sector stakeholders to ensure a clear delegation of roles and responsibilities for health protection against climate change
 - With their interdisciplinary and cross-jurisdictional representation, working groups should serve as the key focal point for routine evaluation of new and emerging climate-related health risks and should oversee the designation of health representatives for all relevant international climate negotiations (e.g., UNFCCC meetings, Conference of the Parties)
 - Working groups should be supported in disseminating relevant knowledge and learnings through open knowledge sharing platforms such as [UN CC: Learn](#), publication in open-access journals, and regular engagement in international talks and conferences
- *Provide technical support to governments and relevant institutions in updating public health-related policy documents and practice guidelines to incorporate emergency contingency measures for climate risks*

 - Regulations on key environmental determinants of health (e.g., air quality, water quality, food quality, housing safety, waste management) should be updated to reflect broader ranges of expected climatic conditions
 - e.g., see [WHO guidelines on climate-resilient water safety plans](#)

- Strategies should be articulated for transparent, culturally appropriate, and scientifically sound public health communication in extreme weather and disaster scenarios, with a clear scope of information and method of communication tailored for each audience (e.g., media, public, health personnel, emergency responders)
- Medium- and long-term plans for disease control programmes should be revised to consider capacities that may be stressed or exceeded by climate change
- National disaster risk reduction strategies and plans should be updated to include clear operational guidelines for responding to climate-sensitive health risks
- *Explore new funding channels and support the development of new financing tools for climate-health integration*
 - Health ministries should be encouraged and supported to:
 - Include climate change as a line item in national or subnational health investment plans
 - Incorporate contingencies, adaptation costs, and potential losses and damages from climate change into major public spending plans
 - Conduct public expenditure reviews to inform sector-specific budget allocation with a climate change adaptation perspective, ensuring linkage with National Health Accounts
 - Conduct micro- and macroeconomic evaluations of climate change–related health interventions
 - Quantify economic returns from health co-benefits of policy actions
 - Possible mechanisms for accessing new financial resources for climate adaptation in the health sector include:
 - Submission of projects and programmes for building health system resilience or responding to climate-sensitive diseases to major international climate change funds (e.g., the GEF, Special Climate Change Fund, Least Developed Countries Fund, Adaptation Fund)
 - Submission of a [Green Climate Fund \(GCF\) Readiness proposal on climate change and health](#) to the respective WHO regional office
 - Negotiations with bilateral donors and multilateral development agencies around mainstreaming health adaptation into existing development and emergency response budgets
 - Public-private partnerships to approach climate finance



Objective 2: Enhancing Regional Climate-Health Practice

To enhance regional practice on climate-health integration—that is, support and collaborate with health workers, including both national authorities and private sector

players, and on-the-ground field partners on actions to reduce health vulnerability to climate change—GHD|EMPHNET can:

- *Support partners (by involving FETPs, academics, and civil society) in conducting climate change and health vulnerability assessments and health impact assessments for key adaptation policies and programmes*
 - Emphasis should be placed on identifying the most vulnerable populations and areas most prone to health risks of climate change
 - Baseline rates should be established for all climate-sensitive diseases to allow for the selection of priority risks and continuous monitoring of changing risk conditions
 - Partners should be encouraged to direct focus towards [expert-identified research priorities](#) for the region, including but not limited to:
 - Effects of climate change on the epidemiology of vector-borne diseases at the regional level, including the generation of stronger biological data to inform predictive models and support monitoring and characterization of the most relevant vectors
 - Environmentally driven morbidity and mortality from exposure to heat and air pollution
 - Impacts of dust exposure on chronic health conditions
 - Mental health challenges of displaced populations
 - Unique climate-health vulnerabilities of individuals residing in refugee/displaced person camps and temporary settlements
 - Temperature raises and vector-borne diseases control
- *Support the development and practical application of integrated surveillance and climate-health early warning systems*
 - Public health surveillance efforts should emphasize particular focus on:
 - Tracking of vector-borne disease spread across borders
 - Collection of information on the frequency and magnitude of climate change–related health outcomes with concurrent linkage to environmental and meteorological indicators
 - Early warning systems should be coupled with and supported by:
 - Use of early detection tools (e.g., rapid diagnostics, syndromic surveillance) to identify changing incidence of climate-sensitive diseases (e.g., heat-stress, zoonotic diseases, undernutrition)
 - Use of advanced meteorological modeling schemes for the prediction of extreme weather events
 - Encourage countries and work with interested partners to implement heat-health action plans with core elements as recommended by the WHO (see [WHO heat-health action plans guidance](#))
 - Contribute towards regular evaluation of the robustness of predictive models (see [WHO quality criteria for the evaluation of climate-informed early warning systems for infectious diseases](#))



- Regular assessment of the response capacity of health systems to early warning system-informed emergency declarations
- *Support implementing partners in launching new health projects which directly target the health impacts of climate change or adapting existing health projects to incorporate a climate change agenda where one is lacking*
 - All projects should be informed by locally implemented health vulnerability assessments and designed in alignment with pre-identified priority health needs in the respective implementation setting
 - All projects should prioritize building local community capacity to proactively adapt and be responsively resilient to climate change-driven health hazards
 - New project ideas include but are not limited to:
 - Ecosystem-based adaptation activities which focus on restoring health-promotive ecosystem services
 - Behaviour change projects which increase public awareness of climate change-related health risks with emphasis on social mobilization and educate on practical prevention measures (e.g., safety precautions during heat waves, elimination of vector habitats, mask-wearing in areas of high atmospheric dust content)
 - Clean cooking stove projects to reduce indoor respiratory health hazards and support the shift away from carbon-based fuel sources
 - Initiatives that build climate-resilient food systems in regions with high malnutrition rates
 - Vector-borne disease control efforts in climate-vulnerable, high-risk areas
 - Existing project adaptations could include:
 - Upgrades to WASH projects to maximize water and sanitation infrastructure durability against extreme weather hazards (see [Strategic Framework for WASH Climate Resilience](#))
 - Incorporation of climate-health behaviour change communication into established community health worker programs
 - Integration of meteorological variables into existing epidemiological predictive modeling
- *Support healthcare facilities¹ in implementing reforms to boost climate resilience, increase environmental sustainability, and advance on the path toward carbon neutrality (for mitigation purposes)*



¹ Note the WHO working definition of climate-resilient and environmentally sustainable health care facilities as those capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, so as to bring ongoing and sustained health care to their target population and protect the health and well-being of future generations

- Examples of suitable reforms may include:
 - Sustainability in the selection of products and procurement of services, including energy, water, transport, and waste management (see [UN Health Facility Electrification Energy Compact](#))
 - New regulations on emissions from the production of facility-supplied medicines and medical equipment, including mandates for declarations of products' carbon intensity and implementation of carbon taxes where appropriate
 - New mechanisms launched to monitor carbon emissions and the environmental footprint of individual health facilities
 - New regulations governing the construction and retrofitting of healthcare facilities to optimize durability against extreme weather events
 - New requirements on minimum staffing numbers during extreme weather events and other climate-induced shocks
 - Upgrades to water and sanitation infrastructures, hygiene standards, and infection prevention and control measures to better manage waterborne and vector-borne disease outbreaks and prevent nosocomial spread
 - Upgrades to procedures for managing medical waste to maximize environmental sustainability
- Useful resources:
 - See [WHO checklists to assess vulnerabilities in healthcare facilities in the context of climate change](#)
 - See Health Care Without Harm's [Global Road Map for Health Care Decarbonization](#)
 - See [WHO guidance for climate resilient and environmentally sustainable health care facilities](#)
- *Support initiatives that build health workforce capacity to respond to climate shocks and to prevent, control, and contain climate-sensitive disease outbreaks*
 - Health workforce capacity building efforts should include:
 - Education on the use of early warning systems to predict acute shocks and climate-sensitive disease outbreaks
 - Education on contingency planning for deployment of sufficient health personnel in cases of acute shocks and climate-sensitive disease outbreaks
 - Education on rapid communication, data sharing, and dissemination of information across diverse stakeholders and levels of government in cases of acute shocks and climate-sensitive disease outbreaks
 - Training on treating morbidity related to extreme weather events such as heat waves, cold spells, floods, storms, wildfires, etc.



- Training on public health risk communication for building awareness on climate-health linkages and promoting positive individual-level behaviour change, where possible
- Training on monitoring climate-related morbidity and mortality using advanced hospital record-keeping systems
- Integration of climate change and health content into secondary and tertiary education curricula for all frontline health workers
- Useful resources:
 - See [Core Competencies for Health Workers to Deal with Climate and Environmental Change](#)
 - See [WHO Climate Change and Health Training Modules](#)
 - See [Climate Resources for Health Education](#)
- *Support rapid responsiveness to emerging health needs in displacement contexts and “climate proofing” of refugee and IDP camps and highly vulnerable groups across the region*
 - Priority actions for addressing refugee and migrant health needs should include:
 - Improvement of mental health and trauma care services for climate refugees and forcibly displaced persons
 - Enactment of sites providing screening and therapeutic foods for the treatment of acute malnutrition during droughts and other climate change-driven emergencies
 - Access to primary health care and safe WASH facilities in camps and along key migration routes
 - Strengthening of emergency preparedness response plans to incorporate transition and recovery programs and assist the most vulnerable in relocating away from high-risk areas while ensuring basic needs are met, such as access to adequate shelter, food, clean water, clothing, and medication
 - Possible interventions for “climate proofing” refugee and IDP camps could include:
 - Camp land-use planning with a focus on flood and erosion control and promotion of alternative climate-smart livelihoods
 - Establishment of agroforestry systems to restore ecosystems that are critical to meet climate adaptation needs
 - Construction of rainwater harvesting systems and climate-resilient WASH facilities
 - Site stabilization measures where landslide risk is high
 - Infrastructural upgrades to ensure compliance with [UNHCR Emergency Shelter Standards](#) so that shelters provide protection from the elements and are adequate regardless of seasonal weather patterns
 - Any of the above actions could be augmented through the enactment of a repository of climate-related displacement and migration data at



the regional level (see the [MENA Academic Journal and Digital Platform on Displacement](#))

Objective 3: Building Regional Climate-Health Partnerships

A network of civil society players is already active in the domain of climate-health integration and climate change adaptation, more broadly. Given the EMR's climate vulnerability, many of these actors have a presence in the region and could offer useful support to GHD|EMPHNET in advancing its agenda for integration of climate change action into Health Programs in accordance with the above-listed priority action items. Some lead players that GHD|EMPHNET should consider partnerships at both regional and national levels are outlined below. Such partnerships, however, should be coupled with ongoing efforts to collaborate with national entities, including but not limited to Ministries of Health and national climate change working groups.



- [WHO Regional Office for the Eastern Mediterranean \(WHO EMRO\)](#):
 - GHD|EMPHNET countries with current presence:
 - Afghanistan, Egypt, Iraq, Jordan, Libya, Morocco, Pakistan, Somalia, Sudan, Tunisia, Yemen
 - Opportunities for collaboration:
 - Partnership with [Regional Centre for Environmental Health Action \(CEHA\)](#) on [existing efforts](#) to support Member States in protecting health from climate change by a) developing evidence-based policies, strategies, and recommendations, b) identifying, preventing, and addressing public health problems resulting from climate change, c) disseminating tools, guidance, information, and training packages to support national awareness and advocacy campaigns on health vulnerability and adaptation to climate change, d) building capacity and providing training to the health sector to assess and monitor health vulnerability to climate change, and e) providing technical support in the preparation of national adaptation plans within health sector plans to protect health from climate change
- [Centers for Disease Control and Prevention \(CDC\)](#):
 - GHD|EMPHNET countries with current presence:
 - Egypt, Jordan, Pakistan, Bangladesh
 - Opportunities for collaboration:
 - Partnerships on emerging infectious disease programs with a focus on climate-sensitive vector-borne and waterborne diseases
- [UNICEF Middle East and North Africa](#):
 - GHD|EMPHNET countries with current presence:
 - Egypt, Iraq, Jordan, Libya, Morocco, Sudan, Tunisia, Yemen
 - Opportunities for collaboration:

- Partnerships on health, nutrition, and WASH programs with focus on diarrheal disease prevention in flood-prone areas, malnutrition screening, prevention, and treatment in drought-prone areas, and early childhood immunization against climate-sensitive vector-borne and waterborne diseases
- [United Nations Environment Programme \(UNEP\)](#):
 - GHD|EMPHNET countries with current presence:
 - All countries
 - Opportunities for collaboration:
 - Partnerships on disaster risk reduction (DRR) programs, including the launching of Ecosystem-based DRR in GHD|EMPHNET countries facing ecosystem degradation and loss of health-promotive ecosystem services (e.g., resource provision, water filtration, soil nutrient cycling, flood control)
 - Partnerships on restoring clean air in heavily polluted settings
 - Partnerships on first ever development and/or retroactive upgrading of National Adaptation Plans with governments of GHD|EMPHNET countries lacking health sector adaptation roadmaps
- [UN Habitat](#):
 - GHD|EMPHNET countries with current presence:
 - All countries
 - Opportunities for collaboration:
 - Partnerships in cities across GHD|EMPHNET countries heavily affected by climate change-driven rural-urban migration on projects in domains of urban health, water and sanitation, and slum upgrading (e.g., for reduced infectious disease spread, vector breeding, etc.)
- [UNHCR MENA](#):
 - GHD|EMPHNET countries with current presence:
 - All countries
 - Opportunities for collaboration:
 - Partnerships on ensuring access to healthcare, providing mental health and psychosocial support services, and optimizing nutrition and WASH in disaster displacement contexts
 - Joint planning with the Middle East and North Africa Civil Society Network for Displacement on common strategies for responding to health implications of climate-related displacement and migration
- [Famine Early Warning Systems Network \(FEWS NET\)](#):
 - GHD|EMPHNET countries with current presence:
 - Afghanistan, Somalia, Sudan, Yemen
 - Opportunities for collaboration:

- Partnerships on tracking key nutrition indicators, linking food security data to public health outcomes, and coordinating emergency response deployment to acute malnutrition in drought-stricken settings with a focus on [Infant and Young Child Feeding in Emergencies \(IYCF-E\)](#)
- [International Association of National Public Health Institutes \(IANPHI\)](#):
 - GHD|EMPHNET countries with current presence:
 - Afghanistan, Jordan, Libya, Morocco, Pakistan, Somalia, Sudan, Tunisia, Bangladesh
 - Opportunities for collaboration:
 - Cross-regional networking and dialogue between member public health institutes
 - Access to additional expertise from members involved in conception of [IANPHI Roadmap for Action on Health and Climate Change](#) and other relevant [IANPHI toolkits](#)
- [World Federation of Public Health Associations \(WFPHA\)](#):
 - GHD|EMPHNET countries with current presence:
 - Afghanistan, Egypt, Jordan, Somalia, Sudan, Tunisia, Yemen, Bangladesh
 - Opportunities for collaboration:
 - Cross-regional networking and dialogue between member public health associations
 - Research partnerships involving environmental health working group interns and climate-migration-health subcommittee members

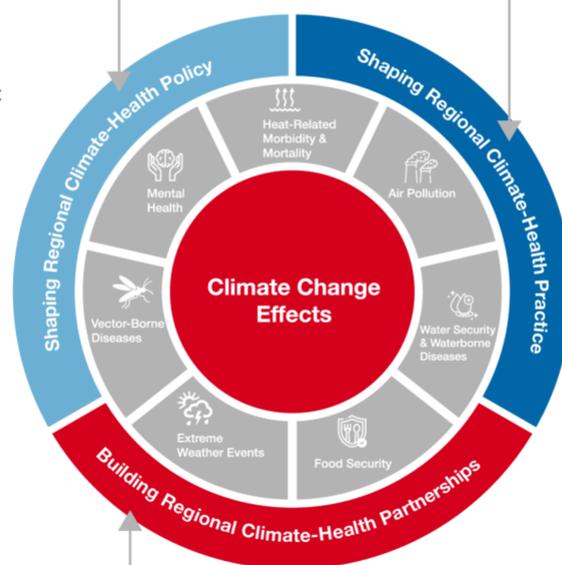
The diagram below summarizes the overall concept describing effects of different climate alongside various actions to ensure climate-health integration to enhance the resilience against the health consequences of climate change in the EMR and beyond under the three main objectives or domains.

Activities

-  Support clear public health strategies within National Adaptation Plans
-  Support the creation of working groups for interdisciplinary coordination of responses to climate-health risks
-  Provide technical support to update policies and guidelines to incorporate emergency contingency measures for climate risks
-  Support the development of new funding channels for climate-health integration

Activities

-  Increase partnerships at the regional and national levels coupled with ongoing efforts to collaborate with national entities



Activities

-  Support the development and practical application of integrated surveillance and climate-health early warning systems
-  Support launching and adapting health projects which directly target the health impacts of climate change
-  Support healthcare facilities boosting climate resilience, increasing environmental sustainability, and advancing carbon neutrality
-  Support initiatives which build health workforce capacity to respond to climate-related events
-  Support rapid responsiveness to emerging health needs in displacement contexts

Figure 4: Summary of Climate Change Health Effects and Actions to Ensure Climate-Health Integration

Conclusions and Next Steps:

Climate change hugely affects social determinants of health which are the grassroot for health consequences in populations. Meanwhile, climate change is a complex issue driven by several factors including political stability and economic development among other, thus, it requires innovative approaches that incorporates multiple sectors. As climate change effects continue to affect public health, a multisectoral approach is required to tackle this issue. On the other hand, there is a need for more publicity and support from governments to be able to act on climate change at a wider scale. The climate-health integration framework in the region will require the support and commitment of all stakeholders across the EMR to implement priority activities and ensure progress. GHD|EMPHNET will work with countries and key audiences such as policy makers, local health departments, grassroots and non-profit organizations, local partners, and communities.

Climate-Health integration framework has been widely proposed as a necessary step in addressing public health issues. Climate change is a complex issue driven by several factors such as political stability and economic developed, thus, requires innovative approaches that incorporates multiple sectors.

As an immediate next step, GHD|EMPHNET will organize a regional event with the countries to formulate a roadmap toward climate-health integration that will shape/re-shape and ensure the integration of climate agenda into the current health systems of the countries in the EMR and beyond.

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GHD|EMPHNET: Working Together for Better Health

The Eastern Mediterranean Public Health Network (EMPHNET) is a regional network that focuses on strengthening public health systems in the Eastern Mediterranean Region (EMR) and beyond. EMPHNET works in partnership with ministries of health, non-government organizations, international agencies, private sector, and relevant institutions from the region and the globe to promote public health and applied epidemiology. To advance the work of EMPHNET, Global Health Development (GHD) was initiated to build coordination mechanisms with partners and collaborators. Together, GHD|EMPHNET is dedicated to serving the region by supporting efforts to promote public health policies, strategic planning, sustainable financing, resource mobilization, public health programs, and other related areas.