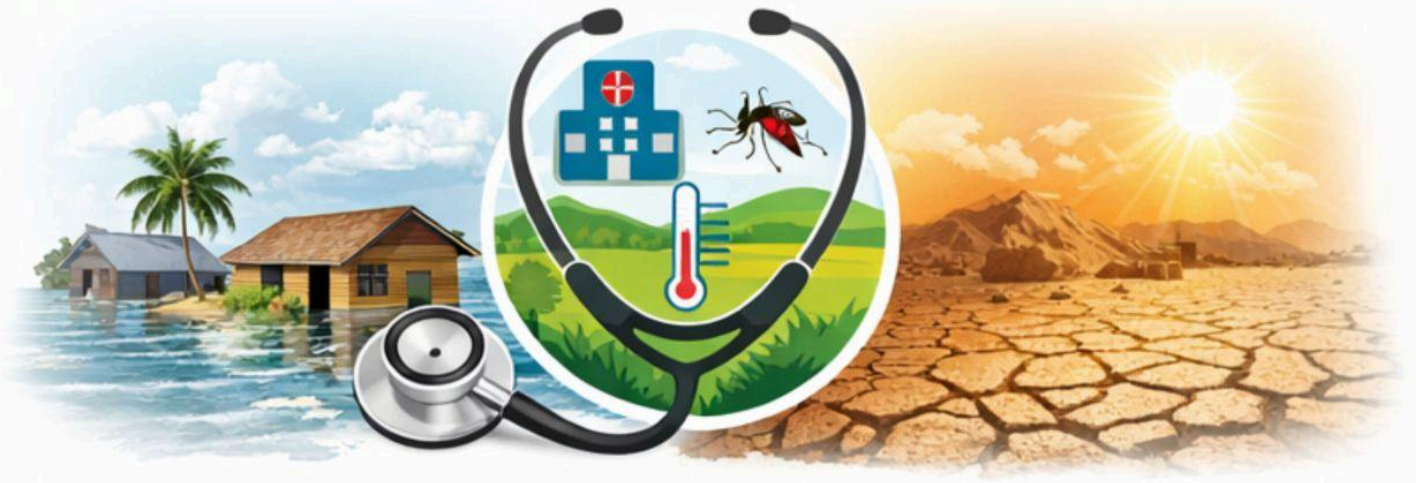
Health National Adaptation Plan (HNAP) Bangladesh

2026-2031



Ministry of Health and Family Welfare
Government of the People's Republic of Bangladesh

Foreword

Bangladesh is widely recognized as one of the countries most vulnerable to the adverse impacts of climate change, ranking 7th on the 2021 Global Climate Risk Index. Due to its geographic location, population density, and socioeconomic context, the country faces severe and multifaceted climate-related challenges that significantly affect public health. Rising temperatures, shifting and irregular rainfall patterns, sea-level rise, ocean acidification, and the increasing frequency and intensity of cyclones, flooding, droughts, and other extreme weather events are posing growing risks to millions of Bangladeshis. These impacts disproportionately affect vulnerable populations, exacerbating both existing and emerging health challenges.

Climate change influences health through both **direct and indirect pathways**. These include a rising burden of **vector-borne diseases** (such as malaria, dengue, chikungunya, and Japanese encephalitis); **water-borne and water-related diseases** (such as cholera and other diarrhoeal illnesses); increased maternal health complications from extreme heat, air pollution; **non-communicable diseases, injuries, increased risk of gender-based violence,** increased maternal morbidity and mortality linked to extreme weather; **undernutrition** driven by climate-induced disruptions in agriculture; and **mental health impacts** arising from climate-related stressors and disasters. Additionally, deaths and injuries caused by natural hazards continue to increase as climate variability intensifies.

To safeguard the physical, mental, and social well-being of the population, Bangladesh must strengthen the resilience of individuals, communities, and the overall health system. Key priorities include improving awareness and communication regarding climate-related health risks; promoting community-based health adaptation; building the capacity of the healthcare workforce; developing climate-resilient and environmentally sustainable health infrastructure; and integrating climate considerations into all levels of health planning and service delivery.

The **Bangladesh Health–National Adaptation Plan (HNAP) 2026** is designed to guide health-sector action over the next five years and beyond. The HNAP builds upon existing national efforts and provides a strategic framework for integrating climate change and health risks into national policies, plans, programmes, and monitoring systems. Aligned with the **National Adaptation Plan (NAP) 2022**, the HNAP promotes coordination across government entities, non-governmental stakeholders, and development partners. Its core objectives include reducing the health burden of climate change, strengthening the adaptive capacity of health systems, enhancing preparedness and response capabilities, and ensuring equitable, gender-responsive access to climate-resilient health services.
Bangladesh is also a signatory to the **COP26 Health Programme**, which outlines two key commitments:

Commitment 1: Climate-Resilient Health Systems

- Conduct climate change and health vulnerability and adaptation assessments (V&As) at both population and facility levels.
- Develop a Health–National Adaptation Plan informed by the V&A and integrated within the national NAP.
- Use the V&A and HNAP to facilitate access to global climate financing for health adaptation, including opportunities through the Green Climate Fund, Adaptation Fund, Global Environment Facility, and other climate finance mechanisms.

Commitment 2: Sustainable, Low-Carbon Health Systems

- Establish a target date for achieving net-zero emissions in the health sector (for high-ambition/high-emitting nations).
- Conduct a baseline assessment of greenhouse gas emissions from the health system, including supply chains.
- Develop an action plan or roadmap to transition to a low-carbon, environmentally sustainable health system, with attention to reducing air pollution exposure.

The Ministry of Health and Family Welfare (MOHFW) fully endorses the HNAP as a guiding framework for advancing climate change adaptation within the health sector. The HNAP also incorporates cost-benefit considerations and provides strategies for human and financial resource mobilization, leveraging both national and international funding sources. Its development involves broad participation from government, academia, civil society, and development partners, ensuring a comprehensive and inclusive approach.

Despite being highly vulnerable, Bangladesh has repeatedly demonstrated resilience in the face of climate challenges. The HNAP aims to build on this foundation by fostering collaboration, strengthening capacities, and ensuring long-term preparedness for climate-related health risks. By implementing this strategic plan, Bangladesh will be better equipped to protect public health, promote sustainable development, and enhance national resilience to the accelerating impacts of climate change.

Preface

Bangladesh stands at the frontline of the global climate crisis. Its geographical location, dense population, and socio-economic context render the country highly vulnerable to the adverse impacts of climate change. Rising temperatures, erratic rainfall, sea-level rise, salinity intrusion, and the increasing frequency and intensity of cyclones, floods, droughts, and heatwaves are already affecting the health and well-being of millions of people. These climate-induced stresses pose serious risks to public health systems, disproportionately impacting women, children, the elderly, persons with disabilities, and marginalized communities.

Climate change is reshaping the epidemiological landscape of Bangladesh. The increasing incidence of vector-borne and water-borne diseases, heat-related illnesses, respiratory conditions linked to air pollution, nutrition insecurity, maternal and child health vulnerabilities, and mental health challenges underscore the urgent need for a climate-resilient health system. Health facilities, supply chains, and essential service delivery mechanisms are increasingly exposed to climate-related shocks and stresses, particularly in high-risk geographical areas.

Recognizing these challenges, the Government of the People's Republic of Bangladesh, through the Ministry of Health and Family Welfare (MoHFW), has developed the Health National Adaptation Plan (HNAP) 2026 as a strategic and operational framework to build a low-carbon, sustainable, and climate-resilient health system. The HNAP is fully aligned with the National Adaptation Plan (2023–2050) led by the Ministry of Environment, Forest and Climate Change and reflects Bangladesh's commitments under the United Nations Framework Convention on Climate Change, the Paris Agreement, and the COP26 Health Programme.

The HNAP 2026 provides strategic guidance for integrating climate change considerations into national health policies, plans, programmes and financing frameworks. It draws upon previous vulnerability and adaptation assessments, national sectoral strategies, and global guidance, including the World Health Organization's Operational Framework for Building Climate-Resilient and Low-Carbon Health Systems (2023). The Plan outlines priority actions to strengthen climate-transformative leadership and governance; develop a climate-smart health workforce; enhance surveillance, early warning and research systems; promote resilient and low-carbon health infrastructure; ensure continuity of essential health and nutrition services; and mobilize sustainable climate and health financing.

This document also recognizes the interlinkages between climate change, nutrition, WASH, gender equality, mental health, environmental determinants, and community resilience. It emphasizes inter-sectoral collaboration and community engagement as essential pillars for effective adaptation. Furthermore, it incorporates costing, financing strategies, and a comprehensive monitoring and evaluation framework to ensure accountability and measurable progress.

Bangladesh has demonstrated remarkable resilience in addressing disasters and public health challenges. The Health National Adaptation Plan 2026 builds upon this legacy and strengthens the health sector's capacity to anticipate, prepare for, respond to, and recover from climate-related shocks and stresses. Through coordinated implementation, sustained investment, and strategic partnerships, Bangladesh is committed to safeguarding public health, advancing Universal Health Coverage, achieving the Sustainable Development Goals and protecting future generations in the face of an increasingly uncertain climate.

Acknowledgement

The Health National Adaptation Plan (HNAP) 2026 for Bangladesh is the result of a collaborative and consultative effort to address the growing health impacts of climate change in Bangladesh. The Ministry of Health and Family Welfare (MoHFW) extends its sincere appreciation to all the institutions, development partners, experts, academia and stakeholders whose commitment and technical contributions made this strategic document possible.

The Ministry of Health and Family Welfare expresses its sincere appreciation to the Directorate General of Health Services (DGHS), the Institute of Epidemiology, Disease Control and Research (IEDCR), and the Climate Change and Health Promotion Unit (CCHPU) for their technical leadership and coordination throughout the formulation process. Their dedication and expertise have been instrumental in shaping a comprehensive and evidence-based national framework.

The Ministry gratefully acknowledges the technical support provided by the World Health Organization (WHO) and the United Nations Population Fund (UNFPA), whose guidance ensured alignment with global best practices and the WHO Operational Framework for Building Climate-Resilient and Low-Carbon Health Systems (2023). Appreciation is also extended to the United Nations Children's Fund (UNICEF) and other development partners for their valuable inputs on child health, nutrition, and climate resilience.

We acknowledge the contributions of the Ministry of Environment, Forest and Climate Change and other relevant ministries, divisions and agencies for their cooperation in aligning the HNAP with the National Adaptation Plan (2023–2050), Nationally Determined Contributions (NDCs), and the Bangladesh Climate Change Strategy and Action Plan. Inter-ministerial collaboration has strengthened the coherence and feasibility of this strategic document.

Special thanks are extended to members of the Technical Working Group, academic and research institutions, professional bodies, civil society organizations, and representatives from vulnerable communities who participated in key informant interviews, stakeholder consultations, and validation workshops. Their practical insights and field experiences have enriched the Plan and ensured that it reflects ground realities.

Finally, the Ministry acknowledges all individuals and institutions whose commitment to climate action and public health resilience made this document possible. The successful implementation of the HNAP 2026 will depend on sustained leadership, coordinated action, adequate financing, and continued partnership at national and international levels.

Together, we reaffirm our shared responsibility to build a resilient, sustainable, and equitable health system capable of protecting the health and well-being of present and future generations from the adverse impacts of climate change.

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❖ Abbreviations and Acronyms

ADB	Asian Development Bank
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BFD	Bangladesh Forest Department
BDRCS	Bangladesh Red Crescent Society
BHE	Bureau of Health Education
BMD	Bangladesh Meteorological Department
BNNC	Bangladesh National Nutrition Council
BRTA	Bangladesh Road Transport Authority
BUET	Bangladesh University of Engineering and Technology
C3HNAP	Comprehensive Climate Change and Health-National Adaptation Plan
CBHC	Community-Based Health Care
CC&H	Climate Change and Health
CCHPU	Climate Change and Health Promotion Unit
CDC	Communicable Disease Control
CMSD	Central Medical Stores Depot
COP-18	Conference of Parties
COPD	Chronic Obstructive Pulmonary Disease
CSD	Climate-sensitive Diseases
CSO	Civil Society Organization
DAE	Department of Agricultural Extension
DDM	Department of Disaster Management
DGHS	Directorate General of Health Services
DGME	Directorate General of Medical Education
DoE	Department of Environment
DPHE	Department of Public Health Engineering
ERD	Economic Relations Division
FY	Finance Year
GCF	Green Climate Fund
HNAP	Health National Adaptation Plan
HEU	Health Engineering Unit
HED	Health Engineering Department
HPNSDP	Health Population and Nutrition Sector Development Plan
ICMH	Institute of Child and Maternal Health
icddr,b	International Centre for Diarrhoeal Disease Research, Bangladesh
IEDCR	Institute of Epidemiology, Disease Control and Research
INDC	Intended Nationally Determined Contributions
IPH	Institute of Public Health
IPHN	Institute of Public Health Nutrition
LGED	Local Government Engineering Department
M&E	Monitoring and Evaluation
MODMR	Ministry of Disaster Management and Relief
MoEFCC	Ministry of Environment, Forest and Climate Change
MoF	Ministry of Finance
MoHFW	Ministry of Health and Family Welfare
MoP	Ministry of Planning
MoU	Memorandum of Understanding

NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NBR	National Board of Revenue
NCDC	Non-Communicable Disease Control
NDMC	National Disaster Management Council
NDC	Nationally Determined Contributions
NIPSOM	National Institute of Preventive and Social Medicine
NNS	National Nutrition Services
PHC	Primary Health Care
PMR	Planning, Monitoring, and Research
PPP	Public-Private Partnerships
PTSD	Post-Traumatic Stress Disorder
PFM	Public Financial Management
SDG	Sustainable Development Goals
SNC	Second National Communication
UHC	Universal Health Coverage
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UNFCCC	United Nations Framework Convention on Climate Change
V&A	Vulnerability and Adaptation
VBD	Vector-borne Disease
WASH	Water, Sanitation, and Hygiene
WBD	Water-borne Disease
WHO	World Health Organization

Definitions

Adaptation refers to the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human interventions may facilitate adjustment to expected climate and its effects. In public health, the analogous term is “prevention”.

Adaptive capacity is the ability of a system to adjust to climate change, to moderate potential damage, to take advantage of opportunities, or to cope with the consequences.

Climate change refers to any change in the climate over time, generally decades or longer, whether due to natural variability or as a result of human activity.

Climate variability refers to trends in variation in the mean state and other statistics of the climate on all temporal and spatial scales beyond that of individual weather events. Extreme weather (storms, extreme temperatures) and climate events (drought) are part of climate variability trends.

Climate-resilient health systems have the ability to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, so as to bring sustained improvements in population health, despite an unstable climate.

Climate-sensitive health outcome is any health outcome whose geographic range, incidence or intensity of transmission is directly or indirectly associated with weather or climate.

Climate-related risks are additional (exacerbated) risks that people and their livelihoods and assets face due to climate change. ese risks can be direct, such as in exposure to more frequent heat waves or floods; or indirect, such as when a drought negatively impacts food supplies (and prices) and in effect livelihoods and nutrition.

Climate resilient and low carbon health systems are those capable of anticipating, responding to, coping with, recovering from, and adapting to climate-related shocks and stress, while minimizing GHG emissions and other negative environmental impacts to deliver quality care and protect the health and well-being of present and future generations. (WHO Operational Framework 2023)

Low carbon health systems are those capable of implementing transformative strategies towards reducing GHG emissions in their operations, reducing short- and long-term negative impacts on the local and global environment. (WHO Operational Framework 2023)

Exposure is the amount of a factor to which a group or individual is exposed; sometimes contrasted with dose (the amount that enters or interacts with the organism). Exposures may be either beneficial or harmful. Exposure to climatic conditions that affect health is heavily influenced by location, socioeconomic conditions and human behavior.

Resilience is the capacity of a social-ecological system to cope with a hazardous event or disturbance, responding or reorganizing in ways that maintain its essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

Vulnerability is the degree to which individuals and systems are susceptible to or unable to cope with adverse effects of climate change including climate variability and extremes. e vulnerability and coping capacity of particular populations to changing meteorological conditions and its human and social consequences is influenced by a variety of factors. These include biological factors, sociocultural factors and access to and control over resources.

Executive Summary

Bangladesh stands among the countries most vulnerable to the impacts of climate change due to its geographical position and socio-economic conditions. Country's health sector faces significant challenges posed by climate change, including increased incidences of vector- borne diseases, water-borne illnesses, and nutrition-related conditions due to altered agricultural outputs. Extreme weather events such as cyclones and floods exacerbate these challenges, directly impacting public health infrastructure and services. The document reviews historical and projected climate trends to tailor its strategies effectively.

The Health National Adaptation Plan (HNAP) (2026) for Bangladesh is a comprehensive strategic document designed to build a low-carbon, sustainable, and climate-resilient health system. Recognizing the country's vulnerability to climate-related health risks, the HNAP aims to enhance the resilience of the health sector and protect public health from the adverse effects of climate change over the next five years and beyond.

The impacts of climate change are already evident in Bangladesh. These include rising temperature leading to heat stress, changes in seasonal patterns and air pollution spikes, and increasing frequency of extreme weather events like flash floods, droughts, severe tropical cyclonic storms, prolonged heat waves, rising sea levels, and intense rainfall. Such events pose significant threats to the health and well-being of millions of people especially pregnant women and children in climate vulnerable areas and are expected to intensify in the coming decades.

Health vulnerability and adaptation assessments conducted in 2011, 2015 and 2021 have provided critical insights into the health risks posed by climate change in Bangladesh. The priority climate-sensitive health outcomes identified in these assessments include vector-borne diseases, water-borne diseases, airborne illnesses, skin diseases, and respiratory-related ailments and other health hazards aggravated by extreme heat. Global and local evidence show increased risk to maternal health from exposure to extreme heat, air pollution and disruption in access to health services during climate induced natural hazards. Additionally, the assessments highlight the growing burden of non-communicable diseases, mental health challenges, and the health impacts of extreme weather events, including under-nutrition, food insecurity, and effects on water, sanitation, and hygiene infrastructure and services.

The objective of the HNAP 2026 is to provide strategic guidance to develop a health system capable of anticipating, preparing for, and responding promptly to climate-related health challenges. enhance the ability to design and implement adaptation measures to prevent and overcome existing and future health risks particularly for women, adolescents and children associated with climate change, Incorporate climate change factors and health risks into national health policies, planning, programming strategies, and action plans. Ensure the health sector works in collaboration and coordination with partners in environment, and other relevant sectors, develop climate-resilient health systems and community-led adaptation through participatory community engagement. The HNAP 2026 incorporates an expanded focus on climate-induced diseases and hazards (e.g., Dengue, malaria, heat wave, extreme weather evets, air pollution and air quality). It prioritizes continuity of essential sexual and reproductive health services including clinical management of rape and GBV response as part of climate-resilient health service delivery and emergency preparedness. It also addresses mental health challenges as well as the impacts of climate change on nutrition and food security. Furthermore, it will assist to decrease in the incidence of climate-sensitive diseases such as dengue, malaria, heat-related illnesses, and water-borne diseases, enhanced capacity of health systems to withstand climate shocks and stresses and thereby improve public health outcomes including equitable access to healthcare services, contributing to the overall well-being.

The HNAP 2026 is finalized in collaboration with IEDCR, DGHS of MoHFW, CCHPU of Ministry of Health and Family Welfare (MoHFW) and other key climate change and health-related stakeholders with technical support from the World Health Organization (WHO). The present version of Health National Adaptation Plan (HNAP) is developed due to evolving climate and health landscape changes over the past five years. This revision aligns with the WHO Operational Framework for Building Climate-Resilient and Low-Carbon Health Systems (2023).

Integrating the current climate change policy documents like Nationally Determined Contribution (NDC) and National Adaptation Plan (2023-2050) along with Bangladesh Climate Change Strategic Action Plan 2009 into the development of a climate resilient health service system has been proposed as the core activities of this Health National Adaptation Plan (HNAP). The HNAP 2026 considered the following 10 key components of the Operational framework for building climate resilient and low carbon sustainable health systems (2023). These components include: Climate-transformative leadership and governance; Climate-smart health workforce; Assessments of Climate and Health, Nutrition Risks and GHG emissions; Integrated Risks, Monitoring, Early Warning and GHG Emissions Tracking; Health, nutrition and Climate Research; Climate Resilience and Low Carbon Infrastructures, Technologies and Supply Chain; Management of environmental determinants of health; Climate informed health and nutrition programs; Climate-related emergency preparedness and management and Sustainable climate health and nutrition financing. It offers guidance on how the health sector can effectively and systematically manage these challenges, contributing to the development of health systems that deliver sustainable, cost-effective, safe, and high-quality care in the face of a changing climate. Additionally, a cost-benefit analysis has been included to strengthen the economic rationale for the proposed interventions.

A detailed Monitoring and Evaluation (M&E) framework accompanies the HNAP to track progress, identify areas for improvement, and ensure accountability. Regular reviews and updates to the plan are mandated to adapt to new scientific findings and shifts in the socio- economic landscape affected by climate change.

Finally, HNAP represents a comprehensive approach to integrating climate resilience into public health planning and response. It aligns with national development goals and international climate adaptation frameworks, aiming to safeguard and promote public health against the backdrop of an increasingly unpredictable climate. The success of this document will depend on continued governmental support, stakeholder engagement, and effective implementation of its strategic actions

1. Introduction and Context

1.1 Climate Change and Health in Bangladesh

Bangladesh is considered one of the most vulnerable countries in the world to the impacts of climate change. Vast coastal areas and a reliance on natural resources combined with high population density and high rates of poverty leave the population at high-risk of extreme weather events, including increasing temperatures, cyclones, erratic rainfall, flooding, drought, rising sea levels, and saltwater intrusion (World Bank, 2022). Bangladesh has a subtropical monsoon climate characterized by wide seasonal variations in rainfall, high temperatures, and humidity. There are four prominent seasons, including winter/northeast monsoon (December February); summer/pre-monsoon (March-May); southwest monsoon (June-September); and autumn/post-monsoon (October-November).

January is the coolest of all months with average temperatures ranging from 18-22°C and April is the warmest month in most parts of the country with average temperatures ranging from 33º-36º C. The country receives on average about 2,200 mm of rainfall per year with most areas receiving at least 1500 mm of rainfall per year (WBG Climate Change Knowledge Portal 2021).

Future Projected Annual Average Temperature (°C)					
Climate Stress Area	Base (1981-2010)	SSP1-2.6		SSP5-8.5	
		2030s (2016-2045)	2050s (2036-2065)	2030s (2016-2045)	2050s (2036-2065)
SWM	25.8	26.5	27.1	26.2	27.7
SEE	25.6	26.2	26.8	26.1	27.5
CHT	25.3	26.1	26.7	25.9	27.4
FPE	24.9	25.7	26.4	25.4	27.0
HFF	24.5	25.3	26.0	25.1	26.8
DBA	25.5	26.2	26.9	25.8	27.5
NNW	24.9	25.6	26.3	25.2	26.9
CBL	25.3	26.0	26.8	25.7	27.4
CHI	25.2	25.9	26.6	25.7	27.3
URB	25.3	26.0	26.7	25.8	27.3
BD	25.5	26.1	26.8	25.9	27.4
BoB *	28.1	28.7	29.0	28.7	29.4

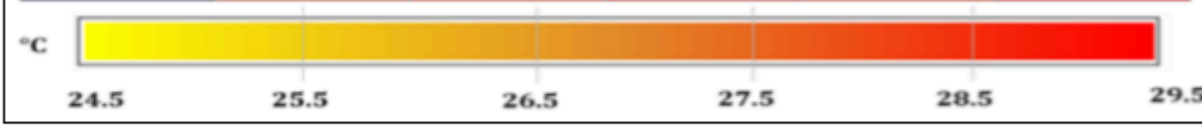


*Figure SEQ Figure * ARABIC 1: Future Projected Annual Average Temperature (°C) Source: (Ministry of Environment, Forest and Climate Change)*

***SWM: Southwestern coastal area and Sundarbans, SEE: Southeast and Eastern Coastal Area, CHT: Chattogram Hill Tracts, FPE: River, Floodplain and Erosion-prone Areas, HFF: Haor and flash flood Area, DBA: Drought Prone and Barind Area, NNW: Northern North-western Region, CBL: Chalan Beel and Low-lying area of the North-western Region, CHI: Char and Islands, URB: Urban Areas, BD: Bangladesh, BOB: Bay of Bengal and Ocean.**

National Guidelines on Heat-Related Illness, MOHFW mentioned about Bangladesh often has some of the warmest day highs in all of Asia, with an average monthly high of roughly 30°C and an average April high of 33°C, according to the UN International Strategy for Disaster Reduction (UNISDR) technical report (2015). The report stated that Bangladesh would soon face “emerging hot and humid seasons, in which the heat index exceeds 35°C.” In the last six decades, the average temperature has risen by 0.7–10 Celsius in Bangladesh. It may rise by 1.40 Celsius in the next three decades.

Hot ambient conditions and associated heat stress can lead to:

- Increase mortality and morbidity
- Increase adverse pregnancy outcomes
- Effect on mental health
- Reduce physical work capacity and motor-cognitive performances
- Increase the risk of occupational health problems

More than 71% of rainfall occurs during monsoon season (Shariot-Ullah, Akhter, Acharjee, & Hasan, 2024). In 2019, the highest relative humidity is observed in the South region, while the Central region shows the lowest humidity levels. The other regions have varying levels of relative humidity, mostly ranging between 76.1% and 80.0% (World Bank, 2021b). Tropical cyclones make landfall in Bangladesh on average once in every two to three years accompanied by heavy rainfall, very high wind speeds, and storm surges. Similarly, rainfall patterns are becoming increasingly erratic resulting in more frequent occurrences of both flooding and drought. Shifts in the intensity and timing of monsoon rains has led to several reoccurring flood events over the past decade, including a 21% reduction in rainfall during the monsoon period (June-August) in 2012.

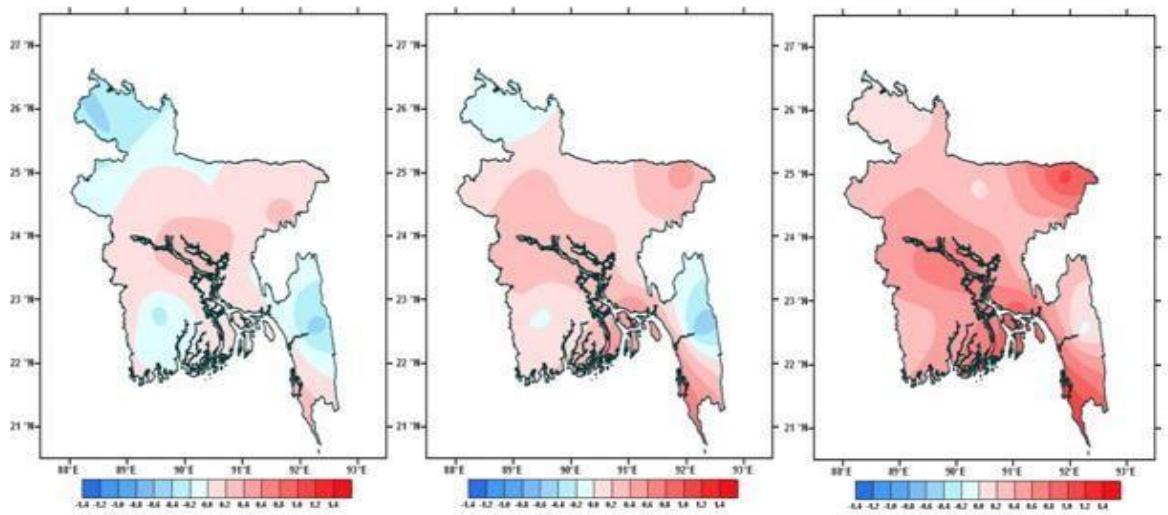


*Figure SEQ Figure * ARABIC 2: Deviation of yearly mean temperature during 1981-1990 (left), 1991-2000 (middle) and 2001-2010 (right) as compared with the previous decades based on local meteorological data Source: Vulnerability and adaptation assessment report. (WHO & IEDCR, 2012)*

Climate change significantly impacts health, in urban settings. The cities are vulnerable to various climate-related challenges, including extreme weather events, air and water pollution, and vector-borne diseases. Bangladesh is experiencing rapid urbanization, with 56% of its population projected to live in urban areas by 2050. The current pace and pattern of urban growth have strained housing and urban services, including access to healthcare and education, significantly compromising the sustainability of both the natural and built environments (Roy, 2021). This rapid urbanization poses public health risks by contributing to environmental degradation, clogged drainage systems, and subsequent waterlogging.

Compounding this issue is the urban heat island effect driven primarily by the absorption and re-emission of heat by urban infrastructure, reduced green spaces, and the concentration of human activities. This phenomenon results in elevated temperatures in urban areas exacerbating the health risks associated with heat waves. The loss of green spaces further exacerbates rising temperatures, increasing the frequency and severity of heat waves, leading to heat-related illnesses and deaths. Vulnerable populations, including the elderly, pregnant women, children, and those with pre-existing health conditions, are at greater risk. According to UNICEF's Children's Climate Risk Index 2021,

children in Bangladesh are at 'extremely high risk' to the impacts of climate change due to their vulnerability and exposure to climate and environmental shocks (UNICEF, 2021). According to the Children's Environmental Health Collaborative, 116,452 years of healthy life lost due to high temperature in children under 20 years, in Bangladesh (CEH, 2024).

Climate change increases risk for adverse pregnancy and maternal health outcomes through direct pathways such as exposure to heat stress, air pollution or disaster-related injury, infections, etc, Indirect pathways driven by health facility closure, disrupted transport, commodity stockouts, reduced access to skilled birth attendance, also prevent pregnant women from receiving timely, evidence-based care. Heightened GBV risk following natural hazards, displacement or as a result from stressful home environment driven by loss of livelihoods or climate uncertainty is also responsible.

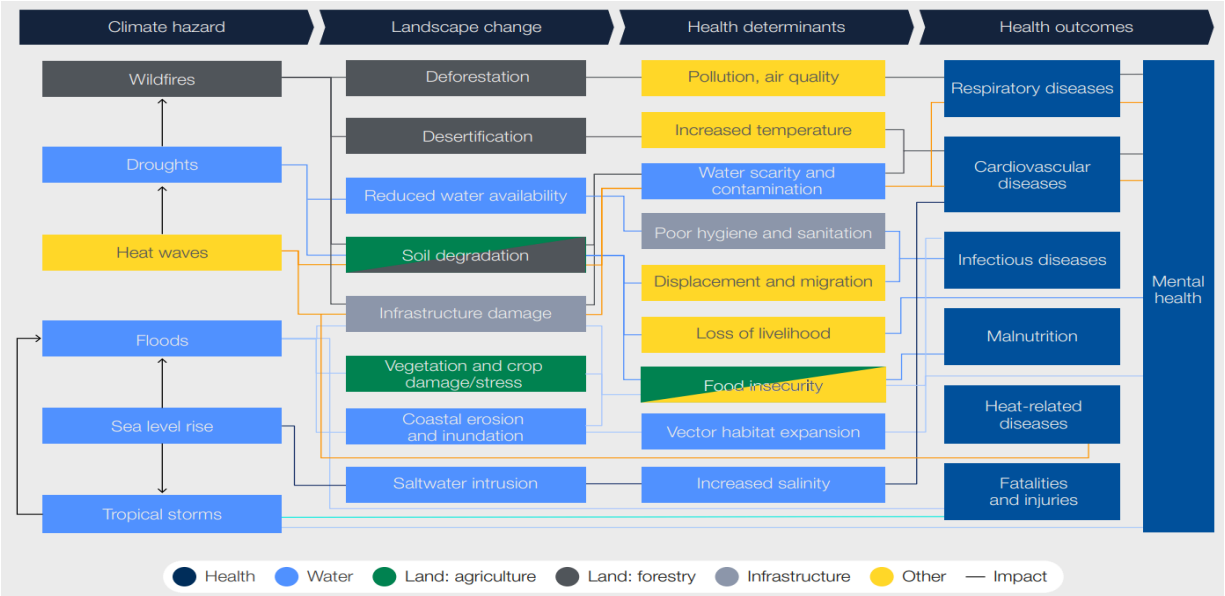
The situation is worsened by poor air quality due to vehicle emissions, industrial activities, and construction, among other factors particular for infants, children, pregnant women. Climate change can worsen air pollution due to increase in dust storms, and wildfire smoke, which aggravate respiratory conditions like asthma and chronic obstructive pulmonary disease (COPD). Additionally, warmer temperatures and altered rainfall patterns create favorable conditions for the breeding of mosquitoes and other vectors. Urban areas may face water scarcity during dry periods, while excessive rainfall can overwhelm sewage and drainage systems, leading to contamination of water supplies and the spread of diseases. To address these challenges, Bangladesh must invest in resilient infrastructure, improve early warning systems for extreme weather events, environmental pollution control, and strengthen timely, equitable and quality healthcare services. Equally important are public awareness campaigns to educate communities about the health risks associated with climate change and promotion of strategies to mitigate its impacts and address to improve energy sources used in homes for cooking and power in rural areas.

In rural areas of Bangladesh, the impacts of climate change on health are profound and multifaceted. These regions often are particularly vulnerable to climate-related health challenges. Flood prone regions in rural areas frequently experience flooding due to monsoons and cyclones. Flood water can contaminate drinking water sources with pathogens, leading to outbreaks of waterborne diseases like cholera, diarrhea, and typhoid. Cyclones and storm surges can cause injuries, fatalities, and displacement. The destruction of homes and infrastructure disrupts healthcare services, exacerbating health issues. Water scarcity and contamination affects the availability and quality of freshwater resources. Droughts can lead to water scarcity, while floods and rising sea levels can contaminate freshwater supplies with saltwater and pollutants, increasing the risk of diseases like diarrhea and skin infections.

Changing temperatures and rainfall patterns create favorable conditions for the breeding of mosquitoes and the spread of vector-borne Diseases like Malaria and Dengue. Rural areas may also experience increased incidence of these diseases as the climate changes. Rural areas often have limited healthcare facilities and resources. Extreme weather events can damage infrastructure, making it difficult to access medical care.

Climate change is transforming the landscape of morbidity and mortality and is already having profound impacts on human health and health systems. Figure 3 shows the cascading effects of climate events and provides valuable insights into the cause-and-effect relationship between climate impacts and health outcomes. Health outcomes involve both direct and indirect consequences of these events – some of which may not appear until months, or even years, after the even

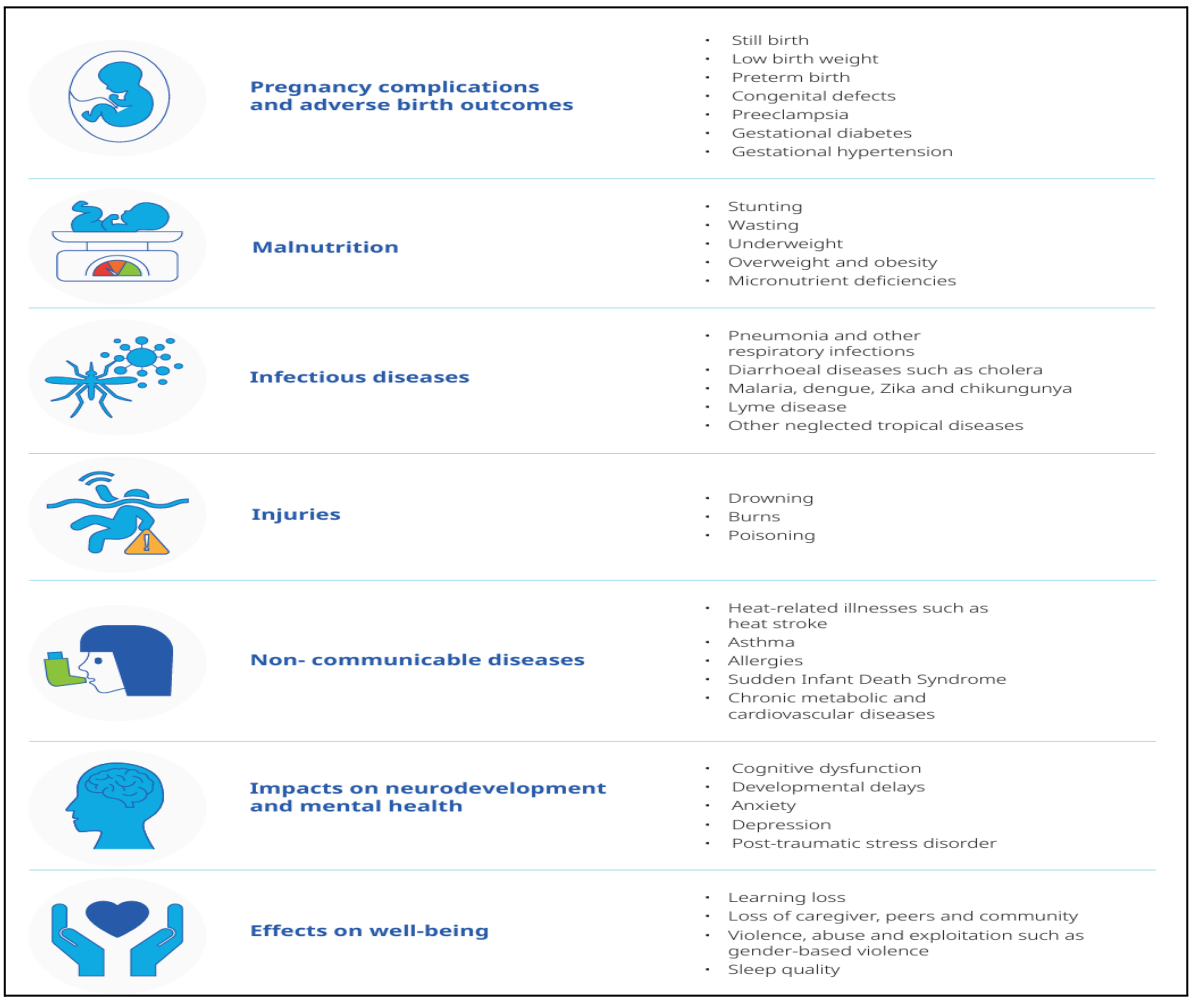
Figure 3.1 Key health impacts of selected climate hazards on children



Source: Oliver Wyman analysis.

WEF, Quantifying the Impact of Climate Change on Human Health. INSIGHT REPORT JANUARY 2024

Figure 3. 1: Key health impacts of selected climate hazards on children



Source: Threat to Progress, to capture MNCH specific outcomes UNICEF, 2023

Bangladesh is among the world's most climate-vulnerable countries. Intensifying heat, altered rainfall, cyclones and sea-level rise (6–21 mm/year in the Bay of Bengal) threaten food production, water security, service delivery and health, risking reversal of development gains unless climate action explicitly safeguards nutrition. Undernutrition persists (stunting 24%, underweight 22%, wasting 11% among under-fives), while overweight/obesity are rising, especially among adolescent girls and women, with anaemia widespread among women of reproductive age. Climate shocks, poverty and fragile food environments compound these risks. Without effective adaptation, additional extreme-heat days and erratic rainfall could reduce Gross Domestic Product (GDP) by 2% by 2050—and up to 9% under a business-as-usual scenario—exacerbating food insecurity and malnutrition. Sustainable approach such as climate–nutrition integration- meaning designing policies, programmes and financing so climate actions improve diet quality and nutrition—for example provision of climate-aware health services, climate- and nutrition-smart agrifood systems, resilient Water, Sanitation and Hygiene (WASH), and shock-responsive social protection. Integrated packages maximise co-benefits and resilience.

Additionally, health services may be overwhelmed during and after such events, limiting the ability to respond effectively to health crises. Currently, 80% of health care facilities in Bangladesh already lack reliable access to electricity and 66% without basic waste management (CEH Collaborative, 2024); this can be exacerbated due to climate events. Rural communities in Bangladesh rely heavily on agriculture for their livelihoods and food security. Climate change impacts, such as changing rainfall patterns and increased salinity from sea-level rise, can reduce crop yields and lead to food shortages. This can cause malnutrition, particularly among children and pregnant women. Children are disproportionately affected because they are uniquely vulnerable to such environmental hazards as compared to adults. This is because of their unique vulnerabilities: they have developing immune and nervous systems, more surface area, higher internal heat, poorer sweating capacity, eat and drink more, and breath faster compared to adults. This all leads to them being more susceptible to the adverse effects of climate related hazards, and the impacts can last a lifetime (UNICEF, 2024).

The loss of crops and livestock due to extreme weather events and shifting growing seasons can lead to economic hardship, impacting the overall health and well-being of rural populations. The uncertainty and stress caused by climate change impacts, such as crop failure, loss of income, and displacement due to natural disasters, can lead to mental health issues, including anxiety, depression, and post-traumatic stress disorder (PTSD). The impacts of climate change on health are severe, affecting millions of people in vulnerable areas of Bangladesh.

1.2 HNAP Formulation

A concrete Health National Adaptation Plan (HNAP) is crucial for Bangladesh to address the climate change impact on public health. It will improve the understanding of the health impacts of and adaptation to climate change among relevant stakeholders, including health policy makers, professionals, workers, program designers, program implementers, civil servants, civil society members.

In Glasgow, COP 26, there was declaration of COP26 Health program which declared two commitments to combat the impact of climate change on health:

Commitment 1: Climate Resilient Health System

- Commit to conduct climate change and health **vulnerability and adaptation assessment**s (V&As) at population level and/or health care facility level by a stated target date
- Commit to develop a **health national adaptation plan** informed by the health V&A, which forms part of the National Adaptation Plan to be published by a stated target date.
- Commit to use the V&A and HNAP to facilitate access to **climate change funding for health and**

nutrition (e.g., project proposals submitted to the Global Environmental Facility, Green Climate Fund, Adaptation Fund, or GCF Readiness programme)

Commitment 2: Sustainable Low Carbon Health System

- High ambition/high emitters: Commit to set a target date by which to achieve health system net zero emissions
- Commitment to deliver a baseline assessment of greenhouse gas emissions of the health system (including supply chains)
- Commit to develop an action plan or roadmap by a set date to develop a sustainable low carbon health system (including supply chains) which also considers human exposure to air pollution and the role the health sector can play in reducing exposure to air pollution through its activities and its actions.

Finally, the formulation of HNAP is necessitated by evolving climate and health landscapes including-

- Emerging health and nutrition challenges
- Alignment with new frameworks
- Integration with national policies
- COP26 health commitment

1.3 Goal and Objectives of HNAP

The HNAP aims to give strategic guidance to the Bangladesh health sector for establishing a climate-resilient health system, including increased capacity to plan health adaptation measures to prevent and/or overcome existing and future risks, and to respond promptly to climate change risks for health and well-being.

Goal:

Building low carbon, sustainable and climate resilient health system in Bangladesh.

Objectives:

Establish a robust framework to build a climate-resilient health system in Bangladesh that integrates low-carbon, sustainable practices and effectively addresses health risks posed by climate change. The specific objectives of HNAP 2026 are as follows:

1. Identify national strategic goals for building health resilience to climate change
2. Integrate climate and health considerations into national policies, plans, and strategies to enhance system-wide climate resilience
3. Foster inter-sectoral collaboration to align health adaptation strategies with broader national and global climate goals
4. Strengthen the capacity of health systems to prevent and manage climate-sensitive health risks by developing training programs and technical resources
5. Develop and implement low-carbon and climate-resilient health infrastructure to mitigate environmental impacts
6. Promote community-led adaptation initiatives to build local resilience and enhance public awareness of climate-health challenges
7. Establish robust monitoring, early warning, and surveillance systems for climate-sensitive diseases and health risks
8. Conduct regular assessments of climate-related health vulnerabilities to guide evidence-based policy and decision-making

9. Build pathways to implement strategies and policies through the funding of different global funds
10. Integrate climate-smart nutrition interventions into health systems to ensure reduce malnutrition, and minimize the carbon footprint of nutrition programs

1.4 Rationale

The National Adaptation Plan (NAP 2023-2050), Bangladesh, was developed based on the National Adaptation Programs of Action (NAPA, 2005) that was designed to support Bangladesh to identify priority actions to respond to their urgent and immediate adaptation needs. The NAP is intended to provide support for medium- and long-term adaptation planning needs in Bangladesh. The Health National Adaptation (HNAP) will be the health component technical guidance document for the National Adaptation Plan (NAP 2023-2050), as an output of a detailed health adaptation plan designed to achieve the national health adaptation goals within a specific period and given available resources (NAP 2022).

1.5 HNAP Development Process

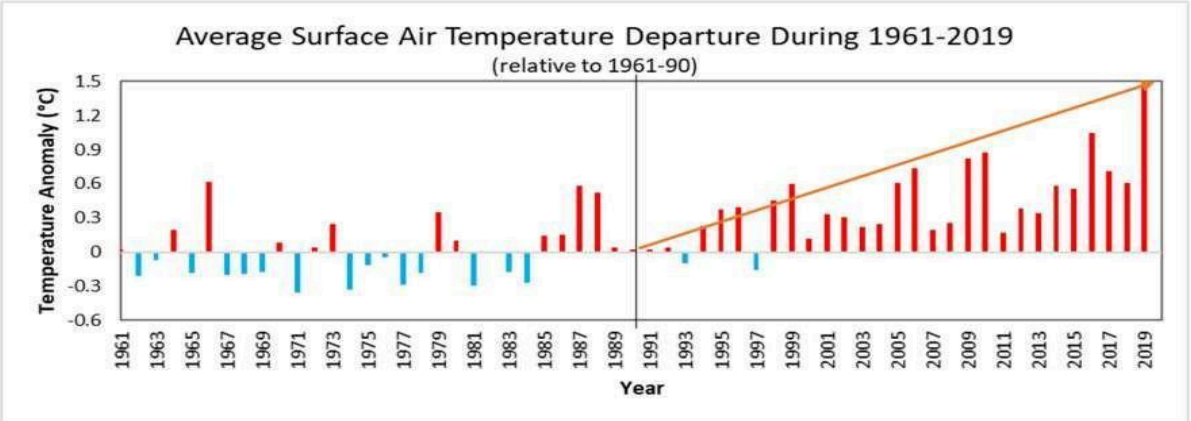
The HNAP is finalized in collaboration with the IEDCR, CCHPU Unit of Ministry of Health and Family Welfare and key climate change and health-related stakeholders with support from the World Health Organization (WHO) and United Nations Population Fund (UNFPA). An extensive literature review was conducted to take stock of all relevant policies, legislation, strategies, programmes, and studies on climate change and health. The HNAP development was guided by previous CC&H vulnerability and adaptation assessments (WHO, IEDCR 2011), Health Adaptation Strategy (WHO-2012), Health, Population and Nutrition Sector Development Plan (HPNSDP 2017-2022), Bangladesh Climate Change Strategy and Action Plan (2009), National Adaptation Plan 2022, V&A assessment 2021, WHO Operational Framework 2023, WHO quality criteria for HNAP for Building Climate-Resilient Health Systems (2015). Key Informant Interviews (KII) were conducted involving representatives from both the government and non-government sectors. The HNAP is finalized through a series of consultative meetings with technical advisors, technical experts (in health, climate and finance), and IEDCR, WHO & CCHPU experts. Shared with concern stakeholders including development partners, UN agencies and other sector partners to collect feedback and reflect on the final version.

2. Climate Change Related Health Risk & Vulnerability in Bangladesh

Bangladesh is highly vulnerable to the impacts of climate change, given its geographical location, low-lying topography, high population density, and socio-economic challenges.

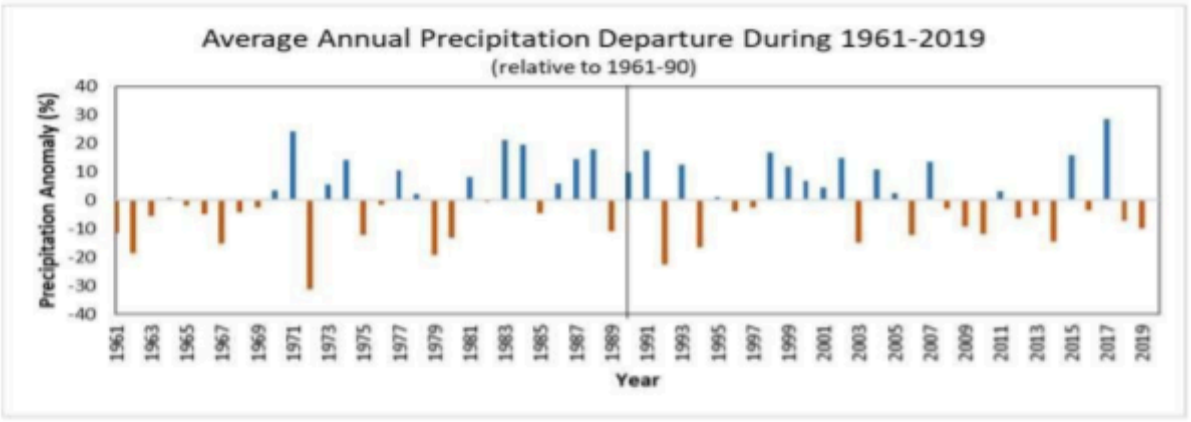
2.1 Historical Climate Trend

Bangladesh is considered one of the most vulnerable countries in the world to the impacts of climate change. Vast coastal areas and a reliance on natural resources combined with high population density and high rates of poverty leave the population at high-risk of extreme weather events, including increasing temperatures, cyclones, erratic rainfall, flooding, drought, rising sea levels, and saltwater intrusion (WHO, 2015). Bangladesh has a humid, tropical climate that is influenced by monsoon circulations. There are four prominent seasons, including winter/northeast monsoon (December- February; summer/pre-monsoon (March-May); southwest monsoon (June-September); and Autumn/post-monsoon (October-November). January is the coldest month with average temperatures ranging from 18° to 22°C, and April is the warmest month with average temperatures ranging from 33°-36°C. Heavy rainfall is a major characteristic of Bangladesh, which most areas receiving at least 2000 mm of rainfall per year. Regions in the northeast are the wettest, receiving on average 4000 mm of rainfall per year compared to the relatively dry western region, which only receives on average around 1600 mm per year. More than 71% of rainfall occurs during monsoon season. Humidity is also highest during monsoon seasons and lowest in the winter season varying from 73% to 86%. The mean annual temperature in Bangladesh has risen by about 1°C during the period 1981-2010, with observed extreme temperatures (>40°C) also increasing from 62 from 1981-1990 to 139 from 2001-2010 (IEDCR, 2012) (Figure 1). Under low and high emissions scenarios, the annual mean temperature is expected to increase by about 1.4°C by 2050 and 4.8°C by 2100 respectively, compared to the current average of 25°C (WHO, 2015a). Similarly, rainfall patterns are becoming more erratic in Bangladesh leading to increased incidences of flooding and drought. Shifts in the magnitude and timing of monsoon rains has resulted in several reoccurring flood events over the past decade, as well as 21% less rain during the monsoon period (June-August) in 2012.

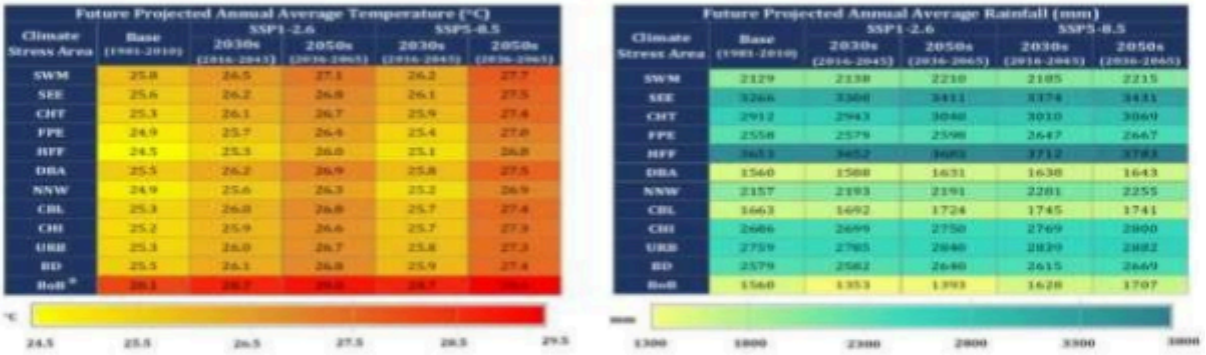


Departure of average annual temperature in Bangladesh relative to climate normal of 1960-1990

Source: CEGIS analysis based on BMD data.

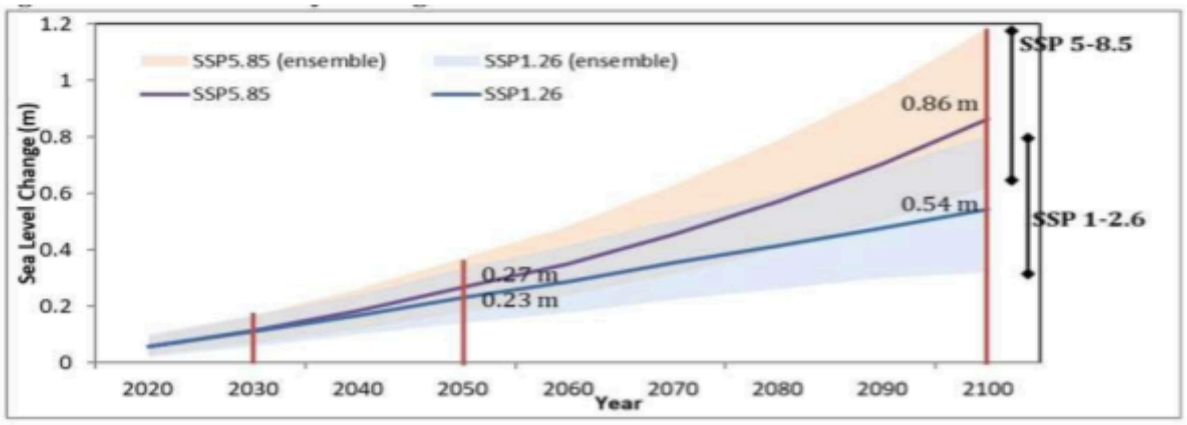


Departure of average annual precipitation in Bangladesh relative to the climate normal of 1961-1990
Source: CEGIS analysis based on BMD data.



Future projections of temperature and rainfall for Bangladesh and different climate stress areas based on downscaled climate data

(Source: CEGIS analysis from the IPCC Sixth Assessment Report multi-model ensemble)



Sea-level rise projections near the Bangladesh coast in the Bay of Bengal

Note: The lines and shaded region represent the ensemble average of sea-level rise and the spread of ensemble results from the IPCC CMIP6 models, respectively. (Source: Fox Kemper et al., 2021.)

2.2 Future Climate Risk and Vulnerability as mentioned in the NAP (2023-2050)

In the NAP a multi-hazards risk map and their potential impacts for Bangladesh illustrates the spatial distribution across the country (CEGIS, 2021). Accordingly, climate change related hazards with potential impacts into 11 climate stress areas illustrated as follows:

Table 1: Climate stress area coverage and related hazards with potential impacts

Climate stress area	Districts	Prominence of climate hazards	Climate Signal and Hazards	Potential Impacts
South-western coastal area and Sundarbans (SWM)	Satkhira, Khulna, Bagherhat, Pirojpur, Barguna, Barisal, Patuakhali, Jhalokhathi, Bhola, Shariatpur, Gopalganj, Jashore, Sundarbans	Rainfall variability, river floods, sea-level rise, salinity, tropical cyclone, storm surges, drought, extreme heat waves, extreme cold, riverbank erosion and lightning	Excessive rainfall	- Urban drainage problem resulting in prolonged water logging - Work hours reduced - Education hampered - Vector-borne diseases due to waterlogged conditions - Road damages and disrupted communications - Recurrent investment losses - Sanitation problems - Waste washouts that pollute the environment - Loss of infrastructure
South-east and eastern coastal area (SEE)	Noakhali, Feni, Lakshmipur, Chattogram, Cox's Bazar, Chandpur	Rainfall variability, river floods, sea-level rise, salinity, tropical cyclone, storm surges, drought, extreme heat waves, extreme cold, riverbank erosion, lightning and landslides	Extreme heat	- Heatstroke and increased deaths - Drinking water crisis - Work hours reduced for the marginal people - Drops in water levels and quality - Declines in dissolved oxygen and poor habitats for aquatic species - Roads, flexible pavement cracking, damaged - Vector and water-borne disease outbreaks - The heat island effect intensified
Chattogram Hill Tracts (CHT)	Rangamati, Khagrachari, Bandarban	Rainfall variability, flash floods, tropical cyclone, storm surges, drought, extreme heat waves, extreme cold, lightning and landslides	Cold spells	- Distress and suffering for homeless and marginalized people

Climate stress area	Districts	Prominence of climate hazards	Climate Signal and Hazards	Potential Impacts
Rivers, floodplains, and erosion-prone areas (FPE)	Nilphamari, Kurigram, Lalmonirhat, Gaibandha, Rangpur, Bogura, Sirajganj, Pabna, Rajshahi, Jamalpur, Tangail, Manikganj, Dhaka, Munshiganj, Mymensingh, Sunamganj, Netrokona, Habiganj, Kishorganj, Sylhet, Brahmanbaria, Narsingdi, Narayanganj, Madaripur, Gopalganj, Rajbari, Faridpur, Narail, Sariatpur, Barisal, Patuakhali, Bhola, Jhalokathi, Khulna, Chandpur, Cumilla, Noakhali, Lakshmipur, Cox's Bazar	Rainfall variability, river floods, tropical cyclones, tornado, extreme heat waves, extreme cold, riverbank erosion and lightning	Frequent river floods	- Houses, roads and other infrastructure inundated and damaged - Communications problems - Investment losses - Outbreaks of diseases - Severe water and sanitation problems - Education hampered - Poverty increases - Loss of crops, poultry, fish and livestock - The agriculture supply chain disrupted due to poor communications
Haor and flash floods areas (HFF)	Sunamganj, Netrokona, Habiganj, Kishorganj, Sylhet, Maulvibazar, Brahmanbaria	Rainfall variability, flash floods, tropical cyclone, tornado, extreme heat waves, intense cold, riverbank erosion, lightning and landslides	Early or frequent flash floods	- Houses, roads and other infrastructure inundated and damaged - Communications problems - Investment losses - Outbreaks of diseases - Severe water and sanitation problems - Education hampered - Poverty increases - Loss of crops, poultry, fish and livestock - The agriculture supply chain disrupted due to poor communications
Drought-prone and barind areas (DBA)	Naogaon, Chapai Nawabganj, Rajshahi, Bogura, Joypurhat, Rangpur, Dinajpur, Meherpur, Chudanga, Kushtia, Jashore, Magura, Jhenaidah	Rainfall variability, tropical cyclone, tornado drought, extreme heat waves, extreme cold and lightning	Severe droughts/ water scarcity	- A drinking water crisis in urban areas - Disease outbreaks in slum areas - WASH problems - Less spring water in the hills - Increased workload for women
Northern, north-western region (NNW)	Panchagarh, Thakurgaon, Nilphamari, Lalmonirhat, Rangpur, Kurigram, Dinajpur	Rainfall variability, river floods, flash floods, tropical cyclone, tornado, drought, extreme heat waves, extreme cold, riverbank erosion, lightning and landslides	Frequent lightning	- Accidental deaths - Hearing problems - Electrocution and fire hazards

Climate stress area	Districts	Prominence of climate hazards	Climate Signal and Hazards	Potential Impacts
Chalan beel and low-lying area of the north-western region (CBL)	Pabna, Natore, Sirajganj, Rajshahi, Naogaon	Rainfall variability, river floods, tropical cyclone, tornado, extreme heat waves, extreme cold, riverbank erosion and lightning	Frequent landslides	- Damage to settlements - Human deaths - Communication problems - Road and infrastructure damages
Char and Islands (CHI)	Nilphamari, Lalmonirhat, Kurigram, Gaibandha, Sirajganj, Jamalpur, Mymensingh, Manikganj, Munshiganj, Shariatpur, Chandpur, Bhola, Patuakhali, Feni, Noakhali,	Rainfall variability, river floods, sea-level rise, salinity, tropical cyclone, tornado, storm surges, extreme heat waves, extreme cold, river bank erosion, lightning, higher sea surface temperature and ocean acidification	Increased salinity	- Severe drinking water crisis - Sanitation problems - Corrosion of road and bridge materials due to salt Need for recurrent investment - Human health issues like premature childbirth or death, stroke, high blood pressure, etc.
Bay of Bengal and ocean (BoB)	Bay of Bengal (maritime boundary)	Rainfall variability, sea-level rise,tropical cyclone, tornado, storm surges, extreme heat waves, lightning, higher sea surface temperature, hypoxy and ocean acidification	Frequent cyclones and storm surges	- Losses of houses and damages to properties - Losses of livelihoods - WASH problems
Urban areas (URB)	43 cities	Rainfall variability, urban floods, sealevel rise, salinity, tropical cyclone, storm surges, drought, extreme urban heat waves, extreme cold and lightning	Sea-level rise	- Infrastructure damages - Recurrent loss of investment - Increased drinking water crisis due to salinity intrusion

2.3 Risks and Vulnerabilities of Health Sector of Bangladesh

2.3.1 Vulnerability and Adaptation Assessment Climate Change and Health, Bangladesh, 2011

To better understand the health risks of and adaptation to climate change a vulnerability and adaptation assessment Climate Change and Health: Bangladesh was conducted in 2011 with the goal to assess existing patterns of climate-sensitive diseases, documenting climate change and health impacts on vulnerable populations, reviewing existing climate change and health-related policies and programmes, and recommend actions to further protect human health from climate change (IEDCR, 2011). The study, which was prepared by the Institute of Epidemiology, Disease Control and Research, the Directorate General of Health Services, and the Ministry of Health and Family Welfare with support from BCCT, used qualitative and quantitative approaches based on data availability to explore associations between climatic variables and a range of climate-related health outcomes, including vector-borne diseases (kala-azar, dengue, and malaria), water-borne diseases (cholera and diarrhoea), and mental health, as well as impact from extreme weather events. The data showed significant co- relationship between climatic factors and kala-azar incidence in Mymensingh, Tangail and Jamalpur districts, the three districts with majority of kala-azar cases in Bangladesh. To quantify the extent of impact from climate change on diarrhoea incidences, the report analyzed the relationship between temperatures and admitted cases of diarrhoea. These results were then used to establish scenarios as indicative measures of potential climate change impacts to diarrhoea distribution in Bangladesh by 2030. Estimates presented in the report predict a 4.5– 5.5% increase of initial risk of diarrheal diseases by year 2030 for a 1℃ increase in temperatures for Bangladesh. Although the analysis was impeded by limited data availability, the V&A was able to take important steps toward evaluating climate change impacts on disease in Bangladesh. Nonetheless, a comprehensive V&A assessment, as well as further analysis and quantification of the health impacts of climate change is needed.

2.3.2 Vulnerability and Adaptation to Climate Change in Coastal and Drought Prone Areas of Bangladesh: Health and WASH, 2015

In 2015 WHO conducted a ***Vulnerability and Adaptation to Climate Change in Coastal and Drought Prone Areas of Bangladesh****: Health and WASH,* to better understand the vulnerabilities of the communities due to the impact of climate change and its links to WASH and health in Bangladesh (WHO, 2015c). The study used both qualitative and quantitative methods including a survey questionnaire, community workshops, and in-depth interviews. Field sites were pre-selected to include both flood and drought prone areas based on expert judgement. In total three communities (one in a drought prone area and two in coastal areas) were selected in three distinct geographical areas. Drought prone areas were identified as the most vulnerable to changes in climate associated with reduced rainfall and reliability of seasons which impacted the drinking water supplies, agricultural production, livelihood and has been exacerbating poverty. The coastal communities were identified as being vulnerable to climate changes associated with increased rainfall, more frequent and extensive flooding, extreme temperatures (hot and cold), changing seasonal patterns and sea-level rise. Finally, the study provided the broad recommendations to enhance vulnerability assessments and evidence base for health adaptation, including the establishment of a climate-sensitive disease surveillance system, increased awareness of upazila health staff of collection of data for CSD, quality assurance measures for data collection and reporting, and daily data to allow for seasonal and cyclical patterns of CSD monitoring.

2.3.3 Health Vulnerability and Adaptation Assessment of Climate Change Impact in Bangladesh, 2021

In 2021, the Ministry of Health and Family Welfare (MOHFW) conducted the *Health Vulnerability and Adaptation Assessment of Climate Change Impact in Bangladesh* to assess the health vulnerabilities caused by climate change and extreme weather events in five distinct geographical regions (drought-prone areas, flood-prone areas, coastal zones prone to cyclones and storm surges, hilly areas susceptible to landslides, and urban areas facing specific vulnerabilities) using household surveys, focus group discussions (FGDs), and community consultation. Respondents widely reported noticeable climate changes, including rising temperatures, longer summers, and shorter winters. These observations were corroborated by meteorological data, which showed a 0.2–0.4°C increase in maximum summer temperatures (April–September) in the study areas. Community members also noted changes in rainfall patterns, with more erratic rainfall events, consistent with available rainfall data. They further reported an increase in new insect species affecting agriculture and a decline in freshwater availability, both of which have implications for food security. These changes are adversely affecting health, as specific health issues were found to be linked to the changing climate. The analysis of waterborne and vector-borne diseases highlighted the effects of temperature and rainfall variability on health. For instance: Diarrheal cases peaked in June in Ullapara due to high temperatures and low rainfall; in Birampur and Dhaka, cases spiked in April; in Patuakhali, in May; and in Rangamati, in December. Malaria cases were most common between June and August, attributed to high rainfall, humidity, and temperature. Further, the study found that health vulnerabilities were nearly equal among men and women in the surveyed areas. Dhaka city shows low vulnerability compared to the other study areas, especially rural areas, due to its more advanced healthcare infrastructure and systems. Key findings indicate that rural health systems and other sectors that have direct/indirect impact on health outcomes (e.g., sanitation, food security, water) need more attention from the government to adapt to the adverse impact of climate change and variability. While the transportation infrastructure has improved, enabling quicker access to hospitals, hard-to-reach areas remain a challenge. Most participants expressed satisfaction with outpatient department and inpatient department of the hospital, and health professionals noted that the health system is prepared for extreme weather events such as floods or cyclones. However, the household survey revealed that the local health system's response to extreme weather events, at the local level, remains insufficient. The report also examined vulnerability and adaptation in the context of WASH programs in the selected areas, highlighting the need for targeted interventions to address climate-related health challenges.

2.4 Impacts of Climate Change on Health

The effects of climate change on health are severe in Bangladesh with the health status of millions of people in vulnerable areas projected to be impacted. Projected impacts include:

Table 2: Climate Change Impacts on Health

Climate Change Characteristics	Projected changes	Impacts on Health
Increasing air and sea-surface temperatures	Average air temperatures are expected to increase by up to 1.4°C by 2050 and by 4.8°C by 2100, depending on future greenhouse gas emissions scenarios (WHO, 2015a).	Reduced agriculture and fisheries production leading to increased food insecurity and food safety issues. Increased risk of heat-related illnesses.
Altered rainfall patterns	Most models predict drier dry seasons and wetter wet seasons for Bangladesh, as well as more "extreme/high "rainfall events (WHO, 2015a).	Increased risk of drought and flooding leading to negative effects on agriculture production and under-nutrition. Increased risk vector-borne disease (malaria, dengue, kala-azar, and chikungunya) and water borne diseases, notably diarrhoeal disease
More severe extreme weather events	Tropical cyclones are expected to decrease in frequency but increase in intensity. 20.3 million people are projected to live in cyclone high-risk areas by 2050 compared to 8.3 million in 2015 (WHO, 2015a).	Destruction of farming lands and health facilities. Injuries and death from extreme weather events. Mental health issues due to climate-related population displacement and effects on livelihoods
Sea-level rise	Current saline intrusion reaches 100km from the Bay of Bengal. 7.2 million people are projected to be affected by flooding due to sea-level rise every year between 2070-2100 under a high emissions scenario (WHO, 2015a).	For low-lying coastal communities sea-level rise can cause crop failure, saline intrusion into drinking water supplies, erosion and possibly even the need for relocation.
Ocean	The increasing acidity of sea-waters has	Destruction of ecosystems and reduced

acidification	a detrimental impact on ecosystems and reduced biodiversity (WHO, 2015a).	biodiversity can have negative impacts on fishing industries and lead to increased food insecurity.
Air pollution	Many drivers of climate change also contribute to air pollution. Outdoor air pollution data for 5 cities in Bangladesh havePM2.5 levels greater than WHO guidelines. Household air pollution is also high in rural communities (WHO, 2015a).	Increased morbidity and mortality from respiratory infections, lung cancer, and cardiovascular disease

To address these concerns, the government of Bangladesh has outlined strategic plans and policies that aim to reduce vulnerability and build capacity to manage the health risks of climate change. In 2009 the government the Bangladesh Climate Change Strategy and Action plan (BCCSAP), which included six pillars, with health belonging to 1st pillar. After the call of Conference of Parties (COP-18) held in Doha, Qatar in 2012, the government of Bangladesh took initiative to develop National Adaptation Plans (NAP). The NAP process is intended to provide support for medium and long-term adaptation planning. The Ministry of Environment, Forests and Climate Change of Bangladesh, in collaboration with UNDP, has been providing support to develop the NAP. However, only a few programmes for mitigation and adaptation to climate change have been incorporated to date. In 2022, Bangladesh has published an extensive National Adaptation Plan (NAP) 2023-2050. Health is a cross-cutting issue in the context of climate change, and there is a need to mainstream health in mitigation and adaptation strategies in all sectors. The health component of National Adaptation Plan (HNAP) needs to be developed for integrating climate change adaptation into relevant national health plans and policies

2.4.1 Water-borne and Water-related Disease

Climate change and variability, particularly impacts from drought, flooding, and tropical cyclones, pose a substantial threat to water security and are projected to increase the potential of waterborne infectious diseases in Bangladesh, including cholera and other diarrhoeal diseases. Waterborne diseases (WBDs) remain a significant concern globally, affecting both high-income and developing countries. They encompass a wide range of illnesses, including diarrheal diseases like cholera,

shigella, cryptosporidiosis, typhoid, schistosomiasis, leptospirosis, hepatitis A and E, and poliomyelitis. Cholera outbreaks, which often occur during seasonal monsoons could become a regular phenomenon in the future due to climate change (Shahid, 2010). Extreme weather events also have the potential to damage water and sanitation infrastructure, disrupt health services, and create overcrowding situations resulting in serious waterborne disease risks to the affected population. This combined with other factors, such as high rates of urbanization and land-use change, puts a significant strain on freshwater supplies and can lead to further risk of water-borne and water-related diseases. In the baseline year 2008, there were an estimated 25 500 diarrhoeal deaths in children aged under 15 years. Under a high emissions scenario, diarrhoeal deaths attributable to climate change in children aged under 15 years are projected to comprise about 8% of the over 8000 deaths projected in 2030. Although diarrhoeal deaths are projected to decline to just under 900 by 2050, the proportion of deaths attributable to climate change will rise to 13%. Limited access to safe water and sanitation contributes to the risk of developing diarrhoeal disease. Children in poor rural and urban slum areas are at high risk. Transmission of enteric pathogens is higher during the rainy season. Drainage and storm-water management are important in low-income urban communities, as blocked drains are one of the causes of increased disease transmission. There have been significant gains in the provision of improved sanitation and safe water supplies over the past few years. Bangladesh, with studies finding variable results: both cholera and ETEC associated with floods; an initial peak in the incidence of rotavirus coinciding with flooding followed by a decline immediately after the flood receded; increases in the proportion of rotavirus diarrhea, rotavirus in older children, percentage of mixed rotavirus infection cases, and an abrupt change in epidemic strains coinciding with the spread of floods; cholera playing a primary role in flood-related diarrhea epidemics, but rotavirus and ETEC also contributing to the epidemics; cholera as the most common cause of diarrhea during flood years, with rotavirus more common in non-flood years. Heavy rainfall and diarrhea have found mixed results. In some cases, positive associations have been observed, such as higher observed diarrhea rates during peak monsoon rainfall months in the Philippines and Bangladesh (Levy, 2016).

3.4.1.1 Diarrhoea

Increased temperatures and changing rainfall patterns can lead to the proliferation of other bacteria in water bodies. Flooding, which often follows cyclones and heavy monsoons, can contaminate

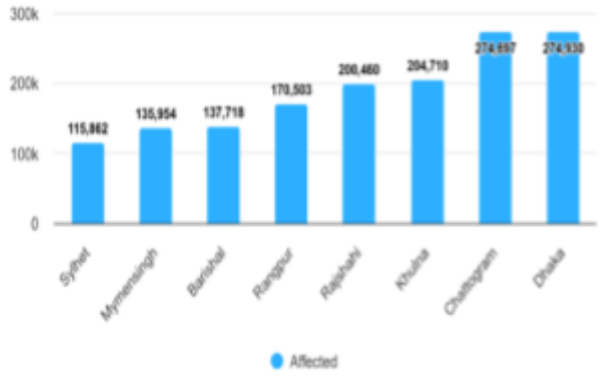


*Figure SEQ Figure * ARABIC 5: Distribution of Diarrheal cases in 2023 (Jan-Dec; Source: Health Emergency Operation Center & Control Room, 2023*

*Figure SEQ Figure * ARABIC 4: Distribution of Diarrheal Diseases in eight divisions of Bangladesh (Jan- Dec 2023; Source: Health Emergency Operation Center & Control Room*

drinking water supply, exacerbated by concurrent severe flooding events in the community water

sources, leading to outbreaks by these bacteria or virus. Infection (e.g., Cholera, Hepatitis, Salmonella) Flooding and inadequate drainage systems can overwhelm sanitation facilities, causing sewage to contaminate water supplies. In the baseline year 2008, there were an estimated 25 500 diarrheal deaths in children aged under 15 years. Under a high emissions scenario, diarrheal deaths attributable to climate change in children aged under 15 years are projected to comprise about 8% of the over 8000 deaths projected in 2030. Although diarrheal deaths are projected to decline to just under 900 by 2050, the proportion of deaths attributable to climate change will rise to 13% (HNAP 2018). Limited access to safe water and sanitation contributes to the risk of developing diarrheal disease. Children in poor rural and urban slum areas are at high risk. Transmission of enteric pathogens is higher during the rainy season. Drainage and storm-water management is important in low-income urban communities, as blocked drains are one of the causes of increased disease transmission. There have been significant gains in the provision of improved sanitation and safe water supplies over the past few years. Figure-4 shows cases of diarrheal diseases distribution in eight divisions with maximum cases in Dhaka and Chattogram divisions and Figure-5 shows post-monsoon rise of diarrhea cases in Bangladesh.

2.4.2 Vector-borne Disease

The transmission of vector-borne disease, particularly mosquito-borne diseases, are sensitive to climatic factors such as increases in temperature and humidity and changes in rainfall patterns, more frequent and intense interrupted rainfall can create favorable conditions for breeding, which affect both the mosquito lifecycle and the number of breeding sites (Kovats, Bouma, Hajat, Worrall, & Haines, 2003). An assessment supported by the World Bank using monthly surveillance data in regions of high-incidence of vector borne disease found strong seasonality and statistical correlation between short-term climate variability and vector-borne disease. For malaria and dengue, climate variables, including temperature, rainfall, and humidity, had a strong correlation with disease caseload, both current and lagged. For Kalaazar, only temperature was significantly correlated increases in transmission diseases. (Mani & Wang, 2014)

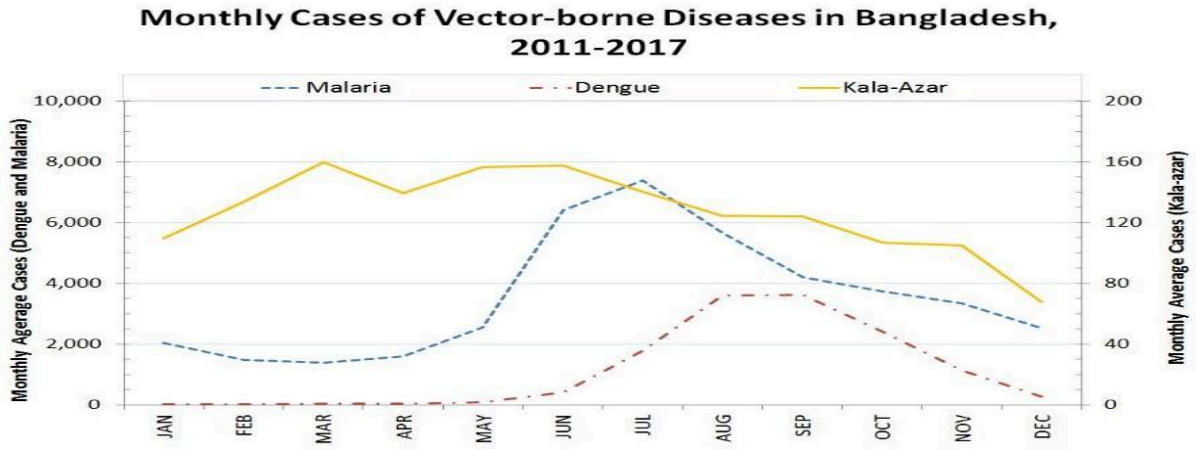


*Figure SEQ Figure * ARABIC 6: Geographic distribution of vector-borne disease in 2011, Source: Mani & Wang, 2014*

With the increased temperatures in climate change there are changes in precipitation patterns. The intense rainfall has contributed to round the year of Dengue in Bangladesh. Bangladesh is also vulnerable to other emerging climate-sensitive vector-borne diseases, e.g., Chikungunya, an arboviral disease transmitted between human beings via the bites of infected female aedes mosquitoes (Aedes aegypti and Aedes albopictus). The Figure-6 shows monthly (2011-2017) case distribution of vector born disease in Bangladesh. Figure-7 depicts the geographic distribution of Malaria, Dengue

and Kala-azar in Bangladesh, (2011). In 2017, a major outbreak of Chikungunya was reported in Bangladesh with 984 cases confirmed and more than 13 176 clinically confirmed cases in 17 of 64 districts, including the capital Dhaka (Kabir, Dhimal, Müller, Banik, & Haque, 2017). The outbreak was anticipated based on the distribution of the aedes vector, suitable climatic conditions, and unusual, excessive rainfalls. Limitations in testing infrastructure and resources delayed containment efforts. Climate model projections under both high and low emissions scenarios suggest the likelihood of expansion of transmission-suitable areas in many parts of the world (Tjadenetal.2017).

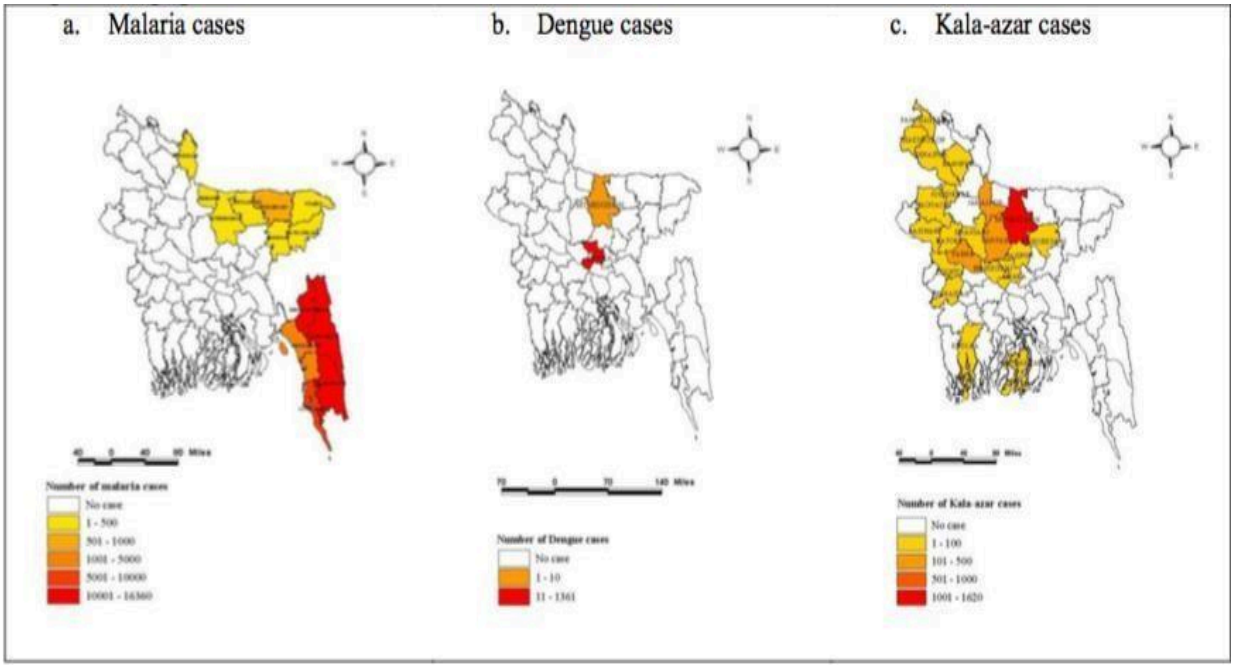


*Figure SEQ Figure * ARABIC 7: Trends and monthly patterns for vector-borne diseases, 2011-17; Source: NKENMCP, 2017*

2.4.2.1 Malaria

The National Malaria Control Program is a vertical program coordinated by the Communicable Disease Control Program of the Directorate General of Health Services. Advances in diagnosis and treatment have contributed to reductions in severe malaria cases. **Error! Reference source not found.** depicts the pattern of malaria cases during 2015-2019 corresponding to total rainfall. A major challenge for this program is that malaria hyper-endemic forested and hilly areas are remote, inhabited by largely undeveloped and very poor people. The mainstay of prevention for populations at risk is the provision and use of insecticide-treated nets. Climate change will impact on the epidemiology of malaria in Bangladesh if the distribution of infected mosquitoes' changes so that non-immune populations are exposed. It is projected that by 2070 over 147 million people will be at risk of malaria, assuming a high emissions scenario. If emissions decrease rapidly, this could decrease to 117 million people (WHO 2015a), **Error! Reference source not found. Error! Reference source not found.** shows the distribution of malaria endemic areas in Bangladesh. the pattern of national malaria cases during 2015-2019 corresponding with total rainfall.

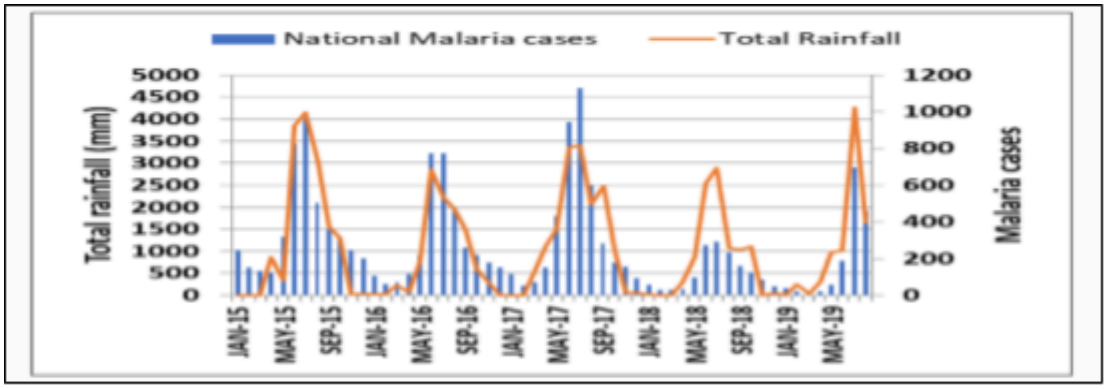


*Figure SEQ Figure * ARABIC 9: Rainfall Vs Malaria cases (2015-2019) Source: icddr,b, n.d*

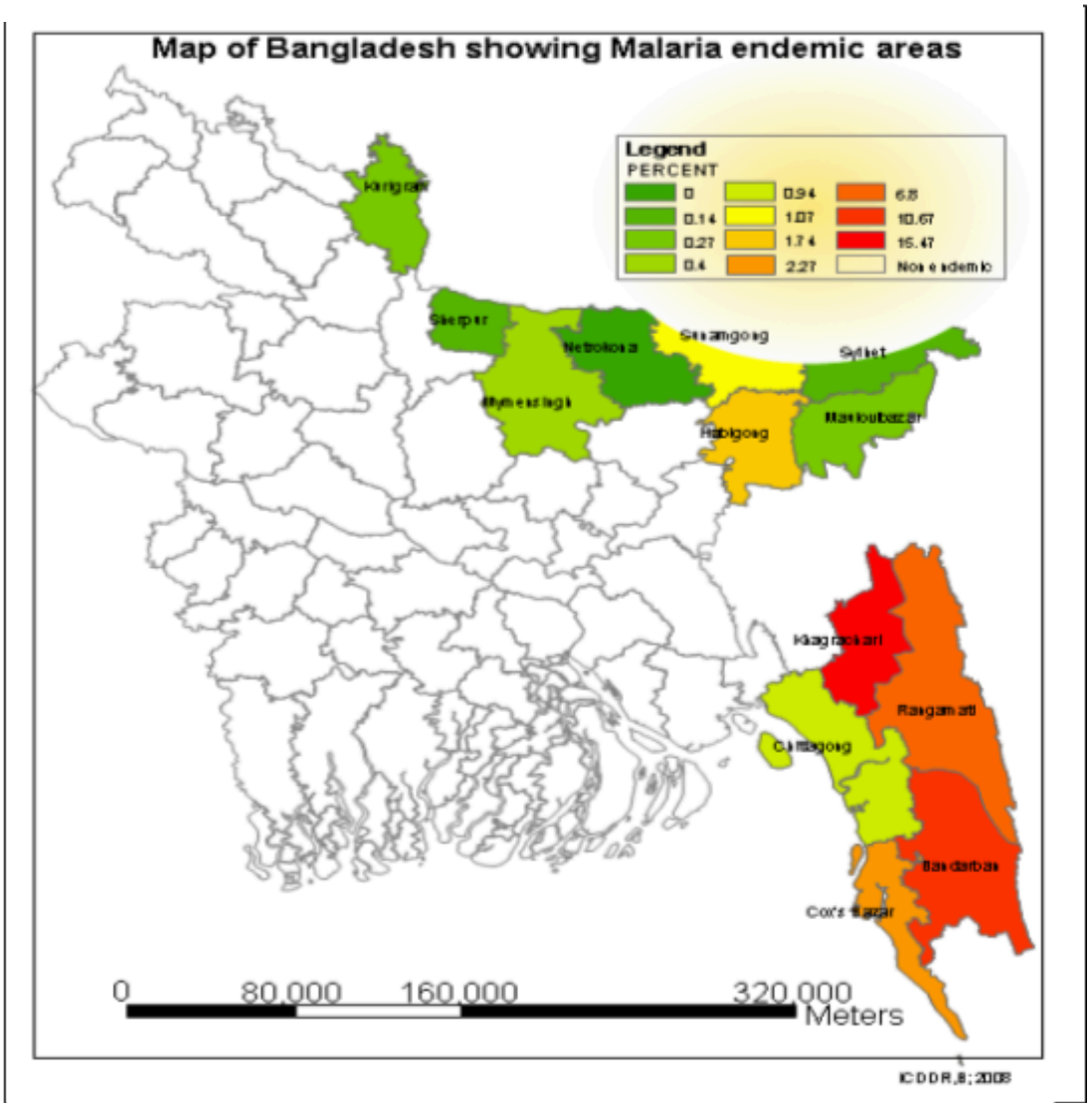


*Figure SEQ Figure * ARABIC 8: Malaria Endemic areas in Bangladesh, Source: Haque et al, 2010*

2.4.2.2 Dengue

Dengue is becoming high endemic in major cities in Bangladesh. The burden of disease is high, although it is difficult to quantify as only hospitalized patients are reported. Dengue incidence is related to precipitation, humidity and temperature. Although cases occur year-round, peak incidence occurs in post-monsoon season. Climate change is expected to affect the epidemiology of dengue via various mechanisms. Changes in rainfall pattern, particularly longer rainy seasons, will increase the sites where *Aedes* mosquitoes breed. Increasing urbanization will increase breeding sites near human habitation. Population migration will alter the underlying immunity to dengue serotypes or contribute to changing geographical serotype distributions, which can lead to outbreaks. Extreme weather events will disrupt health systems and the capacity to perform surveillance of, and manage, outbreaks. Although it is difficult to quantify the projected burden of dengue under future climate change conditions, data from the Directorate General of Health Services of Dhaka city show that it is likely that the rapidly growing urban and peri-urban regions where public health measures (vector control, public education, surveillance) are compromised or neglected will be particularly affected. A recent year-round surveillance study found that the abundance of Aedes mosquito larvae in Dhaka varied in different months, and the highest and lowest number of Aedes larvae were found in the months of June and February, respectively (Kayesh, Khalil, Kohara, & Tsukiyama-Kohara, 2023). The Figure-10 shows the

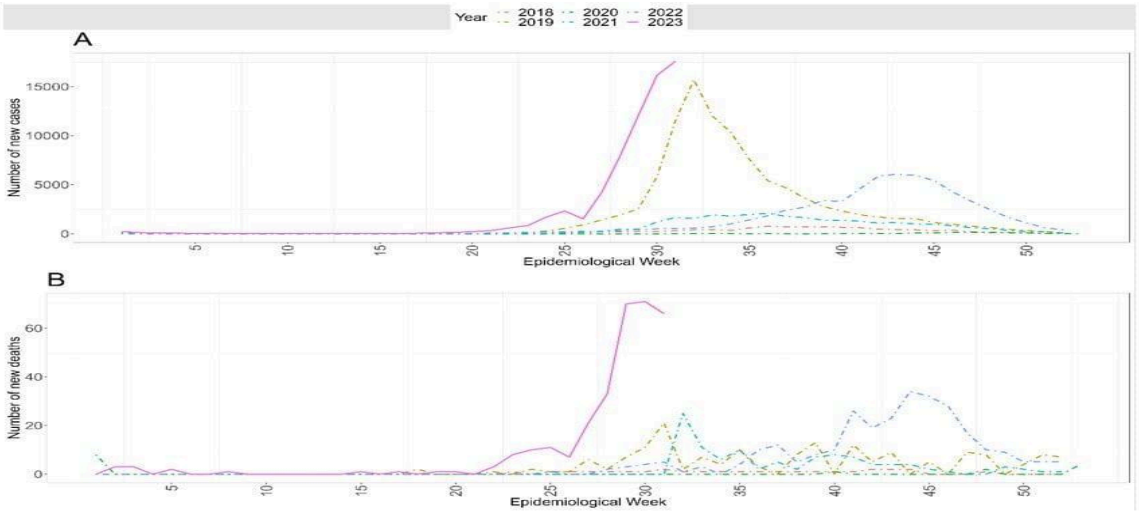


*Figure SEQ Figure * ARABIC 10: Number of dengue cases (A) and deaths (B) reported by epidemic week from 2018 to 2023 [as of 5 August (epidemiological week 31) 2023] Source: WHO, 2023a*

Number of dengue cases (A) and deaths (B) reported by epidemic week from 2018 to 2023. From 1 January to 7 August 2023, the Ministry of Health and Family Welfare of Bangladesh reported a total of 69 483 laboratory-confirmed dengue cases and 327 related deaths, with a case fatality rate (CFR) of 0.47%. Of these, 63% of cases and 62% of the deaths were reported in the month of July 2023.

Although dengue is endemic in Bangladesh, the reported dengue surge was unusual in terms of seasonality and the early sharp increase in comparison to previous years, where the surge started around -late June. Figure-11 shows the seasonality of Dengue outbreak in Bangladesh from 2010-2021. The CFR was also relatively high compared to previous years for the full-year period. The pre-monsoon Aedes survey shows that the density of mosquitoes, and the number of potential hotspots is at the highest level in the past five years. The higher incidence of dengue is taking place

in the context of an unusual episodic amount of rainfall, combined with high temperatures and high humidity, which have resulted in an increased mosquito population throughout Bangladesh (WHO, 2023b).

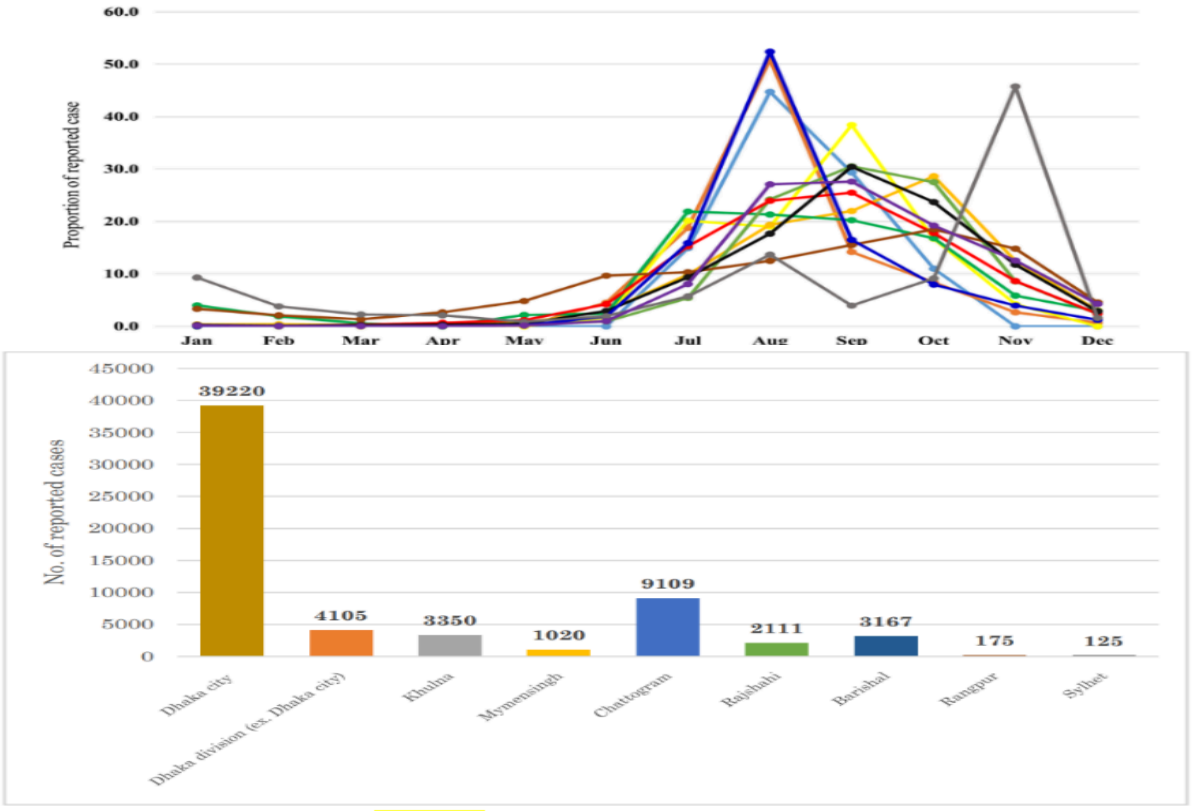


*Figure SEQ Figure * ARABIC 12: Division-wise Dengue case distribution in year 2022, Source: ATDCP, 2022*

Between the first (2000–2010) and the second decade (2011–2022), dengue cases have increased by 8.3 times, and annual deaths have increased by 2.2 times in Bangladesh. **Error! Reference source not found.** reflects the Division-wise Dengue case distribution in year 2022. This growth of cases may partly be explained by global warming, with an increase of 0.49°C annual temperature as well as changes in duration and length of the rainy season. Unusual early or late rain in and beyond the monsoon season likely contributed to extending the length of the dengue transmission season in Bangladesh. The monthly mean temperature and monthly total rainfall of the first-lagged month and second lagged months showed a large influence on the monthly DENV cases in Bangladesh (Hasan et al. 2024).

2.4.2.3 Chikungunya and Zika Virus

The threat posed by chikungunya stands to increase significantly due to climate change: nearly a billion additional people could become at risk for Aedes-borne arboviral diseases, such as chikungunya, by 2030 as a direct result of climate change. Figure-13 reflects chikungunya infected patients in Dhaka city, 2017. Rising temperatures and changing rainfall patterns have provided increased habitats for vectors harboring deadly diseases, while deforestation and urbanization have altered transmission dynamics. Chikungunya has recently experienced an alarming spread—beyond typical geographic areas and outside of normal seasonality—largely attributed to changes in climate and population movement (Love Eliza et. al 2023). Chikungunya continues to be a major public health concern in Bangladesh. Following the initial outbreak in 2008 and a significant epidemic in 2017, recent research has shown that about 2.4% of the population has been exposed to the virus, with higher exposure rates in central and southern regions. This indicates that a substantial portion of the population remains susceptible to future outbreaks. Additionally, the study found that men and individuals previously infected with dengue are at higher risk for chikungunya (Sam W. Allen et al., 2024). To mitigate the impact, efforts are focused on enhancing surveillance and mosquito control, including preventing standing water that serves as breeding sites for Aedes mosquitoes and improving the integration of epidemiological, clinical, and laboratory data for more effective public health responses.

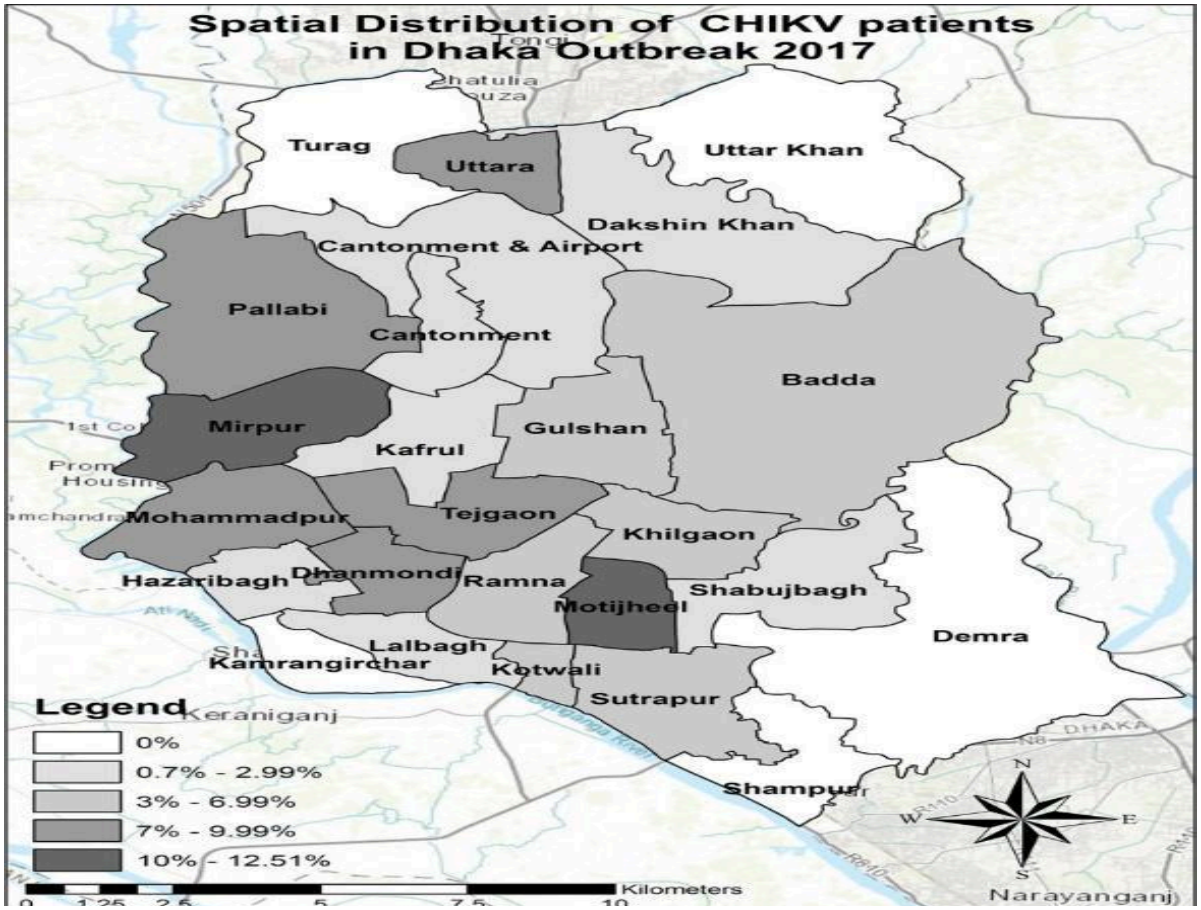


*Figure SEQ Figure * ARABIC 13: CHKV infected patients in Dhaka city 2017 Source: Hossain et al, 2018*

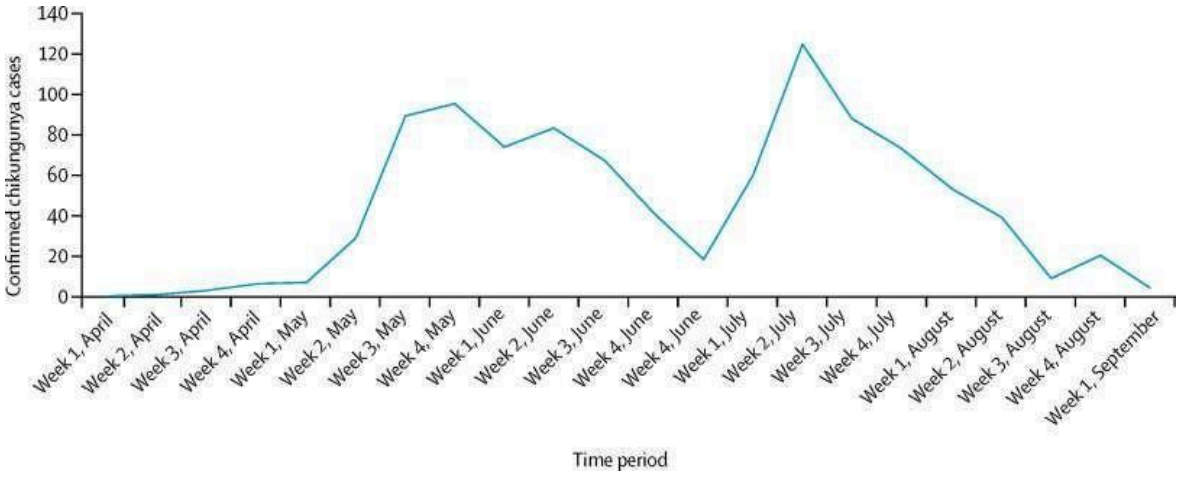


*Figure SEQ Figure * ARABIC 14: Chikunguniya Outbreak in 17 district of Bangladesh (Iqbal, 2017)*

2.4.3 Climate Change Impact on Nutrition and Food Security

Climate change significantly impacts nutrition and food security in Bangladesh, a country particularly vulnerable to environmental changes due to its geographic location and socio-economic conditions. Livelihood of many people in Bangladesh depends on agriculture and rural-based economic activities. Any changes in weather and arable land will lead to food insecurity and more poverty. This requires coordinated efforts across sectors, including agriculture, health, infrastructure, and social services. Long-term planning and international cooperation are also crucial for building resilience.

Vulnerable groups, especially children, pregnant women and elderly, risk further deterioration into food and nutrition crises if they are exposed to extreme weather events. Without considerable efforts to improve climate resilience, it has been estimated that the risk of hunger and malnutrition could increase by up to 20% by 2050.

The effects of climate change on agriculture, food production, and overall food security in Bangladesh include:

Agriculture and Crop Yields

Increased temperatures can stress crops, reduce yields, and alter the growing seasons for key staples like rice. Heat stress can also reduce the productivity of livestock and fisheries, crucial components of Bangladesh's food system. Changes in rainfall patterns, including erratic monsoons, droughts, and reduced freshwater availability, can adversely affect irrigation, crop growth, and soil fertility. Floods and droughts can lead to crop losses and decreased agricultural productivity. Rising sea levels contribute to saltwater intrusion into coastal agricultural lands. This increased soil salinity hampers crop production, particularly affecting rice paddies, which are sensitive to salinity, disrupt food supply chains, and destroy infrastructure. These events can lead to temporary or long-term food shortages and increased food prices.

NDC 3.0 aims to enhance the linkage between health, WASH, and nutrition by establishing reliable access to safe water and sanitation infrastructure, thereby reducing undernutrition caused by waterborne diseases and environmental contaminants. Also NDC 3.0 vows to promote smart agriculture practices to ensure food and nutrition security.

These climate pressures have profound implications for nutrition. Bangladesh has already recognised this by embedding climate considerations in two of its nine Nutrition for Growth commitments (N4G). Moving forward, integrating climate resilience into food systems, social protection, and essential nutrition services will be critical to safeguarding development gains.

Fisheries and Aquaculture

Warmer waters can impact fish populations by altering breeding cycles, reducing fish stocks, and affecting the availability of certain species, crucial for the local diet and economy. Increased salinity and pollution from coastal flooding can affect aquaculture, reducing the quality and quantity of fish and shrimp produced.

Livestock

Rising temperatures can reduce livestock productivity, affecting milk production, growth rates, and overall health. Changing climate conditions can lead to an increase in vector-borne diseases affecting livestock, further impacting food security.

Socio-Economic and Nutritional Implications

Reduced agricultural productivity leads to lower food availability, particularly affecting staple crops like rice and wheat. This can result in increased dependence on imports, which might not always be reliable or affordable. Climate change can lead to increased food prices, making it harder for vulnerable populations to access nutritious food. This economic strain disproportionately affects low-income households, exacerbating malnutrition. Reduced availability of diverse food sources can lead to a decline in dietary diversity. This increases the risk of micronutrient deficiencies and malnutrition, particularly among children and pregnant women. Many Bangladeshi households depend on agriculture, fisheries, and livestock for their livelihoods. Climate-induced disruptions in these sectors can lead to loss of income and increased poverty, further impacting food security. Without effective adaptation, additional extreme-heat days and erratic rainfall could reduce Gross Domestic Product (GDP) by 2% by 2050—and up to 9% under a business-as-usual scenario (World Bank 2022)—exacerbating food insecurity and malnutrition.

Higher temperatures, land and water scarcity, flooding, droughts and displacement negatively impact on agricultural production and cause breakdown in food systems, disproportionately affecting people most vulnerable to hunger and leading to food insecurity. Vulnerable groups, especially children, risk further deterioration into food and nutrition crises if they are exposed to extreme weather events. Without considerable efforts to improve climate resilience, it has been estimated that the risk of hunger and malnutrition could increase by up to 20% by 2050. Undernutrition persists (stunting 24%, underweight 22%, wasting 11% among under-fives), while overweight/obesity are rising, especially among adolescent girls and women, with anemia widespread among women of reproductive age. Climate shocks, poverty and fragile food environments compound these risks. According to the 6th Assessment report of IPCC it states that Foodborne diseases (FBDs) result from consuming contaminated or spoiled food, linked to pathogens, toxins, and chemicals from production to consumption. Contamination, improper handling, and environmental factors like climate change exacerbate FBD risks, affecting the food chain and leading to malnutrition due to weakened immunity. A notable rise in FBDs correlates with higher temperatures and longer summers, with complex transmission pathways and a range of pathogens that thrive under stress, such as enteric viruses and bacteria like Salmonella, which is highly associated with ambient temperature increases. This association is evident in global studies, highlighting the urgent need to address FBDs amidst changing environmental conditions and food safety challenges. 2016 research highlights that climate

change has exacerbated malnutrition rates among children under five in Bangladesh, intertwining climate change, food security, and health issues. Particularly in rural and underprivileged areas, climate change aggravates existing problems and poses new challenges, increasing vulnerability and health risks. This scenario underscores the urgent need for in-depth studies on the social impacts and community vulnerability to climate change effects (Farouque et al 2016).

2.4.4 Non-communicable Diseases

In Bangladesh, non-communicable diseases (NCDs) are emerging as a major cause of morbidity and mortality, accounting for 61% of deaths in 2013 (Alam, Robinson, Kanungo, Hossain, & Hassan, 2013). Cardiovascular disease, diabetes, and tobacco-related illness are the three most common NCDs in Bangladesh and make up a considerable proportion of mortality, morbidity, and health system utilization. Figure-14 shows some major causes of death due to NCDs. The effects of climate change have the potential to exacerbate the incidence of some NCDs, including cardiovascular disease, some cancers, respiratory health, mental disorders, injuries, and malnutrition (Friel et al., 2011).

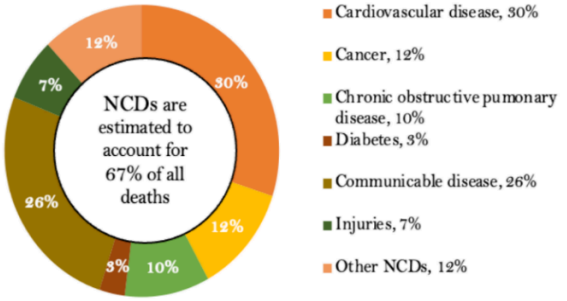


*Figure SEQ Figure * ARABIC 15: Major causes of death due to NDCs*

Climate change as an additional driver of NCD risk include adverse effects on domestic agriculture, as well as climate change related population displacement leading to increased urbanization and driving unfavorable changes in diet and physical activity, further increasing the burden of NCDs.

2.4.5 Air Borne Disease

In Dhaka, Bangladesh, a study examining the impact of PM2.5 pollution from fossil fuel and biomass combustion on cardiovascular health and mortality reveals significant health risks. Exposure to PM2.5 increases the risk of cardiovascular emergencies, hospitalizations, and deaths, with a notably higher impact from fossil fuel combustion particles. For every 10-µg/m3 rise in PM2.5 levels, there's an increased risk of cardiovascular emergency department visits by 0.27%, hospitalizations by 0.32%, and deaths by 0.87%. The effect of PM2.5 on health outcomes is more pronounced at lower concentrations, diminishing at higher levels, especially during periods dominated by crop burning. Fossil fuel-derived PM2.5 is particularly detrimental, having about four times the impact on cardiovascular mortality and double the effect on hospital admissions compared to biomass combustion. Additionally, nearly 80% of mothers in the study used solid fuels, showing a significant association with increased neonatal and infant mortality. The risk of death among newborns and infants was markedly higher for those whose mothers were exposed to solid fuels, especially when combined with indoor cooking, highlighting the severe health risks of air pollution from fossil fuels and biomass in Bangladesh (Rahman, 2017;Alam 2022) According to IPCC 6th Assessment Report Climate change significantly impacts respiratory tract infections (RTIs) through temperature extremes, humidity fluctuations, dust storms, and increased climate variability. Among RTIs, pneumonia and influenza pose substantial health burdens, influenced by both climatic and non-climatic factors such as chronic diseases, air pollution, and immunization status. In temperate regions, pneumonia incidence peaks during winter, though its seasonality's precise causes are

debated. Various studies report different shapes of temperature-pneumonia relationships, suggesting these are location-dependent. Additionally, humidity levels play a crucial role, with associations between pneumonia and combinations of high/low temperatures and humidity.

Bangladesh consistently ranks as one of the worst countries for air pollution, as well as having the highest death rate. Air pollution is high in both rural and urban areas. It increases both morbidity and mortality from respiratory infections, lung cancer and cardiovascular disease – non-communicable diseases, which constitute 67% of all-cause deaths in Bangladesh (WHO, 2021a). As Bangladesh's climate is warming and air pollution is increasing, their interaction effect will likely have a detrimental effect on health outcomes, especially cardiovascular disease and respiratory disease.

In Bangladesh, policies that reduce air pollution while mitigating climate change will have a significant positive impact on health as a co-benefit. Bangladesh initiatives that explicitly address climate change, air pollution and health: First, to address the health and climate impacts of air pollution, (O'Leary, Dasgupta, & Robinson, 2023), Second, the National Adaptation Plan (NAP) 2023–50 and Third, the Bangladesh Climate Change Trust Fund was established in 2010 to support programs and initiatives aimed at reducing the country's vulnerability to climate change.

Furthermore, access and utilizing international climate financing mechanisms such as the Green Climate Fund (GCF), the multilateral development banks (MDBs), Global Environment Facility (GEF), and Climate Investment Funds (CIF) will be essential to address the health impacts of climate change in Bangladesh. The Seventh Five-Year Plan (2016–2020) was commissioned to develop policies and institutions specifically, to build capacity in the area of environmental health through both public and private sector health care providers.

2.4.6 Sexual Reproductive Health Rights and Climate Change

In Bangladesh, sociocultural norms and restricted decision-making access heighten women's inherent vulnerability. Limitations in emergency obstetric service availability and accessibility in geographically remote areas, or urban slums already put pregnant women at high risk of maternal mortality and morbidity. Climate change hazards, particularly extreme climate events, exacerbate these risks According to the 6th Assessment report of IPCC In 2019, maternal and neonatal disorders were responsible for 3.7% of global deaths and 7.8% of Disability-Adjusted Life Years (DALYs), highlighting their significant health impact. Children and pregnant women are particularly vulnerable to climate-related risks, including extreme weather events and undernutrition, which can lead to higher rates of pre-term births, low birthweight, stillbirth, and neonatal stress. During climate-induced natural disasters, access to health facilities is further limited, making it more difficult for pregnant women to access life-saving services; limited supply of contraceptives can lead to unintended pregnancies; there is increased risk of gender-based violence in the overcrowded, informal shelter systems. Difficulty in accessing menstrual products, specifically for marginalized populations who repeatedly experience temporary or prolonged displacement, becomes a major hurdle for females.

Specific environmental hazards, such as increasing groundwater salinity in coastal areas due to sea-level rise, or land mismanagement has increased risk of pre-eclampsia, eclampsia, hypertension in pregnancy and gestational diabetes for pregnant women. Ambient and indoor air pollution and exposure to extreme heat are associated with adverse maternal health outcomes including preterm birth, stillbirth, and low birthweight babies.

2.4.7 Climate Change Impacts on Mental Health

Climate change also has significant indirect effects on the psycho-social well-being of individuals and

communities (Berry, Bowen, & Kjellstrom, 2010). The relationship between climate change and mental health is complex, as it can exacerbate existing mental health conditions and contribute to new ones. Extreme weather events have a profound impact on affected populations in Bangladesh, leading to adverse influences on mental health through various pathways, including declining income from agriculture production, displacement, and post-traumatic circumstances. The 2012 Vulnerability and Adaptation Assessment examined the relationship between mental health and climate change using hospital admissions records for various mental health disorders, meteorological data, and disaster information (CCHPU, 2012). Overall, mental health should be a priority for the health sector, due to impacts of climate change potentially increasing the risk of mental health disorders.

Extreme events, such as temperature increase, heat waves, floods, drought, tornadoes, hurricanes, and wildfire consequences are distress symptoms, suicide rates, and clinical disorders (depression, anxiety, sleep disturbances, PTSD, etc.) (Cianconi, Betrò, & Janiri, 2020). Climate change will produce profound changes in the environment and alter lifestyles, while also generating environmentally motivated migration (random asylum seekers and climatic refugees). These groups of people, forced to migrate, already have their own psychological vulnerabilities (Torres & Casey, 2017). The trauma

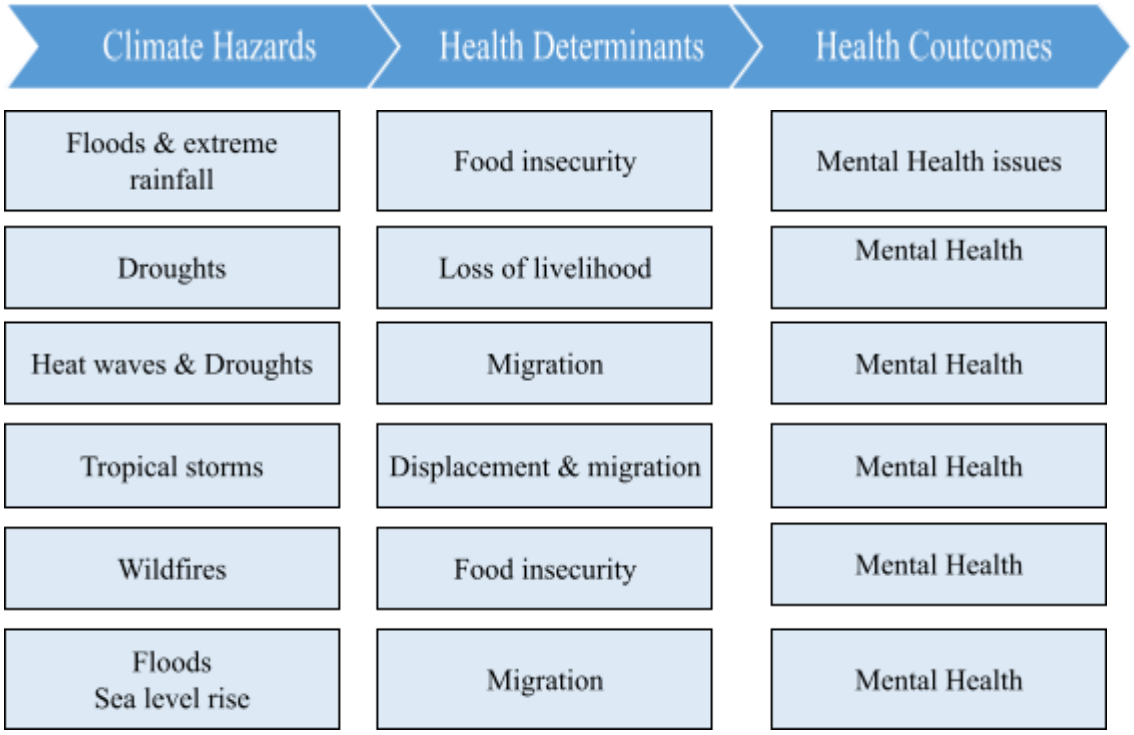


*Figure SEQ Figure * ARABIC 16: Mental Health impacts of the six weather-related events, Source: Customized, WEF, Quantifying the Impact of Climate Change on Human Health. Insight Report January 2024.*

and stress associated with losing homes, livelihoods, and communities to natural disasters contribute significantly to the mental health burden. Furthermore, extreme events can produce various types of psychopathological reactions over time, as they affect mental health acutely, sub acutely, and over a prolonged period.

The level of anxiety disorders increases with temperature and humidity. Increase in mean humidity and mean temperature increases the probability of having anxiety by 0.3 percent and 0.8 percent, respectively. More people suffer from depression during winter. Increase in temperature lowers the probability of depression by 1.6 percent. Further, women are at higher risk than men for depression,

while men are more susceptible to anxiety. (World Bank, 2021). Figure-15 shows health outcomes related to climate hazards and health determinants.

Evidence shows that a 1°C increase in temperature increases the probability of reporting an anxiety disorder by 21%, while exposure to natural disasters such as flooding increases the likelihood of depression by 31%, anxiety by 69%, and co-presence of both these conditions by 87% (Wahid, Raza, Mahmud, & Kohrt, 2023). Climate change-induced natural disasters also displace a substantial number of people in Bangladesh every year. More than seven million people were displaced by these events in 2022 alone, with the number expected to increase to 13 million per year by 2050 (World Bank, 2022). Here are some keyways in which climate change affects mental health: [Source: O'Leary, Dasgupta, & Robinson, 2023].

2.4.8 Extreme weather events

Bangladesh has a long history of extreme weather events, such as flooding (coastal and inland), drought, cyclone, salinity and storm surges, all of which have a significant impact on human health directly and indirectly, through injuries, disease outbreaks, nutritional deficiencies, psychological well-being, and lives lost. Displaced populations as a result of climate-induced extreme weather events, economic distress, or conflict situations are also highly vulnerable to health risk. Coastal regions especially are vulnerable to sea level rise and saline intrusion leading to contamination of drinking water and low levels of freshwater contributes to increase of water-borne disease (e.g-diarreheal disease). Figure-16 shows percentage of water-borne, water-washed and water-related disease occurrences by salinity and non-salinity areas (Coastal Bangladesh).

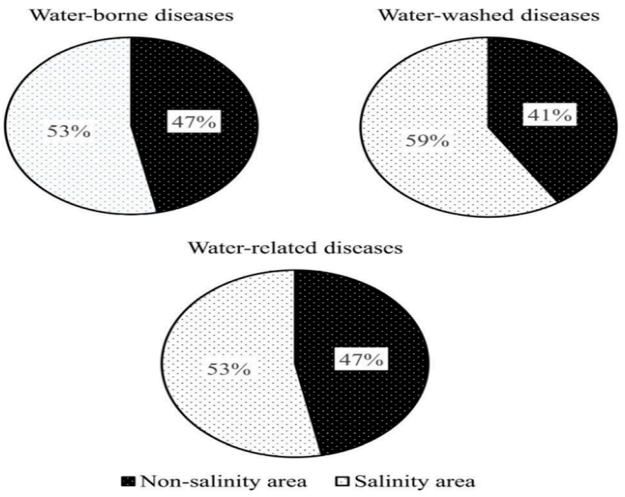


*Figure SEQ Figure * ARABIC 17: The pie Charts showing the percentages of water-borne, water-washed and water-related disease occurrences by salinity and non-salinity areas (Coastal Bangladesh) Source: Asma & Kotani, 2021*

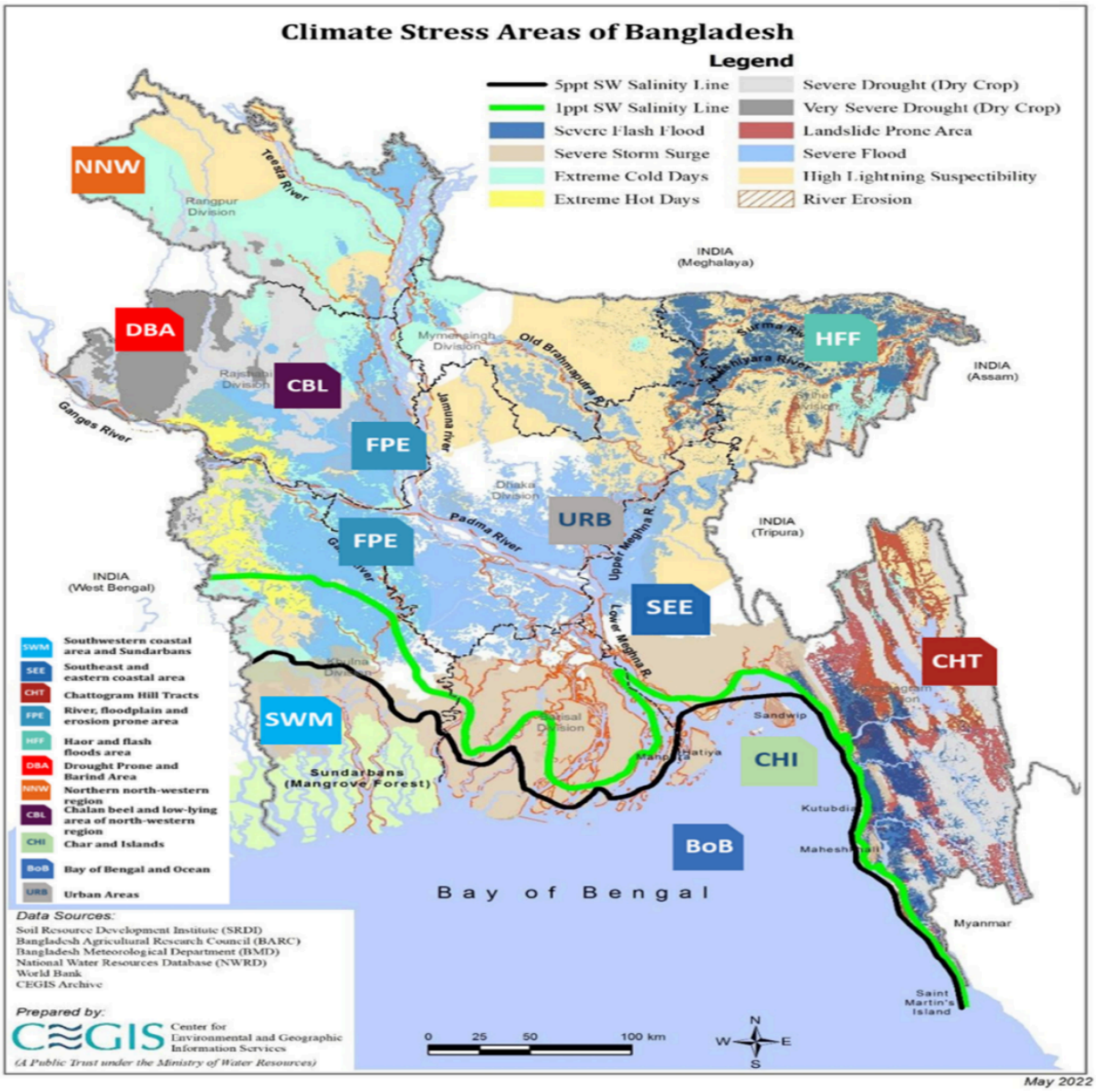
Frequency of drought, flooding and cyclone events are also increasing, exacerbating food and water security issues, as well as risk of disease outbreaks. Additionally, decreased freshwater availability may lead to reduced food production, which in turn may lead to malnutrition.

Heat impact on health includes heat exhaustion, heat stroke, dehydration, electrolyte disorders, diarrhea, and respiratory illnesses. Due to their long exposure to high temperatures, daily wage workers are most likely to suffer from heat-related illnesses (HRIs). Bangladesh is one of the world's most climate-sensitive health risk countries and future predictions indicate that both the frequency and intensity of risks (heat-waves) will rise. Additionally, increasingly higher temperatures are linked to AMR because they are associated with increased bacterial growth rates and horizontal gene transfer (Philipsborn et al. 2016).

When Temperature rises above 40.5°C hyperthermia results, with clinical manifestations of "sweating, flushing, tachycardia (rapid pulse), light-headedness, headache, muscle cramps, hypotension, confusion, delirium, seizures, and finally, coma" (Cheshire 2016). Dehydration and electrolyte disturbances are common symptoms of heat exhaustion, which can progress to heat

stroke. Heat exhaustion related dehydration can result in lower blood volume (and BP) which reduces cardiac filling, and in compensation increasing heart rate. The main cooling mechanism is sweating where salt and water can be lost at up to 2 L/hour. This cutaneous vasodilation dissipates the loss by radiant and convective pathways.

A multi-hazards risk map (Figure-17) for Bangladesh illustrates the spatial distribution across the country (CEGIS, 2021). The risk map includes all described hazards and segregates the country into 11 climate stress areas defined as follows under National Adaptation Plan of Bangladesh (2023-2050).



2.4.9 Plastic Pollution

WBG Report, Bangladesh's Plastic Challenge, 2021:

With rapid internal migration due to climate change and thus unplanned urbanization, Bangladesh faced a sharp increase in both plastic use and pollution. Plastic is a material that degrades slowly and into tiny particles (called micro-plastics), posing a significant risk to humans, marine life, and ecosystems climate change potentially increasing the risk of mental health disorders additionally resources are needed.

3. Policy and Strategic Alignment

Over the last three decades, Bangladesh has made substantial investments to make the country more climate-resilient and less vulnerable to extreme weather events. To guide this process, various plans, strategies, and policies have been developed. This chapter of HNAP outlines of the policy and strategic foundations that guide climate change adaptation within the health sector and ensures that the HNAP is not a standalone document but is fully integrated with national development priorities, climate commitments, and global health and environmental frameworks.

At the national level, the HNAP is strategically aligned with the National Adaptation Plan (NAP) 2023–2050 led by the Ministry of Environment, Forest and Climate Change, positioning health as a cross-cutting and priority sector within Bangladesh's broader climate adaptation agenda. It also complements the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) and reflects commitments under the Nationally Determined Contributions (NDCs), reinforcing the integration of mitigation and adaptation efforts within the health system. Within the health sector, the HNAP is aligned with key policy frameworks and operational plans of the Ministry of Health and Family Welfare, including the Health, Population and Nutrition Sector Development Programme (HPNSDP) and related sector strategies. This alignment ensures that climate resilience, low-carbon development, and environmental sustainability are embedded within routine health planning, service delivery, infrastructure development, and financing mechanisms.

The HNAP also considered the alignment with international commitments and frameworks. It reflects Bangladesh's obligations under the United Nations Framework Convention on Climate Change and the Paris Agreement, and responds to the COP26 Health Programme commitments on building climate-resilient and low-carbon health systems. Furthermore, it contributes directly to the achievement of the Sustainable Development Goals (SDGs), particularly those related to health (SDG 3), climate action (SDG 13), clean water and sanitation (SDG 6), and reduced inequalities (SDG 10).

A strong emphasis is placed on inter-sectoral coordination, recognizing that climate-sensitive health outcomes are influenced by water and sanitation, agriculture, disaster management, urban development, environment, and finance. Therefore, the HNAP promotes a whole-of-government approach, encouraging structured coordination among ministries, agencies, and development partners to ensure coherent planning, resource mobilization, and implementation. Finally, it underscores the importance of policy coherence, institutional strengthening, and sustainable financing. By aligning with existing legal, regulatory, and planning instruments, the HNAP ensures operational feasibility, avoids duplication, and enhances opportunities to access international climate finance mechanisms such as the Green Climate Fund and other global adaptation funds.

In summary, HNAP 2026 establishes the strategic legitimacy of the HNAP 2026 by anchoring it firmly within Bangladesh's national development framework and international climate commitments. It provides the policy backbone necessary for implementing a coordinated, resilient, and low-carbon health system capable of responding effectively to climate-related health risks. The following sections highlight key institutional and policy mechanisms for climate change and health.

3.1.1 National Adaptation Plan (NAP), 2023-2050

National Adaptation Plan (NAP) has been formulated in Bangladesh recognizing that effective medium- and long-term adaptation strategies are imperative to reduce the negative impacts of climate change. It intends to promote sustainable planning for future development, aiming for a viable path to climate-resilient development and minimized climate risks and vulnerabilities. The NAP envisions to establish Bangladesh as a climate-resilient nation through effective adaptation strategies that foster a robust society and ecosystems and stimulate sustainable economic growth. Six national adaptation goals have been set to achieve this vision:

- Goal 1: Ensure protection against climate change variability and induced natural disasters
- Goal 2: Develop climate-resilient agriculture for food, nutrition, and livelihood security
- Goal 3: Develop climate-smart cities for improved urban environment and well-being
- Goal 4: Promote nature-based solutions for conservation of forestry, biodiversity, and well- being of communities
- Goal 5: Impart good governance through integration of adaptation into the planning process
- Goal 6: Ensure transformative capacity building and innovation for CCA

The National Adaptation Plan (NAP) 2023-2050 for Bangladesh addresses the intersection of climate change and health comprehensively. Here are some key points related to climate change and health from the NAP:

- Increased disease burden, including vector-borne diseases like malaria, dengue, and chikungunya, and water-borne diseases such as cholera, diarrhea, and typhoid
- Rising temperatures leading to more cases of heat stress and heat-related illnesses, particularly among vulnerable populations, the elderly and outdoor workers
- Higher temperatures and air pollution exacerbating respiratory conditions like asthma and chronic obstructive pulmonary disease (COPD)
- Climate change impacts on agriculture causing food insecurity and malnutrition, especially among children and pregnant women
- Changes in temperature and humidity affecting food storage and safety, leading to foodborne illnesses

While the NAP 2023–2050 does not have a standalone health section, it integrates health into its objectives and strategies, especially under climate-resilient infrastructure and wellbeing, food security, and urban resilience. Following issues were mentioned explicitly that indirectly benefits health:

- Strengthening health systems & response capacity
- Disease surveillance for climate-sensitive diseases
- Community awareness & adaptive behavior
- Early warning systems (weather & disasters)
- Climate-resilient infrastructure
- Improved WASH access
- Integration of health into adaptation planning
- Research & data systems
- Cross-sectoral collaboration
- International partnerships & financing
- Community-based adaptation
- Capacity building of local actors

3.1.2 Nationally Determined Contribution (NDC) 3.0, 2025

The National Determination Contribution (NDC) of Bangladesh outlines the country's commitments and strategies to address climate change by emphasizing adaptation and mitigation efforts. NDC 3.0 underscores the importance of strengthening the health sector's climate resilience and low carbon transition to safeguard public health and preserve essential services in the face of escalating climate hazards. Key priorities include the implementation of energy-efficient and low-emission medical waste management systems, integration of climate–health modules into medical education and workforce training, and adoption of renewable energy solutions such as solar power and floodproof designs in health facilities. Disaster preparedness and rights-based outreach initiatives will particularly target vulnerable groups, including mothers and children, ensuring health equity in times of crisis.

Additionally, NDC 3.0 aims to enhance the linkage between health, WASH, and nutrition by establishing reliable access to safe water and sanitation infrastructure, thereby reducing undernutrition caused by waterborne diseases and environmental contaminants.

3.1.3 Bangladesh Climate Prosperity Plan (BCPP), 2022-2041

The Bangladesh Climate Prosperity Plan (BCPP) is a comprehensive strategy formulated to address the challenges of climate change in Bangladesh while promoting economic prosperity and sustainable development. The plan's key pillars include building resilience and resource efficiency through infrastructure and agriculture, promoting green growth and sustainable industries, ensuring social development and climate justice, diversifying financing sources, and strengthening governance institutions. Few key components of the BCPP include:

- Building resilience to climate change impacts such as sea-level rise, increased frequency of extreme weather events, and changing rainfall patterns.
- Promoting sustainable and inclusive economic growth by investing in renewable energy, green infrastructure, and low-carbon technologies.
- Emphasizing the conservation and restoration of ecosystems, including forests, wetlands, and coastal areas, to enhance biodiversity, mitigate climate change, and provide livelihood opportunities for local communities.

3.1.4 Bangladesh Climate Change Strategy and Action Plan (BCCSAP), 2009

The Climate Change Action Plan is built on six pillars. The first, entitled "Food security, social protection and health" aims to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change and that all programmes focus on the needs of this group for food security, safe housing, employment and access to basic services, including health.

The remaining pillars include comprehensive disaster management; infrastructure; research and knowledge management; mitigation and low carbon development; capacity building and institutional strengthening, do not directly mention health. However, in the Annex there is an exhaustive list of programmes that relate to each of the six pillars, a number of which mention health, albeit superficially. Note though that no mention is made in BCCSAP about which programmes should be prioritized or how much they are likely to cost. The main body of the report is split into four sections:

- Climate Hazards in Bangladesh – mentions health in the context of multi-purpose cyclone shelters being able to be used as health centers
- Impacts of Climate Change – mentions health in the context of the impacts of climate change on

safe drinking water, climatic changes affecting the health of the poor, and public health measures being needed to prepare for increasing incidences of water- and air-borne diseases associated with climate change

- Adapting to Climate Change – mentions that the Department of Public Health Engineering is one of the government ministries involved in climate change. The Health Ministry is listed as one of the 'other ministries' responsible for sectors that are vulnerable to climate change. This section also acknowledges that civil society has improved health of poor people, thus making them more resilient.

Towards a Climate Change Strategy and Action Plan – identifies that health education and awareness needed to address increased prevalence of disease and disease vectors.

3.1.5 Key Policy and Implementation Gaps for Health Adaptation

A Review of Policies/Strategies, Plans and Programmes relating to Health and Climate Change in Bangladesh conducted in 2013 identified the following gaps in policy for climate change and health adaptation.

- Specification of how, where and when the health sector should engage with others
- a national strategic mechanism to address gaps in knowledge and ensure that research outputs inform policy and practice
- Evaluation of the extent to which past recommendations have been achieved and have reduced vulnerability to climate change
- Clear identification of measurable outputs or outcomes associated with future interventions; and
- Clear timelines for action and funding strategies
- Nationwide Development of EWS and response for climate-sensitive health risks
- CC&H resilience costs included into domestic and international planned allocations
- Conducted valuation of co-benefits of health implications of mitigation policies

3.1.6 Alignment with Development Agenda/NAP

In the National Adaptation Plan (NAP) published in 2022, significant interventions such as CRC6, CRC8, CRC9, CRC11, CRC12, and CDR14, were proposed to enhance resilience against climate change, focusing on improving water supply, sanitation, and hygiene services in urban settings, alongside promoting the well-being of children and youth, and advancing surveillance and early warning systems for mental health risks. While these interventions mark crucial steps towards mitigating the impacts of climate change on health, the policy notably falls short in two critical areas: addressing the unique challenges faced by the rural health system and the comprehensive implementation of disease control and early warning systems across all regions.

For future improvement, it is imperative to extend the scope of the NAP to include specific strategies for bolstering the rural health infrastructure, which is often the most affected by climate-related events yet remains under-resourced. This should involve deploying mobile health units, enhancing

local health workers' capacities, and ensuring that rural health facilities are equipped and resilient to climate impacts. Furthermore, a more integrated approach to disease control is needed, one that encompasses both urban and rural settings and leverages technology and community networks for broader surveillance coverage. Early warning systems must also be refined and expanded, ensuring they are accessible to all segments of the population, including those in remote areas, and that they provide actionable advisories for impending climate-induced health risks. By addressing these gaps, the NAP can foster a more inclusive and comprehensive strategy that ensures resilience across all communities, irrespective of their geographic or socio-economic status, against the backdrop of an increasingly unpredictable climate.

4. Strategic Framework

The World Health Organization (WHO) presents its 'Operational Framework for Building Climate Resilient and Low Carbon Health Systems 2023', addressing the dual challenges of climate resilience and greenhouse gas (GHG) reduction in health systems. Climate change significantly threatens human health and universal health coverage, increasing climate-sensitive health outcomes as GHG emissions rise. To mitigate these impacts, transformative actions across sectors are essential, focusing on social and environmental determinants of health and the root causes of climate change. Health systems must adapt to provide safe, quality care, playing a leading role in this transformation through a sustainable, equitable approach supported by strong governance and political commitment tailored to national circumstances.

4.1 Introduction to Operational Framework for Building Climate Resilient and Low Carbon Health Systems, 2023

The framework is built on WHO's 2015 version, incorporating low-carbon sustainability while maintaining its foundational approach. It serves as a resource for health sector managers, public health professionals, and decision-makers, guiding comprehensive planning, project proposals, and interventions on climate change and health. WHO's framework, 2023 integrates climate considerations into the six building blocks of health systems: leadership, workforce, information systems, medical products, service delivery, and financing. By implementing the 10 key components of the six building blocks, health organizations can better manage climate-related health risks, promote environmental sustainability, and contribute to universal health coverage and the Sustainable Development Goals.

The framework's goal is to increase the climate resilience of health systems to protect and improve the health of communities in an unstable and changing climate, while optimizing the use of resources and implementing strategies to reduce GHG emissions. Implementing low carbon health practices would contribute to climate change mitigation while also improving health outcomes. Achieving these aims is an important contribution to universal health coverage (UHC), global health security, and specific targets within the Sustainable Development Goals (SDGs).

WHO has identified six building blocks that are common and relevant to all health systems, and are needed to support the delivery of UHC and improve health outcomes. These are: (i) leadership and governance; (ii) health workforce; (iii) health information systems; (iv) essential medical products and technologies; (v) service delivery; and (vi) financing. For the whole health system to become climate-resilient and have low carbon pathways, each of its six independent building blocks must integrate climate change considerations. To provide a comprehensive health response to climate change risks and protect people's health and health systems, this new framework proposes 10 components (detailed below) or functions linked to the six building blocks that when implemented by health systems would get translated into increased climate resilience and reduced GHG emissions.

4.2 Operational Framework for Building Climate Resilient and Low Carbon Health Systems

Goal:

To increase the climate resilience of health systems to protect and improve the health of communities in an unstable and changing climate, while optimizing the use of resources and reducing GHG emissions.

Objectives:

The framework's objectives are to:

- Guide health sector professionals, including through their collaborations with officials in health determining sectors to understand and effectively prepare for the additional health risks posed by climate change, through climate resilient and low carbon approaches;
- Present the main health system functions that need to be strengthened to build climate resilience and low carbon health systems, and use these as the basis for developing comprehensive and practical strategies (e.g. national climate change and health strategy) and plans (e.g. health component of National Adaptation Plan (HNAP) and healthy long-term low emission development strategies (LT-LEDS) and further development of AFOLU component under NDC 3.0;
- Support the development of specific interventions that can be implemented by health systems that address both the increased risks posed by climate change and progressive reduction of carbon emissions, and the synergies among these actions; and
- Support health decision-makers to identify roles and responsibilities to develop and implement action plans for resilience, and low carbon pathways, engaging actors within and outside the health sector.

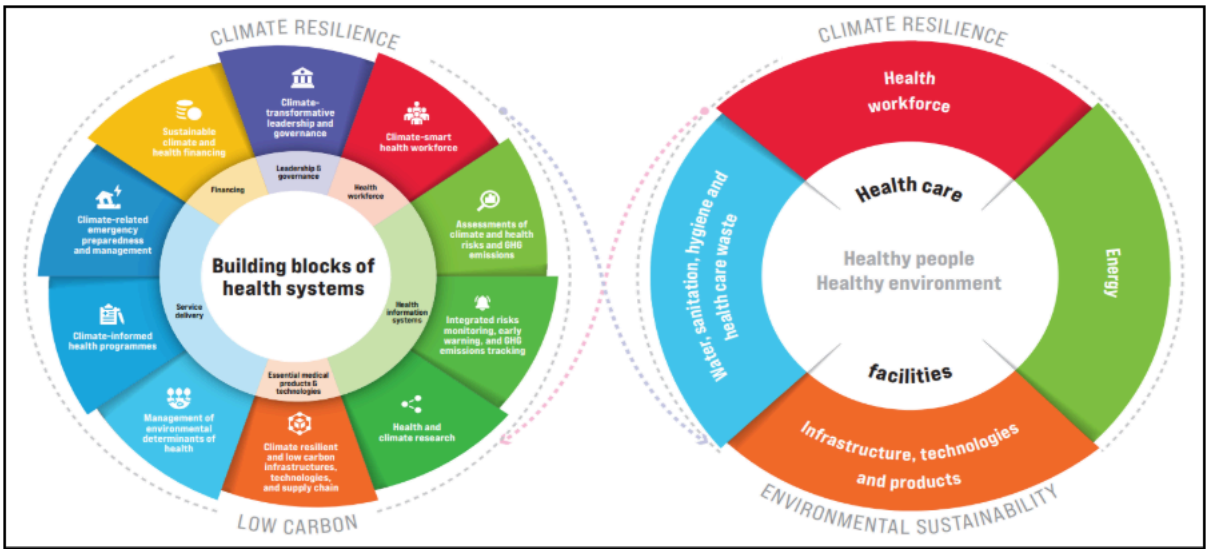


*Figure SEQ Figure * ARABIC 19: The framework as a tool for building climate resilience and low carbon interventions in the health facilities, Source: WHO, 2023b*

4.3 Framework Components for Building Climate Resilient and Low Carbon Health Systems

The overall purpose of HNAP 2024 is to support for building climate resilient and low carbon health systems, as well as mainstream climate risks into health policies, planning and programs. To accomplish this, the following section outlines the 10-components of the WHO Operational framework, 2023, highlighting long-term strategic objectives, as well as medium to long term adaptation actions appropriate for Bangladesh. The resulting HNAP Action Plan 2024-2029 aims to prioritize these adaptation options and layout plans and actions, and related indicators to be implemented in the next five-years.

4.3.1 Component 1: Climate-transformative Leadership and Governance

A strong political leadership and willingness at the highest levels within the government to address the health risks of climate change and ensuring climate change considerations are included in all health programs. This component aims to establish specific responsibility and accountability mechanisms for climate change and health within the Ministry of Health and its departments, strengthened coordination and cross-sectoral collaboration across different ministries with its departments, such as water, agriculture, environment, social protection, Economic Relations Division (ERD), as the Green Climate Fund (GCF) National Designated Authority (NDA), Bangladesh National Nutrition Council (BNNC) and energy with Ministry of Health are required to promote and protect health.

The strengthening includes collaboration across all relevant health programs, such as environmental health; epidemiological surveillance; vector and zoonotic control; water, sanitation and hygiene; mental health and NCDs; maternal and newborn health; nutrition, health care waste management; air quality surveillance; chemical surveillance; preparedness and management of disasters; health information systems; health workforce and human resources; pharmaceuticals, technologies, infrastructure and the supply chain; and operation and delivery of health services, in addition effective response to climate change assessment, monitoring, regulation, and management of climate-related health risks that originate in other sectors.

Goal: Strengthen health sector leadership, governance and coordination roles.

Strategic objectives:

- Governance – Specific responsibility and accountability mechanisms on climate change and health established within the Ministry of Health;
- Policy development – Climate change considerations, both for resilience and low carbon sustainability, reflected in main health policies and programs.
- Cross-sectoral collaboration – Cross-sectoral collaboration strengthened, and synergies maximized to ensure that decisions taken in other sectors protect and promote human health.

Present status:

The Climate Change and Health Promotion Unit (CCHPU) of the Ministry of Health and Family Welfare has been working on climate change and health issues since 2010 (cchpu-mohfw.gov.bd). The CCHPU lacks an appropriate country-specific monitoring framework to guide the integration of climate change and health into various policies and plans, as well as provide feedback for decision-makers on key climate-related health risks.

Table 3: Measurable outputs and indicators for climate-transformative leadership and governance integration with NAP

Component 1: Climate-transformative leadership and governance	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Governance				
Designated climate change and health focal	Designation of Focal	Official documentation	PIN 2	S6.1, S6.2,

Component 1: Climate-transformative leadership and governance	Outputs	Indicator	NAP Code	NAP Strategy
points within the Ministry of Health with specific Program of action	Points	detailing the roles and responsibilities of the focal points.		S6.3, S6.4, S6.5
Health sector commitment to achieve climate resilience in the health system	Climate Resilience Policy and strategy developed	Policy Adoption and Implementation		
Health sector commitment to transition the health system (including health care facilities and supply cha**ins) to low carbon or net-zero emissions**	Low-Carbon or Net-Zero Emission Policy developed	Documentation of Policy Adoption and Integration in the health system		
Climate change and health focal points or units, working in collaboration with relevant climate-**sensitive health programs (e.g., vector-borne diseases, nutrition, infectious diseases, disaster risk reduction) to build climate resilient and low carbon programs**	Climate change and health focal points or units established and functional and SOP developed	Designated number of climate change and health focal points or units		
Gender-sensitive approach adopted in the regulations and strategies on climate change and health	Integration of gender considerations into regulations, and strategies (e.g- climate change and gender action plan, GoB 2024)	Official endorsements and formal adoption document		
Meaningful participation of the health sector in main climate change processes at national, regional, and global levels with UNFCCC global negotiations, National Adaptation Plan, National Communications (NCs), Nation**ally Determined Contributions (NDCs), and long-term low-emission development strategies (LT-LEDS) promoted**	Establishment of formal participation network at all levels	Meetings & Workshops. Participation document /report		
SRHR and GBV coordination mechanisms integrated into national and sub-national climate and health governance structures.	• Existence of formal SRHR/GBV sub-working group or focal point within HNAP Technical Working Group (TWG), with approved ToR • Frequency of SRHR/GBV agenda items addressed in TWG meetings			
Objective 2: Policy development				
Develop National strategy on health and climate change (covering both resilience and low carbon sustainability approaches)	National strategy document developed	Official endorsement and publication of the national strategy	PIN 3	S6.1, S6.2, S6.3, S6.4, S6.5
Develop and integrate, Health component of National Adaptation Plan (HNAP) as a chapter in the overall NAP	HNAP document integrated in the NAP, Bangladesh	Published NAP, Bangladesh with chapter on H-NAP with endorsement		
Health is integrated into the Nationally Determined Contributions (NDCs)	Updated NDC Document	Presence of health-related sections and commitments in the NDC document.		
Establish mechanism to estimate GHG emissions in the health system	Mechanism to estimate GHG emissions developed Policy document developed	Number of reports on GHG Emissions incorporated in the national policy		

Component 1: Climate-transformative leadership and governance	Outputs	Indicator	NAP Code	NAP Strategy
Develop roadmap or action plan in collaboration with health-determining sectors and community actors for implementation of HNAP to build climate resilience health system	The roadmap (action plan) for climate resilience in health systems developed	The roadmap (action plan) for climate resilience in health systems approved		
Develop roadmap or transition plan for reducing GHG emissions in the health system in collaboration with health-determining sectors, including decarbonization targets	The roadmap (transition plan) for reducing GHG emissions in health systems developed	The roadmap (transition plan) for reducing GHG emissions in health systems report / document		
Establish coordinated strategies within the health sector and in health-determining sectors to develop policies for building a climate-resilient and low carbon health system, maximizing health co-benefits	Coordinated strategies established	Coordinated strategies endorsed and integration in the NAP		
Objective 3: Cross-sectoral collaboration				
Establish Agreements (e.g. MoU) between the Ministry of Health and key stakeholders at national level (e.g. meteorological and hydrological services, MoE, food and agriculture, energy, transport, planning), including specific roles and responsibilities in relation to protecting health from climate change and/or reducing the GHG emissions of health sector operations	Signed multisectoral agreements and documents on climate change and/or GHG emissions of health sector operations	Number of Agreements and Number of key stakeholders	PIN 4	S5.1, S5.3
Establish Multisectoral governance and coordination (involving people, communities, civil society, private sector, and all other engaged stakeholders) mechanisms to support climate resilience and decarbonization in the health system by the support of MOEFCC	Multisectoral governance and coordination mechanisms established	Multisectoral governance and coordination mechanisms established, document and meeting minutes		
Main policies and strategies from health-determining sectors reflect climate change and health considerations both in relation to adaptation and mitigation	Policies and strategies from health-determining sectors incorporated	Number of health-determining sector policies		
Inter-ministerial group on climate change and health established and promoting health in all adaptation and mitigation policies of key health-determining sectors	Inter-ministerial group on climate change and health established	Number of Inter-ministerial group meetings and meeting minute		
Conduct Health impact assessments for new mitigation and adaptation policies and programs in all health-determining sectors, in accordance with article 4.1.f. of the UNFCCC	Health impact assessments are conducted by relevant sectors	Number of Health impact assessments Reports		

Adaptation Strategies:

- To relocate and strengthen the proposed Directorate General of Primary Health Care and Public Health (DGPHCPH) for better coordination and sectoral collaboration of climate change and health activities and issues with designated focal point and resources.
- Develop a reporting tool to assist ministries and directorates in reporting CC&H activities to strengthen interagency coordinating platforms and climate-sensitive programs and health-determining sectors (water, environment, agriculture, nutrition, social protection, energy)
- Establish a HNAP TWG with agreed TORs for updating, monitoring, and evaluating progress of HNAP implementation

4.3.2 Component 2: Climate-smart Health Workforce

The health workforce is key to building climate resilience and environmental sustainability of health systems. Strengthening the technical and professional capacity of health personnel, strengthening the organizational capacity of health systems, and promoting collaboration between the health sector and other sectors are the main objectives of this component.

Health workforce competencies can be developed through pre-service education, lifelong learning, and mentoring. Skills required include understanding and using climate information for health interventions and decision-making; engaging in cross-sectoral action; conducting research, assessments, and interventions; and effectively managing climate change risks to health and health system performance.

Goal: Strengthening of technical and professional capacity of Health professionals at different tiers of health system on climate change and health.

Strategic objectives:

- Health workforce capacity – Sufficient number of health workers with the required technical capacity to deal with the health and nutrition risks posed by climate variability and change and to lead reductions in GHG emissions.
- Organizational capacity development – Resources, information, knowledge, and processes employed by health organizations used in an efficient and targeted manner to promote climate resilience and reduce their own GHG emissions and environmental impacts.
- Information, awareness and communication – Improved information, awareness and communication on health and nutrition impacts from climate change and opportunities for reducing emissions targeted among different target audiences (e.g. policymakers, health facility managers, media and communities).
- Strengthen health workforce's capacity to respond to humanitarian disasters, including first responders' training for appropriate levels of healthcare workers.
- Strengthen capacity of health workers Minimum Initial Services Package (MISP) for life saving SRHR services for climate vulnerable districts.
- Strengthen health workforce portfolio present in primary healthcare centres at the union level for faster disease surveillance, improved access to care including maternal health services. This can be done through addressing healthcare absenteeism, deploying more healthcare workers including midwives at the union level.

Present status:

Distribution of workforce (sanctioned post) among different directorates and offices under MOHFW. There are about 233,339 sanctioned posts at the Ministry of Health and Family Welfare and its agencies, for Directorate General of Health Services (DGHS), Directorate General of Family Planning (DGFP) and Directorate General of Nursing and Midwifery (DGNM) (Source: HRH Data Sheet 2022, MOHFW, 2022). At the medical college level, Handbook on climate Change and Relevant Issues for MBBS Course" has been developed to bridge the gap between fields of medicine and environmental science.

A regional training package consisting of 16 stand-alone modules on climate change and health was

launched in 2015 for WHO SEARO and climate change and health has been included in school health programs in Bangladesh. Many health professionals received training in CC and health at national and grass root level by different organization after 2015. Climate change impacts a wide range of program areas, including communicable diseases, maternal and child health, and nutrition, but the non-communicable diseases control program unit is responsible for addressing climate change in all health programs.

Table 4: Measurable outputs and indicators for a climate-smart health workforce integration with NAP

Component 2: Climate-smart health workforce	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Health workforce capacity				
Health workers received training on climate resilience and low carbon sustainability in the past two years	Health workers trained on climate resilience and low carbon sustainability	-Report on Number Health workers trained and type of training	CDR 1	S6.1, S6.2, S6.3, S6.4, S6.5
Health workers in specific programs have information and training on the interlinkages between specific health outcomes and climate variability and change	Health workers in specific programs have received information and training.	-Percentage of health workers trained on climate and health interlinkages		
Develop Health workforce capacity on decarbonization opportunities in health systems and health care facility operations, the supply chain and in-service delivery	Health workforce capacity developed	-Number of health workers trained on decarbonization practices. -No. of trainings		
Develop and impart 'Curricula on Climate Change and Health' covering both resilience and low carbon sustainability issues in secondary and/or tertiary levels	Curricula on climate change and health, resilience and low carbon sustainability developed	-Coverage of key topics in the curricula. -Number of educational institutions incorporated curriculum		
Objective 2: Organizational capacity development				
Develop contingency plans for the deployment of sufficient health personnel for acute shocks (e.g. extreme weather events and outbreaks) at the relevant level	Contingency plans for the deployment of health personnel developed	-Approved Contingency plan -Number of health personnel deployed at the relevant level	CDR 2	S6.1, S6.2, S6.3, S6.4, S6.5
Innovative approaches to reducing GHG emissions at health system or health care facility level (e.g. teams sharing best practices across different domains, and a system of rewards) promoted	Innovative approaches to reducing GHG emissions at health care facility level are promoted.	-Number of health facilities adopted innovative approaches to reduce GHG		
Health workforce participating in decision-making, planning and management of climate change risks	Health workforce participated in decision-making, planning management meetings	-Percentage of Health workforce participating in decision-making, meeting minutes		
Capacity building initiatives integrating climate change and health at early stages of professional health training	Capacity building initiatives established	-Number of capacity building initiatives		

Component 2: Climate-smart health workforce	Outputs	Indicator	NAP Code	NAP Strategy
Develop innovative capacity building plans responding to identified human resources and institutional capacity gaps	Innovative capacity building plans developed	-Number of innovative capacity building plans developed		
Objective 3: Information, awareness and communication				
Health professionals, the media and community leaders trained on climate change risk communication, including communication of uncertainty	Health professionals, the media and community leaders trained	-Number of Health professionals, the media and community leaders trained	CDR 4	S6.1, S6.2, S6.3, S6.4, S6.5
Establish stakeholder forum on climate change and health as a way to engage health determining sectors, the media and community groups	Stakeholder forum on climate change and health established	-Number of Stakeholder forum meetings (meeting minutes) -Number of Stakeholder forum members		
Develop 'Internal and external health communication plans' with focus on raising awareness of climate change risks and health outcomes and implementing efficient strategies to build climate-resilient health system	Internal and external health communication plans with focus on raising awareness of climate change risks and health outcomes plans are developed	-Number of communication plans developed -Implantation strategies		
Internal and external health communication plans with focus on measuring GHG emissions and implementing strategies to reduce health system emissions	Internal and external health communication plans with focus on measuring GHG emissions are developed	-Number of communication plans developed -Implantation strategies		
Raise awareness among decision-makers, health workers, the media and community leaders on climate change and health	Awareness among decision-makers, health workers, the media and community leaders raised	-Number of decision-makers -Number of health workers -Number of media and community leaders		
Establish initiatives with focus on climate change risk communication among different target audiences, and develop health action plan	Initiatives with focus on climate change risk communication established. & action plan developed	-Number of climate change risk communication initiatives developed. -Endorsed health action plan		

Adaptation Strategies:

- Ensure new and in-service training of existing healthcare workforce to deal with emerging and reemerging diseases particularly focusing on CSDs
- Review and update enhanced climate focused health education programs for medical students
- Conduct mass media and communication campaigns

4.3.3 Component 3: Assessments of Climate and Health Risks and GHG emissions

This component includes a range of assessments that can be used to generate policy-relevant evidence on the scale and nature of climate-related risks to health and health systems, and the impact of health systems operations and GHGs emissions on the environment. It also includes generation of information on health-promoting mitigation actions and policies in sectors responsible for most of the GHG emissions.

Vulnerability and Adaptation (V&A) assessments, help to identify populations and geographical areas that are most vulnerable to climate hazards; baseline conditions can be established and future climate change health impacts assessed; changes in disease risks can be assessed; protective measures need to be defined; and health systems' capacity to manage risks can be determined. The V&A assessment process include: Vulnerability and risk mapping, Modelling, Scenario development, Health system capacity and performance assessment, Economic assessments, Health impact assessments of decisions in other sectors, Specific risk, events, and hazard assessments. It is common for healthcare facilities to be exposed to climate-related hazards, such as cyclones, thunderstorms, droughts, floods, sea-level rise, extreme heat, and increased outbreaks of weather climate-sensitive diseases.

As health systems are responsible for approximately 5.2% of global carbon emissions (Romanello et al., 2022) approaches and tools to understand key hotspots of these emissions are needed. New assessment tools for estimating GHG emissions from health systems and health care facilities are being developed (e.g. The Aga Khan Development Network's Carbon Management Tool, 2021). Health systems and health care facilities measurement of emissions per bed will inform the development of targeted decarbonization and environmental sustainability actions and plans. By developing a dedicated carbon analytics capability in health systems, it will be possible to calculate emissions more accurately, fill evidence gaps, prioritize data-driven high impact projects, and monitor and verify emissions reductions.

Goal: Assessment of potential health impacts of climate change and identifying adaptation options.

Strategic objectives:

- Health risks – A sound understanding of the main hazards, exposures, current and future health risks, vulnerabilities of different population groups, geographical areas, and health systems available in the country or region.
- Perform detailed assessments of GHG emissions across the health sector to identify key emission hotspots at the national and facility levels.
- Progress tracking – A process and system established to track progress in overall climate resilience and GHG emission in health systems as well as to assess health risks in an iterative manner.

Present status:

A climate change and health Vulnerability and Adaptation (V&A) assessment was conducted by the Climate Change and Health Promotion Unit in Bangladesh in 2011, which examined relationships between climatic variables and diarrheal disease, vector-borne disease (Kala-azar, dengue, and malaria), mental health, and impacts from extreme weather events; the V&A could not be mainstreamed into regular health programs due to lack of awareness and motivation. In addition, WHO conducted a vulnerability and adaptation to climate change study focused on health and WASH. Although extensive, the assessment was limited to nine communities located in coastal and drought prone areas and only focused on WASH-related impacts.

World Bank supported climate change and health assessment conducted in 2014 attempted to measure health adaptation capacity. Using the 2011 Bangladesh Health Facility Survey and 2011

census data, the study measured and mapped quality of health service delivery based four core indicators, covering equipment availability, essential drug availability, staffing quality, and patient satisfaction. The exercise summarized that there was strong evidence of poor geographic targeting of public resources in the health sector, as well as basic environmental infrastructure in Bangladesh (Mani & Wang, 2014).

Furthermore, Health Vulnerability and Adaptation Assessment of Climate Change Impact in Bangladesh was conducted in 2021. This study was conducted under the WHO and MOHFW project titled "Building resilience of health and health system from the impact of climate change" with financial assistance from GEF. The project sought to achieve the outcome of updating HNAP through effectively revising and integrating health risks from climate variability and adaptation options. (Detailed about this study is already mentioned in 2.1.c).

Table 5: Measurable outputs and indicators for assessments of climate and health risks and GHG emissions integration with NAP

Component 3: Assessment of climate and health risks and GHG emissions	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Health risks				
Conduct climate change and health vulnerability and adaptation assessments, including SRHR, maternal and newborn health, family planning and GBV risks, providing evidence on current and future health risks from climate variability and change	Climate change and health vulnerability and adaptation assessments conducted Number of V&A assessments that explicitly analyze SRHR/MNH/FP/GBV risks and service disruption pathways	Number of Climate change and health vulnerability and adaptation assessments conducted and report produced	CDR 5	S6.1, S6.2, S6.3, S6.4, S6.5
Assess baseline rates and climate sensitivity of health conditions, allowing the selection of priority risks, and continuous monitoring of changing risk conditions and health outcomes	Monitoring of changing risk conditions and health outcomes assessed	Monitoring report on changing risk conditions and health outcomes		
Gather information on health system's capacity (for each of the ten components included in this framework) to address the increased health risks from climate change as part of the V&A assessments	Information on health system's capacity and health risks from climate change collected	Report on health systems' capacity to address health risks from climate change		
Results of V&A assessments integrated into health system planning and into key climate change processes (e.g. HNAP)	V&A assessments integrated into health system planning and into key climate change processes	V&A assessments integration report.		
Identification and mapping of vulnerable populations and areas prone to high current and future climate-related health risks	Vulnerable populations identified and areas mapped	Report on identified vulnerable populations		
Assessment of health trends in climate-sensitive diseases	Climate-sensitive diseases health trends assessed	Assessment report on climate-sensitive diseases		
Objective 2: GHG emissions				
Conduct assessment of GHG health sector emissions and report publicly	Assessment on GHG emissions conducted and reported publicly	-Number of facilities with GHG emissions inventories completed -GHG emission reported		
Information on the environmental impact,	Information on	Report on		

Component 3: Assessment of climate and health risks and GHG emissions	Outputs	Indicator	NAP Code	NAP Strategy
including GHG emissions, of products and services used or delivered by the health system	environmental impact and GHG emissions developed	environmental and GHG emissions impact		
Information on key GHG emissions in health systems and/or health care facilities available and used to inform interventions aiming to reduce emissions	Information on GHG emissions in health systems and/or health care facilities gathered	Report on GHG emissions in health systems and/or health care facilities		
Low regret interventions for reduction in GHG emissions identified for each of the key GHG emission hotspots (e.g. access to renewable energy, energy efficiency, greener waste management practices, transition to low carbon transport, reducing emissions from anaesthetic gases and inhalers)	Interventions for reduction in GHG emissions identified	Report on Interventions for reduction in GHG emissions Adoption rate of renewable energy solutions in healthcare facilities.		
Interventions to reduce supply chain emissions identified, including through: more efficient use of resources; low carbon substitutions and product innovation; and requirements for health system suppliers to reduce GHG emissions	Interventions to reduce supply chain emissions identified	Report on interventions to reduce supply chain emissions		
Agreements with health system suppliers to reduce GHG emissions in the supply chain	Agreements to reduce GHG emissions achieved	Number of agreements and partnerships for emission reduction in supply chains		
Number of health facilities with GHG emissions assessed	Health facilities with GHG emissions assessed	Report on health facilities with GHG emissions		
Objective 3: Progress tracking				
Assessments' results used to identify a set of key indicators to be tracked over time both for health systems' climate resilience and reductions in GHG emissions	Key indicators for health systems' climate resilience and reductions in GHG emissions identified	Key indicators assessments report		
Establish a dedicated climate change team responsible for coordinating implementation of the climate strategy and monitoring progress across the system	Dedicated climate change team established	Document of dedicated climate change team		
Assessments' results used to prioritize allocation of resources and effective climate change and health interventions both for resilience and low carbon sustainability	Assessments to prioritize allocation of resources done	Assessments' report to prioritize allocation of resources		
Plan defined and established mechanism for iterative assessments of health risks from climate variability and change	Mechanism established for iterative assessments	Iterative assessments Mechanism Report		

Adaptation Strategies:

- Update V&A assessments (2012, 2015 & 2021) every three/five year and include climate-related health risks, as well as vulnerable populations and refined scope
- Coordination among different actors and relevant sectors
- Incorporate details about HNAP in the NAP 2022, Bangladesh.
- Develop SOP for carbon footprint assessment in health care facilities

4.3.4 Component 4: Integrated Risks, Monitoring, Early Warning and GHG Emissions Tracking

Integrated risk monitoring refers to the use of tools and epidemiological surveillance for early detection in conjunction with direct and remote sensing technologies for surveillance of the environmental determinants of health (e.g., water and air quality, variability in ambient temperature and humidity or incidence of extreme weather events); integrated monitoring and progress tracking including GHG emissions and other environmental impacts; and communication to inform timely action.

Building climate resilience to respond to these challenges entails: (i) developing adequate capacity and flexibility to understand how climate conditions influence health outcomes; (ii) being able to anticipate changing health risks; (iii) informing preparedness, surveillance, and response in a timely manner; and (iv)monitoring health outcomes.

Monitoring a broad range of signals around a health risk can allow changing conditions to be identified more quickly in order to anticipate detection of outbreaks and emergencies related to weather and climatic conditions and the core elements of climate informed EWS are to: "(i) monitor environmental conditions; (ii) forecast high-risk conditions and initiate active surveillance; (iii) send alerts and communication; and (iv) establish a mechanism for early response." (WHO, 2021b).

Information sources on climate-risks may originate from local community knowledge, as well as multiple fields of scientific and practice-based knowledge (such as epidemiology, meteorology and climate, environment, agriculture, water resource management, environmental health surveillance). Relevant information may be qualitative or quantitative, as well as observational or modelled. Environmental impacts from health systems are related to land use, air pollution and GHG emissions through energy consumption (transport, electricity, heating, and cooling) as well as product manufacturing, procurement, use and disposal.

- **Integrated Disease Surveillance, Routine health information data and Early Warning**:

- Collect, analyze, and interpret data on climate-sensitive environmental risks, hazards, and epidemiological trends to enable timely responses to health risks.
- Strengthen national health information management system to integrate with disease surveillance
- Ensure disaggregated data accounting for gender, age and disability. Additional disaggregation based on underlying disease status (especially for noncommunicable diseases, pregnancy, etc.,) will be beneficial

- **Monitoring and Progress Tracking**:

- Monitor and report on climate change impacts, health risks, vulnerabilities, health system capacity, and GHG emissions from health sector operations over time.

- **Communication**:

- Deliver timely warnings to health decision-makers, media, and communities, ensuring effective actions are taken to prevent adverse health outcomes.

Goal: Strengthening integrated disease surveillance and early warning system.
Strategic objectives:
Integrated disease surveillance and early warning – Data on climate-sensitive environmental risks, hazards, and epidemiological trends collected, analyzed and interpreted on a continual basis, and timely response to risks promoted.

- Monitoring and progress tracking – Information on climate change, health risks, impacts, vulnerability, health systems capacity, environmental impacts and GHG emissions of health sector operations monitored and reported over time.

- Communication – Timely warnings communicated to health decision-makers, the media and communities and translated into effective action to prevent negative health outcomes.

Present status:

EWARS:
EWARS plays a vital role in tracking and predicting the emergence and transmission patterns of climate sensitive diseases by integrating climate data, disease surveillance, and early warning systems. EWARS guideline has been developed through extensive analysis, and collaboration with World Health Organization, Bangladesh, Institute of Epidemiology, Disease Control & Research (IEDCR), DGHS & Public Health experts. It provides comprehensive information on the setup, operation, and management of the surveillance system, along with detailed protocols for data collection, analysis, and reporting. This guideline will serve as a vital resource for healthcare professionals, epidemiologists, and disease control personnel at central and filed levels.

The IEDCR in collaboration with WHO HQ, developed climate informed disease surveillance early warning and alert response system. EWARS is currently on trial basis at central (IEDCR) level and hopefully is going to be piloted in three sentinel sites in near future.

Carbon Emission: (GHG)
'Carbon footprint assessment of the healthcare facilities in Bangladesh-2023' is a pioneering initiative taken by the Institute of Epidemiology Disease Control and Research (IEDCR) under MoHFW with the technical assistance of World Health Organization to estimate the emissions generated from the healthcare sector in Bangladesh. The assessment aimed to evaluate and reduce carbon emissions from healthcare facilities in Bangladesh.

The Carbon Management Tool developed by the Aga Khan Development Network was used for the assessment of carbon emissions from 9 hospitals of different categories over the period of 3 months. The annual emissions were projected from 3 months assessment. The carbon mitigation plan was developed for each of the hospitals considering carbon sequestration from tree species (existing and new plantation), and carbon trading mechanism. The mitigation plan indicates that significant profits could be achieved through waste management. Hospitals could also generate revenue by supplying solar energy to the national grid.

Hospitals could improve their database management system to improve the record-keeping and make the data digitally accessible. Additionally, hospitals could foster behavioral changes to reduce carbon emissions, such as promoting carbon-neutral travel methods through staff recognition and tracking energy consumption to encourage competition in reducing emissions. By adopting the proposed mitigation strategies, hospitals could potentially achieve carbon neutrality or even negative emissions.

Table 6: Measurable outputs and indicators for integrated risks monitoring and early warning, and GHG emissions tracking integration with NAP

Component 4: Integrated risks monitoring and early warning, and GHG emissions tracking	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Integrated disease surveillance and early warning				
Implement an integrated climate and health surveillance system for specific climate sensitive diseases (ensuring	An integrated climate and health surveillance	Report on integrated climate and health surveillance	CRC9, CDM 3	S3.2, S3.3,

Component 4: Integrated risks monitoring and early warning, and GHG emissions tracking	Outputs	Indicator	NAP Code	NAP Strategy
disaggregated data availability)	implemented			S1.2, S1.3, S4.1, S4.2, S4.3 S1.3, S2.4, S2.1, S2.2
Identify early detection tools (e.g. rapid diagnostics, Syndromic surveillance) and used to identify changing incidence and early action for implementation	Early detection tools developed	Documentation on early detection tools Implementation Report		
Develop, Climate-informed health early warning systems that predict the risk of outbreaks of priority infectious diseases (e.g. malaria, dengue, cholera) and implement	Climate-informed health early warning systems developed and implemented	Climate-informed health early warning systems development and implementation documentation		
Use climate and weather data to predict risk of outbreaks of climate-sensitive diseases (i.e. integrated health and climate surveillance systems)	Assessment tool for climate and weather information developed	Assessment tool for using climate and weather data in disease risk prediction developed		
Participation of the Ministry of Health in cross-sectoral groups receiving warnings on extreme-weather events	MOH and cross-sectoral groups participatory sessions on extreme-weather events held	Number of participatory sessions conducted Number of participants attending cross-sectoral discussions.		
Geographic and seasonal distribution of health risks and outcomes (e.g. risk mapping) tracked for priority climate-sensitive diseases	Health risks and outcomes mapping done	Reports on 'Risk Mapping 'completed.		
Objective 2: Monitoring and progress tracking				
Establish, Monitoring process with a clearly defined mechanism for the tracking system to measure progress in GHG emissions reduction	Monitoring process established Record GHG emission/bed as per Guide to the Aga Khan Development Network's Carbon Management Tool, 2021	Monitoring process established with clear mechanisms Number of GHG tracking reports completed using established tools	CDM 2, WRM 2, WRM 11, WRM 4, CRC 12	S1.2, S1.1, S1.2, S1.3, S2.1, S2.2, S2.3, S2.4 S3.2, S3.3, S1.2, S1.3, S4.1, S4.2, S4.3
Impacts from main climate-related determinants of health (e.g. water availability and quality, air quality, food) monitored by the health sector	Monitoring system to track the impacts of main climate-related determinants of health established	Number and frequency of water, air, and food quality testing and reporting		
Indicators on climate change risks, impacts, vulnerability, capacity of health systems, and emergency preparedness capacity, as well as climate and environmental variables included in relevant monitoring systems at the national level and reported over time	Relevant indicators identified and regular reporting done.	Number of reviews conducted annually Improvements or deteriorations identified and documented.		
Periodic reviews for improvement or deterioration of capacities identified in V&A assessments	Periodic capacities reviews done through V&A assessment	Number of periodic reviews conducted annually. Number of assessment reports produced & published Number of		

Component 4: Integrated risks monitoring and early warning, and GHG emissions tracking	Outputs	Indicator	NAP Code	NAP Strategy
		improvements or deteriorations identified		
Objective 3: Communication				
Develop and implement a communication strategy on climate risks to health, targeting diverse audiences (e.g., media, public, health workers, and other sectors) with clear roles and communication methods for acute shocks and long-term stresses.	Comprehensive communication plan or strategy developed and implemented. (on climate risks to health)	Approved and published communication plan / strategy. Number of designated communicators identified and trained	CDR 3	S6.1, S6.2, S6.3, S6.4, S6.5
Develop a communication plan or strategy on health system decarbonization – outlining the scope of information for diverse audiences (e.g., media, public, health personnel and other sectors) and events, including who should communicate, and the means of communication –and implement	Comprehensive communication plan or strategy developed and implemented. (on health system decarbonization)	Approved and published communication plan. Number of designated communicators identified and trained		
Information on the health system's carbon emissions and best reduction practices and opportunities shared with relevant stakeholders and communities	Dissemination of relevant information data and actionable insights with stakeholders and communities done.	Number of reports on carbon emissions produced and published annually. Number of best practices documents created and updated. Number of stakeholders and community members reached.		
Community engagement and feedback mechanisms established to empower affected populations to respond to warnings, and to guide future development of monitoring and warning systems including with regards to environmental impacts of health care	Community engagement and feedback mechanisms established	Number of community engagement platforms or forums established. Number of training sessions conducted. Number of community members trained		

Adaptation strategies:

- Incorporate the climate informed disease surveillance early warning and alert response system with the health system's MIS
- Identify mechanisms and conduct baseline assessment of GHG emission from health care facilities and health system
- Develop risk communication strategy for vector-borne diseases, water-borne diseases, and nutrition/food security
- Strengthen the inter-ministerial and departmental coordination and cooperation by developing mechanism
- Ensure disaggregation for gender, age, disability, underlying noncommunicable disease status, pregnancy status

Box: Climate-Sensitive Nutrition Surveillance and Early Warning

Objective

Enable anticipatory and responsive nutrition action through integrated climate–nutrition intelligence.

Key Interventions

- Integrate nutrition indicators (wasting, stunting, low birth weight, anaemia) into climate-sensitive disease surveillance systems (anemia should also be monitored for women of reproductive age and specifically pregnant women).
- Link climate early warning systems with nutrition risk triggers (e.g. floods, droughts, food price spikes).
- Undertake research to understand ethnographic aspects of gendered malnutrition exacerbated by climate change and propose subsequent solutions to combat gender inequity in nutrition.
- Strengthen routine nutrition data collection in climate-vulnerable districts and urban slums.

Expected Outcomes

Timely identification of nutrition risks and improved preparedness for climate-related nutrition crises.

4.3.5 Component 5: Health and Climate Research

Research should be built from existing knowledge management platforms, be effectively and clearly communicated to communities and healthcare personnel and adapted for practical purposes when possible. Long-term effects depend on current measures to reduce the emission of GHGs. Scientific research allows us to estimate increases in morbidity, injuries and mortality caused by global warming. Implementing strategies for sustainable low carbon health systems also need research support and development of assessment methods to support countries in measuring the total health system resilience and carbon footprint.

Research from global to local level can be used in the following ways: to gather knowledge on climate risks to health and health systems' impacts on the environment; the modulating effect of social and environmental determinants of health; climate-sensitivity of diseases and risks; how communities and health systems currently understand and cope with climate risks and GHG emission reductions; local conditions and vulnerabilities are connected to broader social and environmental determinants; and the degree to which communities and local health services are prepared to reduce carbon emissions and environmental impacts while responding to climate-related stress and shocks.

Goal: Conducting comprehensive research on climate change and health to facilitate the development of targeted strategies.

Strategic objectives:

- Develop and Implement a Multidisciplinary Research Agenda**:** Define, endorse, and implement a national research agenda on climate change and health in collaboration with decision-makers and key stakeholders, ensuring alignment with national priorities and policies.
- Strengthen Research Capacity: Build multidisciplinary research capacity on climate change and health by supporting collaborative networks, allocating financial resources, and providing targeted training opportunities. Focus areas include climate resilience, low-carbon sustainability, and evidence generation for adaptation and mitigation strategies.
- Translate Research into Policy and Practice: Integrate and apply research findings on climate change and health into policies and decision-making processes. Strengthen evidence-based approaches to improve adaptation and mitigation strategies across sectors, transforming practices and contributing to measurable policy outcomes.

Present status:

Several globally recognized research institutes (and renowned experts) exist in Bangladesh that focus on climate-related health risks; however, research on climate change and health is still limited. The Climate Change Strategy and Action Plan (2009) and NAP 2022, Bangladesh, highlighted the need to establish a centre for adaptation research and training to help facilitate knowledge management and capacity building on climate change issues. However, there is need for more coordination effort between various sectors, for access to climate-related information with regard to scientific evidence, health risks of climate change, treatment technology, policies and interventions that can minimize the adverse impacts. There is a need for a clear 'research agenda for climate change and health' to provide guidance for future research activities.

Table 7: Measurable outputs and indicators under health and climate research integration with NAP

Component 5: Health and climate research	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Research agenda development and implementation				
Develop national research agenda on climate change and health	National priority research areas, and funding strategies developed	Approval of the research agenda. Number of stakeholder meetings or consultations	CDR 10	S6.1, S6.2, S6.3, S6.4, S6.5

Component 5: Health and climate research	Outputs	Indicator	NAP Code	NAP Strategy
		held.		
National research agenda on climate change and health incorporates health system de-carbonization	National research agenda with incorporation of health system de-carbonization developed	Approval of the research agenda with de-carbonization. Number of stakeholder meetings or consultations held.		
The health system has a budget dedicated to climate and health research agenda	Dedicated budget allotted	Approved and available dedicated budget		
Results of a V&A assessment are used to inform a national research agenda on climate change and health	V&A assessment incorporated in the Research agenda	Approved Research agenda with incorporation of V&A assessment		
Research agenda incorporating the need to identify technologies for climate resilience with GHG emission reduction potential in priority areas	Research agenda with identification of technologies to reduce greenhouse gas (GHG) emissions developed	Approval of the documents. Number of stakeholder meetings or consultations.		
Objective 2: Research capacity				
Develop multidisciplinary research partnerships, rosters of national experts, and knowledge management networks established to support research agenda and implement	Multidisciplinary research partnerships, networks established	Number of members of multidisciplinary research partnerships. Number of experts listed in the knowledge management networks.	CDR 12	S6.1, S6.2, S6.3, S6.4, S6.5
Provide incentives for tertiary educational institutions to offer research programs on climate change and health	Research programs incentive mechanism established	Approval of document. Number of Institutes provided funding (Incentives)		
Establish data-sharing agreements within and outside the health sector established for supporting research on GHG emissions and low carbon technologies	Data-sharing agreements established	Approved Agreement document. Number and name of the Sectors involved		
Establish data-sharing agreements within and outside the health sector for supporting research on climate-sensitive disease surveillance and monitoring	Data-sharing agreements established	Approved Agreement document Number and name of the Sectors involved		
Establish data-sharing agreements within and outside the health sector for supporting research on climate resilience	Data-sharing agreements established	Approved Agreement document Number and name of the Sectors involved		
Establish financial investment mechanisms to support research programs and postgraduate research training programs	Research program financial investment mechanisms established	Approved Agreement document. Module for the postgraduate research training programs are in place		
Objective 3: Research into policy				
Establish mechanism for researchers to inform planning, policy, and stakeholder groups	Mechanism to inform for researchers, stakeholders group established	Approved document. Number of Stakeholders group involved.	CDR 14	S6.1, S6.2, S6.4, S6.5
Establish mechanisms to support, spread and scale innovation across the health system that supports climate resilience and/or health care decarbonization	Mechanisms to support, spread, and scale innovation established	Approved document. Number of innovation support mechanisms established. Document of allocation of funding		
Dissemination of research findings on climate change and health and used to develop key health (e.g.	Research findings Dissemination program, done	Report on Research findings dissemination program. Number of Dissemination		

Component 5: Health and climate research	Outputs	Indicator	NAP Code	NAP Strategy
health sector strategic plans, strategies of priority vertical programs) and climate change (e.g. NAP, NDCs, LT-LEDs) plans, policies and strategies		programs. Number of stakeholders.		
Develop evidence-based capacity for decision-making within and outside the health sector to contribute to policy outcomes	Evidence-based policy outcomes developed	Report on Policy outcomes		
Health services-oriented climate and health research promoted	Orientation program-oriented climate and health research done.	Report of Orientation program. Number of Orientation programs. Number of relevant stakeholders		
Conduct research on climate change and health and translated into health policy	Research Data to policy developed	Number of Research conducted Number of Research data to policy done.		
Adaptation and mitigation decision-making based on the results of the research agenda implementation	Integration of research findings into the decision-making done	Number of policy documents, strategies, or action plans that reference research findings. Number of adaptation and mitigation strategies developed and implemented.		
Research on climate change and health responds to needs by policy makers	Research agenda that aligns with the specific needs and priorities of policymakers developed	Number of consultations with policymakers to identify research needs. Number of policy briefs or reports produced		

Adaptation strategies:

- Knowledge Sharing and Dissemination Platform
- Develop a dedicated knowledge-sharing platform or hub to disseminate climate change and health (CC&H) research findings to key stakeholders and policymakers, fostering collaboration and informed decision-making.
- Multidisciplinary National Research Agenda
- Define, endorse, and implement a multidisciplinary national research agenda on climate change and health in partnership with decision-makers, health stakeholders, and relevant sectors to align research efforts with national priorities.
- Data Sharing and Collaboration Framework
- Establish a Memorandum of Understanding (MOU) among the Ministry of Health and Family Welfare (MoH&FW), Bangladesh Institute of Development Studies (BIDS), universities, research centers, meteorology services, and other relevant sectors to facilitate data sharing and establish baseline data for prioritized climate-related health risks.
- Policy-Oriented Dissemination of Research Findings
- Initiate a regular dissemination program to share research findings with policymakers, ensuring the evidence is accessible and actionable.
- Incorporation of Research into Policy Development
- Ensure that research findings are systematically incorporated into the policy formulation process, emphasizing the need to revise and adapt policies based on emerging evidence and trends in CC&H.

4.3.6 Component 6: Climate Resilience and Low Carbon Infrastructures, Technologies and Supply Chain

Strengthening adaptation of current infrastructures, technologies, and supply chains; introducing new low carbon technologies; and promoting environmental sustainability of health operations. A climate-resilient health system including provision of essential preventive and curative health products, from vaccines for climate sensitive diseases to surgical equipment, special allocation for climate change affected area in specific technologies both within and outside the health sector can enhance health service delivery and reduce disruptions during extreme weather events.

Additionally, it considers the importance of environmental services to health facilities, such as safe water, sanitation facilities, reliable cold chains, enforced building codes, and dependable information communication technologies. The energy sources and waste management & drainage system all that contribute to a climate resilient health system, may be compromised by extreme winds, flooding, sea level rise, or drought, as well as electricity supplies. Further, reducing the carbon footprint of healthcare facilities through "greening" exercises, such as solar energy and water recycling pumps, contributes to climate resilience and long-term sustainability.

Innovative interventions of climate resilience, health systems and health care facilities can also significantly reduce GHG emissions. Opportunities need to be promoted for reducing consumption, reusing and/or recycling; reducing food waste; and establishing sustainable procurement guidelines. By choosing technologies that consume less energy, medical and food supply chains that are more environmentally friendly, and decentralized renewable energy sources, such as solar photovoltaics, can contribute to both climate resilience and long-term environmental sustainability.

Goal: Implementation of National WSP at all health facilities.

Strategic objectives:

- Adaptation of current infrastructures, technologies, and supply chain – Current and future climate risks systematically considered in the context of revising and upgrading of infrastructures, technologies, products, and processes for climate resilient and low carbon sustainable health service delivery.
- Promotion of new technologies – Innovative climate resilient and low environmental impact technologies, including low carbon measures, promoted and deployed by the health sector through transformative health service delivery.
- Environmental sustainability of health operations – Low environmental impact technologies procured and promoted by the health sector to enhance resilience to climate change and contribute to long term sustainability.

Present status:

Health care facilities, especially in remote areas, are vulnerable to extreme weather events and become inoperable during the events, when they are most needed. Remote facilities often lack access to safe emergency electric supply, running water and sanitation facilities, which are preventive for many climate-sensitive diseases. Orientation of the Policy makers is required for better understanding for the necessary fund allocation to the climate-resilient health care infrastructure.

As a part of conserving nature and preventing air pollution, Bangladesh Medical Students' Society (BMSS) organized "Project: Green Hospital" collaborating with 22 medical colleges & hospitals

throughout Bangladesh (Green Time news, May, 2024). The concept of the "Green Hospital" is introduced as a paradigm shift in healthcare, focusing on optimizing resource efficiency and minimizing environmental impact. This concept encompasses renewable energy integration, natural lighting, sustainable materials, green roofs, and smart building management systems.

In water scarce, salinity prone southern Bangladesh, models like Rainwater Harvesting system and Pond Sand Filtration System in healthcare, school and communities may help meet the safe water needs with low-cost, low-carbon and climate resilient approaches (Ref: Mukherjee S, Hyde KR. Promoting urban rainwater harvesting in Dhaka, Bangladesh).

Table 8: Measurable outputs and indicators under climate resilient and low carbon infrastructure, technologies, and supply chain integration with NAP

Component 6: Climate resilient and low carbon infrastructure, technologies, and supply chain	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Adaptation of current infrastructure, technologies, and supply chain				
Implement climate resilience interventions at health system and/or facility level	Climate resilience interventions implemented	Implementation Document. Number of facilities implemented the climate resilient interventions	CDR 15	S6.1, S6.2, S6.4, S6.5
Review specifications for siting and construction of health facilities iteratively and revise in line with projected climate risks	Guidelines and standards for the siting and construction of health facilities developed	Completion and approval of initial specifications. Number of climate risk projection updates incorporated. Number of stakeholder consultations or meetings		
Review specifications for technologies and selection of products and processes of services, iteratively and revise in line with projected climate risks	Updated guidelines & standards based on climate risk assessments and best practices developed SRHR commodities integrated into climate-resilient supply chain and emergency logistics systems.	Number of review meetings or workshops. Frequency of reviews and updates to the specifications. Approved specification Guidelines. Proportion of climate-vulnerable districts with pre-positioned SRHR commodities (contraceptives, clean delivery kits, dignity kits, post-rape care supplies) Frequency of SRHR commodity stock-outs during climate shocks		
Number of health facilities retrofitted according to climate resilient and low carbon standards	Health facilities Identified	Number of health facilities identified and prioritized. Number of retrofitting plans developed.		

Component 6: Climate resilient and low carbon infrastructure, technologies, and supply chain	Outputs	Indicator	NAP Code	NAP Strategy
Review specifications for siting and construction of health facilities, and energy, water, waste management and sanitation provisions iteratively and revise in line with (i) projected climate risks, and (ii) the latest standards for low or zero carbon and environmentally sustainable buildings	Iterative review and revision of specifications for siting and construction of health facilities done	Number of review meetings or workshops. Number of stakeholder consultations or meetings. Approval of the review and revision document.		
Training and recommendations for prescription of pharmaceuticals during extreme heat revised	Revised document developed	Approved Document. Number of trainings.		
Improvement plan for ensuring health service delivery during extreme weather events and outbreaks of climate-sensitive diseases developed based on results of vulnerability assessments of health care facilities	Improvement plan developed	Approved plan document. Number of trainings.		
Objective 2: Promotion of new technologies				
Promote access to renewable energy in health care facilities as an adaptation and low carbon sustainable measure	Access to renewable energy and adaptation to low carbon measures in the health facilities are promoted	Number of renewable energy projects initiated and completed. Types of renewable energy sources implemented	WRM 3	S1.1, S1.2, S1.3, S4.1, S4.3, S2.1, S2.2, S2.3, S2.4
Adopt environmentally sustainable technologies suitable for harsh conditions (e.g. green cooling)	Environmental and WASH related technologies adopted	Number of Environmental and WASH technologies projects initiated and completed. Type of Environmental and WASH sustainable technologies sources implemented		
Use new technologies such as e-Health, telemedicine or satellite imagery to strengthen climate resilience and reduce carbon emissions, while contributing to improving health systems performance and UHC	New technologies adopted to improve health systems	Approved Document. Number & type of New technologies implemented		
Objective 3: Environmental sustainability of health operations	Outputs	Indicator		
Conduct assessments of health sector impacts on the environment, including GHG emissions,	Impact Assessments conducted	Assessment report. Number of Health sectors assessed.	WRM 3	S1.1, S1.2, S1.3, S4.1, S4.3, S2.1, S2.2, S2.3, S2.4
Implement decarbonization actions at health system and/or facility level	Decarbonization actions implemented	Implementation Plan Document. Number of Health facilities		
Interventions implemented to reduce emissions from high carbon medicines at the 'point of use', e.g. reducing emissions from inhalers and anesthetic gases	Implemented the interventions to reduce emissions	Implementation plan report. Number of Health facilities		
Promote active transport (e.g. cycling and walking) and the use of public transportation for patients, visitors, and health workers	Active transportation to health care centers promoted	Active transportation plan. Number of Promotion activities. Number & type of clients		

Component 6: Climate resilient and low carbon infrastructure, technologies, and supply chain	Outputs	Indicator	NAP Code	NAP Strategy
		oriented.		
Health sector transportation systems transitioned to low GHG emissions	Transportation systems to low GHG emissions promoted	Transportation systems to low GHG emissions plan. Number of Promotion activities.		
Integrate GHG emissions and environmental sustainability considerations within health sector procurement policies and practices, with suppliers, procurement teams and other stakeholders engagement to support implementation	GHG emissions and environmental sustainability considerations integrated	GHG emissions Policy / Plan. Number of health sector teams. Number of other Stakeholders		
Prioritize purchases from companies with transparent sustainability standards and science-based targets (near- and long-term) for reducing GHG emissions for products and services	Purchase from reduced GHG emissions products and services adopted	Reduced GHG emissions products and services purchase Policy / plan. Number of companies oriented		
Mobilize cross-sectoral collaboration for improving practices on environment and health protection	Cross-sectoral collaboration mobilized	Cross-sectoral collaboration Mobilizing practices Policy /Plan. Number of collaborative frameworks established. Number of joint initiatives implemented		
Promote environmentally sustainable, low carbon diets and procurement of locally produced food, and interventions implemented to minimize food waste in health care facilities	Low carbon diets and food procurement promoted, and implemented	Low carbon diets and food procurement Policy / Plan. Number of health facilities plan executed		
Number of health facilities incorporating climate variability and change in decisions related to siting, construction, technologies, procurement, and procedures to ensure provision of basic services (including energy, water and sanitation, waste management)	Development of climate variability guidelines and protocols	Guidelines and protocols developed and implemented. Percentage of health facilities adopting these guidelines and protocols		

Adaptation strategies:

- Develop guidelines and SOPs for low carbon climate resilient and low carbon infrastructures, technologies, and supply chain involving private sectors.
- Promote “Green hospital” initiatives and incorporate all necessary components climate resilient and low carbon infrastructures, technologies, and supply chain.
- Provision of Health sector transportation systems transitioned to low GHG emissions
- Promotion of low carbon, climate resilient WASH technology e.g. Rainwater Harvesting System, and Pond Sand Filtration System, Managed Aquifer Recharge, innovative Faecal Sludge Treatment and Management systems
- Strengthen proper waste management systems in health care facilities including medical waste following the health care waste management protocol/ guideline developed

4.3.7 Component 7: Management of Environmental Determinants of Health

Climate change will likely impact other determinants of health, such as water quality and quantity, air quality, nutrition and food security, waste management, and housing. Respond to environmental risks to health by strengthening monitoring and management of environmental determinants of health; developing and implementing regulatory instruments and mechanisms; and promoting coordinated intersectoral management. Raising awareness, support monitoring of environmental exposures, and define regulatory standards, both at policy and programmatic levels and some of the most effective actions that can be taken by health systems are in collaboration with other sectors.

Even though the health sector does not have substantial direct control over environmental determinants, it still plays an important role on both a policy and programmatic level in: (i) providing evidence of the link between risk factors and diseases; (ii) implementing effective preventive measures; (iii) raising awareness; (iv) monitoring environmental exposures and health outcomes; (v) defining regulatory standards and managing health risks.

Goal: Establishment of multisectoral risk management frameworks to address health risk.
Strategic objectives:

- Monitoring – Joint monitoring of climate-sensitive environmental risks based on evidence-based standards strengthened.
- Regulatory mechanisms – Regulatory policies protecting populations from climate-sensitive environmental risks defined, revised, and enforced.
- Coordinated cross-sectoral management – Environmental determinants of health jointly managed, with clear roles and responsibilities defined across sectors.

Present status:

Water, Sanitation, and Hygiene

Water, sanitation, and hygiene (WASH) issues are led by the Department of Health and Engineering within the Ministry of Local Government, Rural Development and Cooperatives in Bangladesh. Groundwater is the major source of drinking water in Bangladesh with an estimated 6–11 million tube wells (BGS, 2001), serving an average of 20 people each in country. Although, the coverage of the population with access to improved water sources has increased to 80%, difficulties still exist. Notably, arsenic contamination is becoming a problem with 25% of existing wells being exposed to arsenic (WHO, 2015c). Bacteria contamination, due to poor maintenance, is also a concern.

Cyclones, storm surges, and sea-level rise also affect water quality due to disruptions in supplies, damaged WASH facilities, and reduced freshwater availability. Although some WASH strategies (e.g. Water Safety Plans) have worked to combat communicable diseases and helped increase resilience to extreme weather events, more focus and resources are needed to prepare and manage current and future climate-related risks.

Air Quality

Bangladeshi cities have extremely poor air quality compared to other cities in Asian and South Asian countries, posing serious health and economic concern for the citizens. Air pollution is a major health risk in the world and the death tolls in Bangladesh are rising as diseases are being aggravated by polluted air. Outdoor air pollution can have direct and sometime severe consequences for health, leading to increased risk of respiratory infections, lung cancer, and cardiovascular disease (WHO, 2015a). Household air pollution is also a growing health concern in Bangladesh, especially in rural areas that primarily rely on solid fuel for cooking. It is estimated that nearly 88,000 deaths (44% of deaths from stroke, cardiovascular disease, lung cancer etc.) are attributable to indoor air pollution which accounts for 10% of all death in Bangladesh in 2012 (WHO, 2015a). Exposure to poor and contaminated air triggers adverse health risks, creating various symptoms and diseases.

Both long-term and short-term exposure to poor air have detrimental health risks which may contribute to diseases such as lower respiratory infection, pulmonary diseases, ischemic, cardiovascular diseases, and chronic obstructive pulmonary diseases (Boogaard, Walker, & Cohen, 2019). Children between the age 1 year to 4 years, and the elderly between the age of 60 years to more than 95 years, are the most vulnerable groups, as their mortality increases when exposed to ozone, particulate matter, and dust pollution (HEI, 2020). Vehicular emission, coal fired power plants, brick kilns, industrial emissions, road dust, and construction activities are major emission sources of PM in urban cities (Hossain, Majumder, Islam, & Nayeem, 2019) (Majumder, Nayeem, Patoary, & Carter, 2020). According to the annual Air Quality Life Index (AQLI) report of 2022, Bangladesh's average concentration of PM2.5 increased by 13.1 per cent to 75 µg/m3 from 2019 to 2020 (Greenstone & Hasenkopf, 2023).

In a study by the World Bank, it was found that loss of welfare due to air pollution accounted for about 6.14 per cent of the total GDP of Bangladesh in 2013 (World Bank & IHME, 2016). Due to pollution and environmental degradation in urban areas, the annual loss of productivity was estimated to be USD 1.44 billion for Dhaka city, and approximately USD 6.52 billion, or 3.4 per cent of GDP for Bangladesh in 2015 (World Bank, 2018). Despite increasing evidence of the health impacts of poor air quality (Shahid, 2009) (WHO, 2015a) policy and programmatic interventions are limited in Bangladesh. Achieving a greener environment with cleaner air has become a necessity for the citizens of the country.

Table 9: Measurable outputs and indicators under management of environmental determinants of health integration with NAP

Component 7: Management of environmental determinants of health	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Monitoring				
Integrated monitoring systems collect data on environmental hazards (e.g. water quality, water availability, air quality)	Integrated monitoring systems developed and operational	Integrated monitoring systems strategy report. Frequency of water quality data collection. Frequency of air quality data collection	WRM 2, WRM 1, WRM 5	S1.1, S1.3, S4.1, S4.2, S4.3, S2.1, S2.2, S2.3, S2.4
Proportion of health facilities with access to energy, safe water, and sanitation services	Health facilities have access to energy, safe water, and sanitation services	Number of health facilities with uninterrupted access to reliable energy. Number of health facilities with access to safe drinking water. Number of health facilities with access to sanitation services.		
Establish integrated monitoring systems allowing collection and analysis of data on environmental hazards, socioeconomic factors and health outcomes	Integrated monitoring systems established	Number of integrated monitoring systems developed and operational. Types of Data collection form		
Objective 2: Regulatory mechanisms				
Regulations on key environmental determinants of health (air quality, water quality, food quality, waste management) designed to reflect broader ranges of expected climatic conditions and the health sector's own contribution to GHG emissions and environmental impacts	Regulation on key environmental determinants of health developed	Number of new or revised regulations developed and enacted. Document on Types of environmental determinants of health considered	CDR 11	S6.1, S6.2, S6.3, S6.4, S6.5

Component 7: Management of environmental determinants of health	Outputs	Indicator	NAP Code	NAP Strategy
Promote regulations for clean energy systems as a means to improve local air quality and reduce the number of premature deaths from exposure to air pollution	Regulation for clean energy systems promoted	Number of new or revised regulations developed. Types of clean energy systems are in place		
Implement risk assessment and management approaches aiming to minimize the health impacts from climate change via water, sanitation and hygiene (WASH) (e.g. climate resilient water and sanitation safety plans)	Risk assessment management approaches Implemented	Number of risk assessments conducted focusing on climate change impacts on WASH systems Implementation report.		
Objective 3: Coordinated cross-sectoral management				
Environmental health impact assessments for policy and programs in sectors such as transport, water, food and agriculture, and WASH implemented in coordination with the Ministry of Health	Environmental health impact assessments done	Environmental health impact assessment report for policy and programs Numbers of sectors covered	PIN 5	S5.1, S5.4
Implement joint multisectoral risk management approaches to health risks related to climate related emergencies and disasters, water, waste, food, and air pollution	Joint multisectoral risk management plan implemented	Multisectoral Risk Management Plan. Number of sectors involved in the development and implementation of these plans		
Integrate low carbon sustainability approach in managing the environmental determinants of health	Low-carbon sustainability approach integrated	Development of Low-Carbon Sustainability Policies. Types of environmental determinants addressed		
Proportion of population with primary reliance on clean fuels and technologies increased	Increase in Adoption of Clean Fuels and Technologies	Percentage increase in the proportion of the population compared to a baseline. Number of new clean fuel and technology installations		

Adaptation strategies:

- Collaboration and development of strategy for jointly managing Environmental determinants of health, with clear roles and responsibilities defined across sectors
- Strengthen and develop Joint monitoring of climate-sensitive environmental risks based on evidence-based standards strengthened monitoring system for ambient air quality and link with disease surveillance
- Implement/scale up pilot project for climate-resilient water safety plans, WASH models, and WASH FIT programs
- Conduct health assessment to reduce household air pollution (identified in NCD plans) and develop strategy to pilot climate-proofing housing for vulnerable communities
- Promote, awareness and advocacy to ensure clean, drinkable water everywhere. Additionally, WASH awareness needs to be raised among the vulnerable and marginalized population.

4.3.8 Component 8: Climate Informed Health Programs

This component aims to ensure that health policies, programs, and operations are aware of and take into account both current and future climate change risks. The health sector must take lead, in coordination with other sectors, for programs that address climate-sensitive health risks (such as vector- and water- borne diseases, mental health, cardiovascular and respiratory diseases, maternal and newborn health, nutrition), preparedness and response to extreme weather and environmental events, as well as other crises.

Multi-sectoral issues should be in collaboration with climate change and health focal points or units in the ministries of health and other sectors, e.g., Emergencies and disaster risk management, public health preparedness, early warnings, food security and nutrition, occupational health, infectious disease monitoring, climate-sensitive disease surveillance, and several vertical programs for communicable and NCDs and injury prevention.

Goal: Strategic planning of health programmes for climate sensitive disease.
Strategic objectives:

- Health programming – Information on current and projected (future) climatic conditions integrated into strategic planning of health programs for climate-sensitive diseases.
- Delivery of interventions – Public health programs revise their standard operating procedures to integrate climate change considerations both in relation to resilience and low carbon sustainability in the delivery of interventions

Present status:
There is inconsistent incorporation of climate change considerations into public health strategies, plans and policies. The 4th Health Population and Nutrition Sector Program (HPNSP) and Operational Plan of DGHS not only identifies the likely impacts of climate change on health, but also sets out priority interventions. The strategies and actions of this HNAP will contribute significantly to the mainstreaming of climate change in health. The current programs needs to address disability-inclusive, gender-responsive national initiatives in mental health, including crisis preparedness, trauma counseling, educational support, and general well-being programs.

Table 10 Measurable Outputs and Indicators under Climate-informed HealthPprograms integration with NAP

Component 8: Climate-informed health programs	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Health programming				
Use information and evidence to gathered in components 3–5 (i.e. addressing research, assessments, and integrated surveillance) to inform action on priority climate-sensitive health programs	Evidence based action on priority climate-sensitive health programs developed	Evidence generated document. Number of Health programs used to inform action	CDR 3	S6.1, S6.2, S6.3, S6.4, S6.5
Proportion of health programs informed by a V&A assessment in integrating climate change and health adaptation and resilience actions within their own programs	V&A assessment is integrated in climate change and health adaptation	Assessment Report and Integration Policy/Plan. Number of health programs V&A assessment in integrated		
Proportion of health programs integrating climate change mitigation actions	Climate change mitigation actions integrated	Programs integrating Report and Integration Policy/Plan Number of health programs climate change mitigation actions integrated.		
Procurement processes and mechanisms of specific health programs are assessed and improved based on climate resilience and low carbon sustainability considerations	Procurement mechanisms developed	Assessment Report Procurement mechanisms. Number of health programs assessed.		
Investment plans to address identified capacity gaps in health programs to deal	Investment plans developed	Investment plans document. Number of capacity gaps		

Component 8: Climate-informed health programs	Outputs	Indicator	NAP Code	NAP Strategy
with the increased health risks from climate variability and change developed		identified in health programs		
Information on current and projected climate change risks integrated into strategic health programs	Current and projected climate change risk data into the health programs incorporated	The strategic health plans and policies. Number of health programs that include climate risk data in their planning processes.		
Number of health programs with standard operating procedures to respond to environmental risks revised for integration of climate information	Focused and revised SOPs developed Climate-informed SRHR programs (maternal health, family planning, adolescent SRH, GBV clinical services) implemented in climate-vulnerable areas	- The revised SOPs document. - Number of health programs included revised SOPs - Number of SRHR programs integrating climate risk data into planning - Proportion of births attended by skilled health personnel in climate-vulnerable areas during climate shocks - Proportion of women of reproductive age with access to modern contraception during and after climate events		
Service delivery informed by a sound understanding of the different exposure pathways from climate related hazards, and targeted to those most at-risk, considering gender differences and diverse vulnerability factors	Identification of exposure pathways from climate-related hazards to those most at-risk done	Detailed reports of these assessments. Number of assessments conducted to identify exposure pathways.		
Objective 2: Delivery of interventions				
Implement health sector response plan for key climate-sensitive health risks	Health sector response plan developed	Health sector response plan. Implementation report	CDM 7	S1.1, S1.2, S1.3, S2.1, S2.2, S2.3
Public health programs are targeted to those most at-risk of health impacts from climate change (e.g. maternal, newborn and children, older people, migrants, people with pre-existing conditions)	Identification and assessment of populations most at risk done	Detailed assessment reports produced. Number of targeted public health programs developed and implemented.		
Number of health sector program areas implementing GHG emission reduction interventions	Program implemented on GHG emission reduction	Program on GHG emission reduction implementation report. Number of health sectors GHG emission reduction program done.		
Prioritization of number of short- and long-term climate resilience interventions defined and on key health programs	Identification of short- and long-term climate resilience interventions done	Approved short- and long-term climate resilience programs		
Number of sustainable low carbon interventions defined and prioritized on key health programs	Sustainable low carbon interventions health programs Identified	Approved intervention programs. Number of low carbon interventions identified for each health program		
Risk maps and analysis of seasonal trends in diseases used to target resources and preventive measures for those most at-risk	Risk maps that identify high-risk areas developed	Risk maps and analysis of seasonal trends report Geographic coverage and resolution of risk map		

Adaptation strategies:

- Mainstream climate change risks into relevant policies and operational plans for VBD, WBD, and nutrition.
- Develop risk maps for VBD, WBD, and nutrition/food security using GIS (strengthen CBNP in hot spot areas)
- Develop and implement health adaptation prevention and control interventions based on risk maps.

4.3.9 Component 9: Climate-related Emergency Preparedness and Management

Holistic management of overall public health risks with an emphasis on preparedness, as well as emergency response is key for building climate-resilient health systems, through climate-smart policies and protocols; establishing climate-informed health emergency and disaster risk management; and supporting community empowerment. Climate-informed preparedness plans, emergency response systems, and community-based disaster and emergency management are essential for building climate resilience in health systems and communities, which are vulnerable to a wide range of hazardous events. National emergency operation policies, plans and programs that apply an all-hazards strategy, comprehensive emergency management principles and whole-of-society approaches are necessary.

Community-based actions are at the forefront of protecting health in emergencies and disasters, including those related to extreme weather events. Policies, programs, and strategies related to reducing health risks from climate change and related emergencies and disasters require multisectoral action with community participation (such as health workforce, various community groups, women groups, private sectors, key health-determining sectors, and private sector) in health decision making (WHO, 2019).

Goal: Develop health Sector emergency response plans for extreme weather events including risk reduction, preparedness and response from work.

Strategic objectives:

- Policies and protocols – Climate sensitive health risks and low-carbon operations included within national disaster reduction strategies, plans and protocols and wider development processes.
- Risk management – Strengthen health system capacity to manage risks so that overall vulnerability and exposure to climate hazards are reduced and residual risks and uncertainties effectively managed.
- Community empowerment – Empower communities to effectively prevent and respond to health risks from extreme weather events.

Present status:

The Directorate General of Health Services is responsible for providing preventive and curative health services during disasters following extreme weather events by coordinating and funding medical teams on an emergency basis. The Directorate General of Health Services works in all four phases of disaster management: normal, alert and warning stage, disaster stage and rehabilitation stage. Additionally, the Ministry of Disaster Management and Relief is responsible for reducing the risk of people from hazards and ensuring that there is an efficient emergency response management system in place. For data collection and disaster early-warning systems, the Bangladesh Meteorology Department (BMD) collects real-time meteorological information from 35 observatories, and the Bangladesh Water Development Board (BWDB) collects ground and surface water information, as well as monitors flood and drought situations. Finally, the Disaster Management Information Network, within the Disaster Management Bureau, support 64 districts and 482 sub-district offices, providing information on risks, mapping risk reduction activities, maintaining databases on disaster management capacity, and operating a national information portal.

The National Disaster Management Council (NDMC) and Inter-Ministerial Disaster Management Coordination Committee also play significant roles in facilitating policy-making, planning and implementation of disaster risk reduction and emergency response management in Bangladesh. Bangladesh doesn't have the Health Emergency and Disaster Risk Management (H-EDRM) framework. WHO Operational framework for building climate resilient and low carbon health systems, 2023 promotes the Health Emergency and Disaster Risk Management (H-EDRM) framework is a rights-based approach to developing national strategies for emergencies and disasters. Addressing climate risks in H-EDRM requires whole-of-society actions. To strengthen their readiness,

health system operations including health facilities and public health infrastructure should implement integrated approaches to H-EDRM as part of developing an all-hazards H-EDRM framework that includes climate hazards and the Climate-based H-EDRM must use a comprehensive emergency management (CEM) approach.

Table 11: Measurable outputs and indicators under climate-related emergency preparedness and management integration with NAP

Component 9: Climate-related emergency preparedness and management	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Policies and protocols				
Policies, protocols, plans, and strategies for Health Emergency and Disaster Risk Management (H-EDRM) reviewed and improved through the integration of climate-sensitive health risks and weather and climate information (e.g. El Niño/La Niña conditions)	Policies, protocols, plans, and strategies for H-EDRM developed	Approved Policies, protocols, plans, and strategies for H-EDRM.	CDM 5	S1.1, S1.2, S1.3
Develop health sector contingency plans for extreme weather events and implement	Health sector contingency plans developed SRHR and GBV services integrated into emergency preparedness, response and recovery plans	- Approved Health sector contingency plans - Implementation report - Existence of emergency preparedness plans incorporating SRHR/GBV service continuity - Availability of clinical management of rape and emergency obstetric referral services during climate emergencies		
Include gender sensitivity and equity approaches in H-EDRM, considering vulnerable populations and regions at risk from climate related hazards	Gender sensitivity and equity approaches included in H-EDRM	Approved H-EDRM document with Gender, equity, vulnerable populations and regions		
Health sector contingency plans for extreme weather events, including risk reduction, preparedness, and response, are aligned with the WHO H-EDRM or a local health emergency and disaster risk management framework	Aligned health sector contingency plans developed	Aligned health sector contingency plans document		
Protocols for H-EDRM integrate low carbon and environmentally sustainable practices including for logistics, supply change, procurement and storage of medicines and equipment, and transport	Sustainable H-EDRM protocols developed	Approved H-EDRM protocols.		
Objective 2: Risk management				
Risk assessments for current and projected future exposure to extreme weather events routinely used to inform health sector strategic development plans	Risk assessments for current and projected future exposure done	Risk assessments Report. Number of risk assessments conducted annually.	CDM 5	S1.1, S1.2, S1.3
Develop climate change related emergency and disaster response plans for individual health facilities and implement	Climate change related emergency and disaster response plans developed	Approved emergency and disaster response plans. Implementation report. Number of health facilities implemented the plans.		
Geographical and seasonal distribution of climate health risks and outcomes used to inform emergency and disaster response plans	Geographical and seasonal distribution of climate health risks response plans	Approved health risks response plans. Number of data collection initiatives on climate health		

Component 9: Climate-related emergency preparedness and management	Outputs	Indicator	NAP Code	NAP Strategy
	developed	risks conducted annually.		
Use EWS for extreme weather events and climate-sensitive diseases to inform roles and responsibilities of different actors for H-EDRM planning	EWS for extreme weather events and climate-sensitive diseases practiced	EWS use operationalized. Roles and responsibilities of different actors defined.		
Objective 3: Community empowerment				
Implement capacity development programs to support the roles of local communities to identify risks, prevent exposure to hazards, and take action to save lives in extreme weather events	Capacity Development Programs implemented	Approved Capacity Development Programs. Operational Capacity Development Programs	CDM 5	S1.1, S1.2, S1.3
Establish stakeholder mechanism to support participation, dialogue and information exchange, to empower civil society and community groups as primary actors in emergency preparedness and response	Mechanism to support stakeholder participation, dialogue, and information exchange established	Number of meetings and dialogue sessions conducted annually. Attendance and participation rates of civil society and community groups.		
Mechanisms in place to ensure information related to health risks from extreme weather events reaches communities in a way that preventive action by them is triggered	Mechanism for information exchange on health risks from extreme weather events established	Number of communication channels (e.g., radio, SMS, social media, community meetings) operational. Frequency and consistency of information dissemination during extreme weather events		

Adaptation strategies:

- Develop climate-smart policies and protocols for emergency and disaster risk management strategies
- Integrate climate-sensitive health risks and climate data into national disaster risk reduction strategy
- Incorporate climate-related health risks into emergency preparedness and response plans for health facilities
- Strengthen the procurement system to access and manage medical and disaster response supplies during emergencies.
- Develop Health Emergency and Disaster Risk Management (H-EDRM) framework in health systems – considering climate change risks and low-carbon operations – contributes to building climate resilience and to protecting population health.

Box : Climate-Resilient Nutrition Services

Objective

Ensure continuity and quality of essential nutrition services during climate shocks and stresses.

Key Interventions

- Climate-proof delivery of maternal, infant, child, and adolescent nutrition services in flood-, cyclone-, drought-, and heat- and salinity-affected areas.

-Integrate nutrition services into emergency preparedness and response plans (including mobile outreach and surge capacity).

-Strengthen nutrition counselling, growth monitoring, and supplementation through primary health care and community-based health care platforms.

Expected Outcomes

Reduced disruption of nutrition services during extreme weather events and improved nutritional status of vulnerable populations.

4.3.10 Component 10: Sustainable climate and health financing

Additional funds will be required to enhance the climate-resilience of health systems. For example, resources to expand the geographic or seasonal range or population coverage of surveillance and control programmes for climate-sensitive infectious diseases, or to retrofit health facilities to withstand more extreme weather events. A comprehensive approach to financing health protection from climate change will first build on core investments in the health sector, such as investments to ensure adequate numbers of trained health personnel, and basic health infrastructure and services, which also help to address climate change risks. To mobilize and implement resources, assessments should be conducted to determine requirements, available finance, finance gaps and opportunities to acquire funds (from national funds or external donors) (WHO 2024).

At the international level, the main multilateral funding mechanisms are mandated under the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, promoting financial assistance from more developed parties to those countries deemed more vulnerable and with fewer resources available to adapt to climate change. Parties to the UNFCCC have mandated the Global Environmental Facility (GEF) to manage the Special Climate Change Fund and the Least Developed Countries Fund, established the Adaptation Fund under the Kyoto Protocol and recently the Green Climate Fund.

Green Climate Fund (GCF): At the 16th session of the UNFCCC Conference of Parties (COP) in 2010, the Parties established the GCF to assist in mobilizing funding for low-emission and climate-resilient development. The GCF was designated as an operating entity of the financial mechanism accountable to the COP in 2011, and remains involved in decision-making regarding policies, program priorities and eligibility criteria for funding. The WHO has been approved as a GCF Readiness Delivery Partner, enabling WHO to support countries in accessing GCF Readiness funds, undertaking adaptation planning and developing strategic frameworks to build their programming with the GCF.

Global Environment Facility (GEF): was established in 1992, is an international partnership with a large network of countries, international institutions, private sector, and civil society organizations. It serves as an operating entity of the financial mechanism of the UNFCCC to provide financial resources to developing country Parties. Parties also founded the **Special Climate Change Fund (SCCF)** and the **Least Developed Countries Fund (LDCF),** which are both managed by the GEF. The SCCF was established to finance initiatives relating to adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry and waste management; and economic diversification. The LDCF was established to support least developed countries in preparing and implementing National Adaptation Programs of Action (NAPAs).

Adaptation Fund (AF): was established under the Kyoto Protocol in 2001, also supports environmental initiatives by financing concrete adaptation projects and programs in developing countries that are particularly vulnerable to the adverse effects of climate change. The AF is managed by the Adaptation Fund Board.

Source: Finance for health and climate change

The main international climate change specific financing mechanisms, funding is also available through bilateral and regional channels. The ATACH Finance Working Group aims to support countries aiming to access finance and funding for climate change and health by reducing barriers to funding and by maximizing investments in health (WHO, 2023).

Climate Budget and Trends in Bangladesh

Bangladesh has advanced climate-responsive fiscal policy through the Climate Fiscal Framework (2014) and annual Climate Budget Reports (since FY2017–18), integrating climate into national budgeting across 25 ministries. Allocations have grown, with an increasing share directed to development projects (65% by FY2026), signalling long-term investment. In FY2025, climate-relevant allocations totalled BDT 42,206.89 crore—about 10% of relevant ministries' budgets—but climate

spending remains under 1% of GDP. Food security, health and social protection receive the largest share (43.4%), followed by infrastructure and mitigation, while research, knowledge and institutional strengthening remain underfunded.

Climate Readiness Funds in Bangladesh

Bangladesh faces acute climate vulnerability with adaptation needs of about US$3 billion annually by 2030 and over US$8 billion by 2050, far exceeding current flows of around US$1.3 billion. Climate finance comes from national sources—such as the Bangladesh Climate Change Trust Fund (BCCTF)—and from international mechanisms including the Green Climate Fund (GCF), Global Environment Facility (GEF), Adaptation Fund (AF) and Climate Investment Funds (CIF). The Economic Relations Division (ERD) serves as the National Designated Authority (NDA), with accredited entities such as Palli Karma Shohayak Foundation (PKSF) and Infrastructure Development Company Ltd (IDCOL) now able to directly access GCF resources. Development partners (UNDP, UNEP, FAO, IFAD, WFP, UNICEF, Save the Children, GIZ, ADB, World Bank) provide readiness and delivery support, with recent grants strengthening the NDA and expanding Bangladesh's climate finance pipeline. While institutional architecture is in place, scaling finance to meet adaptation and mitigation needs remains the key challenge. To advance through climate-finance review stages, pipeline projects must strengthen climate rationale, embed measurable health and nutrition indicators and include clearer safeguards and monitoring arrangements

Goal: Ensure adequate resources to address the health impact of climate variability and climate change as a line item in national health investment.

Strategic objectives:

- Health specific funding and financing mechanisms – Climate change considerations for both resilience and low carbon sustainability included in relevant proposals submitted to and funded by health funding mechanisms.
- Climate change funding streams – Climate change finance accessed by the health sector.
- Funding and financing for health-determining sectors – Health and climate change considerations incorporated in projects and programs supported through funding for health-determining sectors.
- Identify cross-cutting funding opportunities integrating multiple health issues.

Present status:

The Bangladesh Government has incorporated climate change into national planning. In the existing development planning process, all projects worth more than US$ 6.37 million go to the Executive Committee of the National Economic Council of the Ministry of Planning for review and approval. Now, projects related to climate change and costing less than US$ 250 million will not need to go to the Executive Committee. The Monitoring and Evaluation wing of the Ministry of Planning monitors and evaluates Bangladeshi Government-funded projects.

A cost-effectiveness analysis was conducted in 2014 to estimate the cost and health benefits of three adaptation interventions focused on WASH, nutrition, and early-warning/risk reduction systems (CCHPU, 2014). In summary, the study identified several key gaps, including lack of cost data on projects and programs related to access safe WASH, investment in early-warning systems, and risk management measures, as well as absence of rigorous impact evaluations for health adaptation interventions. In addition, a small amount of funding, distributed through the Climate Change Trust

Fund, has been disbursed to the CCHPU Unit for climate change and health projects. Further, a GEF proposal for building climate resilient health systems in Bangladesh has been approved with funds set to be disbursed in 2018.

Table 12: Measurable Outputs and Indicators under Sustainable Climate and Health Financing integration with NAP

Component 10: Sustainable climate and health financing	Outputs	Indicator	NAP Code	NAP Strategy
Objective 1: Health specific funding and financing mechanisms				
Scale-up public financing to build the foundations of climate resilient and low carbon health system	Public financing to climate-resilient and low-carbon health system developed	Public financing to climate-resilient and low-carbon health system document. Total amount of public financing allocated to climate-related health initiatives	PIN 6, PIN 7	S5.1, S5.3, S5.5
Access to domestic or international funding to strengthen climate resilience of health systems	Domestic and international funds to support health systems accessed	Number of funding sources accessed. Breakdown of funding types secured (e.g., grants, loans, equity).		
Resources for climate change and health interventions, both for resilience and low carbon sustainability, included in national or subnational health investment plans	National or subnational health investment plans developed	Approved National or subnational health investment plans		
Access domestic or international funding to strengthen low carbon sustainability of health systems	Domestic and international funds to support low carbon sustainability health systems accessed	Number of funding sources accessed. Breakdown of funding types secured (e.g., grants, loans, equity).		
Percentage of the national health budget addresses risks posed by climate variability and change including at health care facility level	Climate variability and change addressed in national health budget	Portion of the national health budget specifically address risks posed by climate variability and change		
Use decadal and longer-term forecasts to inform health investments (e.g. construction of new health care facilities)	Integration of Forecasts into Planning done	Number of health investment projects that have utilized climate forecasts in their planning stages. Number of decisions or investments made based on climate forecast data		
Use results of V&A assessment and HNAP to access health funding and financing mechanisms	Funding Access on Results of V&A assessment and HNAP used	Funding Access Based on Assessments documents. Percentage of funding requests that incorporate findings from V&A assessments and HNAP		
Objective 2: Climate change funding streams				
Submit climate change and health projects and programs to and granted by the main international climate change funding mechanisms (e.g. Green Climate Fund (GCF), the Global Environment	Climate change & health projects and programs submitted to major international climate change for funding	Number of project proposals submitted. Number of projects and programs approved and funded	PIN 6, PIN 7	S5.1, S5.3, S5.5

Facility (GEF), the Adaptation Fund (AF) and bilateral donors)				
Development of investment cases for climate resilient and low carbon sustainable health systems by relevant actors (e.g. multilateral development banks) and used to facilitate access to funding and financing	Investment cases for climate-resilient and low-carbon sustainable health systems by relevant actors developed	Number of comprehensive investment cases developed. List of relevant sectors Quality and completeness of investment cases		
Objective 3: Funding and financing for health-determining sectors				
Monitor health impacts of climate change in programs funded through financial mechanisms specific to health-determining sectors	Health impact monitoring operational	Health impact monitoring report. Number of funded programs with established monitored	PIN 6 PIN 7	S5.1, S5.3, S5.5
Funding of climate interventions across sectors with a focus on health, including sustainable low carbon health facilities	Climate interventions with a specific focus on health, funded	Number of climate intervention projects funded. Number of low-carbon health facilities funded.		
Submission of Climate change adaptation and mitigation projects and programs and granted to key health-determining sectors integrate costed activities related to assessing and monitoring potential positive and negative health impacts	Climate change adaptation and mitigation projects and programs Submitted	Climate change adaptation and mitigation projects and programs submission report. Number of approved of climate change adaptation and mitigation projects and programs		
Screening for climate variability and change, and related health risks included as criteria for selecting investments in key health determining sectors, (such as water, sanitation, food and agriculture, energy, transport, and urban planning)	Climate variability and change, and related health risks screening done	Screening report of climate variability and change, and related health risks. Criteria for selecting investments in key health determining sectors developed		

Adaptation strategies:

- Develop a resource mobilization plan that identifies funding mechanisms for health (e.g. Climate Change Trust Fund) as well as resource gaps
- Develop and submit proposals for building climate-resilient health systems to international climate change and health funding sources (e.g. GEF, GCF, bi-lateral donors)
- Develop and submit proposal for building climate resilient health system in perspective of Bangladeshi climate variability.
- Identify resource partners which can fund multiple health issues – such as climate change impacts on maternal health.

5. Implementation Strategies

The Health National Adaptation Plan (HNAP) 2026 for Bangladesh is a comprehensive strategy aimed at addressing the impacts of climate change on the health sector. This plan will guide the integration of climate resilience into health policies, programs, and systems to safeguard public health in the face of changing environmental conditions.

5.1 Key Components of Implementation

5.1.1 Policy and Governance

- Integrate HNAP into National Health Policies including the National Nutrition Policy: Ensure that HNAP is incorporated into existing and future health policies, plans, and frameworks.
- To relocate and strengthen the proposed Directorate General of Primary Health Care and Public Health (DGPHCPH) for better coordination and sectoral collaboration of climate change and health activities and issues with designated focal point and resources.
- The proposed DGPHCPH will coordinate the "Climate Change Project" activities for implementation of the HNAP.
- Legislation and Regulation: Develop and enforce regulations that support climate-resilient health systems.

5.1.2 Health System Strengthening

- Infrastructure Development: Upgrade/retrofit health facilities to withstand climate impacts, such as extreme weather events, and ensure uninterrupted service delivery.
- Supply Chain Management: Ensure the availability of essential medicines, vaccines, and medical supplies in the face of climate-related disruptions.
- Human Resources for Health: Recruit, train, and retain health workers with expertise in climate change, MISP and health.
- Enhance transparency, accountability, and streamline fund access.

5.1.3 Surveillance, Monitoring, and Evaluation

- Climate-Health Data Systems: Develop integrated data systems to monitor climate-sensitive diseases and health outcomes.
- Collect data specifically on vulnerable groups – such as children, pregnant women, people with disability – to account for health impacts of climate change.
- Early Warning Systems: Strengthen early warning systems to predict and respond to climate-related health emergencies.
- Monitoring and Evaluation Framework: Establish a robust M&E framework to track progress and effectiveness of the HNAP implementation.
- Add climate–nutrition indicators (service continuity, diet diversity proxies, shock-affected coverage) into District Health Information Software 2 (DHIS2) and Electronic Logistics Management Information System (eLMIS) dashboards.
- Integrate hydro-meteorological and Disaster Risk Reduction (DRR) feeds into health/nutrition systems to trigger stock reallocation and staff redeployment.

5.1.4 Community Engagement and Public Awareness

- Community-Based Adaptation Programs: Support community-driven health adaptation initiatives, particularly in vulnerable areas and particularly for vulnerable groups.

- Identify opportunities to integrate climate change and health information within existing community health programs and existing community health workers.
- Public Awareness Campaigns: Implement targeted campaigns to raise awareness about the health impacts of climate change and promote adaptive behaviors.
- Behavioral Change Communication: Design and implement programs that encourage health-promoting behaviors in the context of climate change.

5.1.5 Capacity Building and Training

- Professional Development Programs: Provide continuous education and training for health professionals on climate change and health and emergency preparedness, including MISP.
- Curriculum Development: Periodic review and update climate change and health into the curricula of medical, nursing, midwifery and public health schools.
- Community Training: Develop training programs for community health workers and volunteers on climate-related health risks.
- Collaborate with different health directorates, Directorate General of Nursing & Midwifery (DGNM) and Directorate General of Family Planning (DGFP), Directorate General of Health Services (DGHS) to reach different kinds of health service providers.
- Collaborate with professional societies such as the Obstetrics and Gynecological Society (OGSB), Bangladesh Nursing and Midwifery Counsil (BNMC), Bangladesh Midwifery Society (BMS) to build inherent climate change and health capacity within professionals.

5.1.6 GHG Emission Reduction in Health Sector

- Energy Efficiency: Implement energy-efficient technologies in healthcare facilities, such as LED lighting, efficient HVAC systems, and energy management practices.
- Renewable Energy Use: Transition to solar, wind, or other renewable energy sources in hospitals and clinics, reducing reliance on fossil fuels.
- Sustainable Transportation: Promote the use of electric or low-emission vehicles for health-related transportation and patient services.
- Waste Management: Improve waste segregation, recycling, and safe disposal of medical waste to minimize environmental impact.

5.1.7 Research and Innovation

- Climate and Health Research: Promote interdisciplinary research to generate evidence on the health impacts of climate change in Bangladesh.
- Commission and conduct epidemiologic research on climate impacts on maternal, newborn and child health.
- Innovation in Health Technologies: Support the development and deployment of innovative technologies for climate-resilient healthcare delivery.
- Knowledge Sharing Platforms: Establish platforms for sharing best practices and lessons learned in climate change adaptation in the health sector.

5.1.8 Intersectoral Collaboration

- Cross-Sector Partnerships: Foster partnerships between the health sector and other sectors such as agriculture, water, environment, disaster management and social welfare.
- Integrated Health and Climate Policy: Promote policies that integrate health considerations into climate change adaptation and mitigation strategies.

- International Collaboration: Engage with international organizations and donors to leverage support for HNAP implementation.
- Convene a joint steering mechanism (Ministry of Health and Family Welfare [MoHFW], Ministry of Women and Children's Affairs (MoWCA), Ministry of Environment, Forest and Climate Change [MoEFCC], Ministry of Agriculture [MoA], Ministry of Disaster Management and Relief [MoDMR], Bangladesh National Nutrition Council [BNNC], Local Government Institutions [LGIs], Water Resources, NGOs, private sector) to align pipelines, standards and indicators.
- Introduce dual budget tagging (climate + health and nutrition) and publish an annual climate–nutrition budget brief.

5.1.9 Resource Mobilization

- Domestic Financing: Secure funding from national budgets and allocate resources specifically for the implementation of HNAP.
- International Funding: Access international climate finance mechanisms, such as the Green Climate Fund, to support HNAP activities.
- Public-Private Partnerships: Encourage private sector investment in climate-resilient health infrastructure and technologies.
- Blend financing: pair domestic health/WASH budgets with adaptation grants for resilience assets (e.g. solar cold chain, water safety).

5.1.10 Implementation Timeline

- Short-Term (2026-2027): Initiate policy integration, establish coordinating bodies, and begin capacity-building activities.
- Medium-Term (2027-2029): Scale up health system strengthening, surveillance, and community-based interventions.
- Long-Term (2029-2031): Achieve full integration of climate resilience into the health sector and ensure sustainability of adaptation efforts.

5.1.11 Monitoring and Evaluation

- Regular Progress Reviews: Conduct annual reviews to assess progress against targets and adjust strategies as needed. Intra-sectoral and multisectoral 'Regular Progress Reviews'
- Vulnerability assessment: Undertake periodic vulnerability assessments to evaluate and identify vulnerabilities and recommend for remediation or mitigation steps where required.
- Impact Assessment: Undertake periodic impact assessments to evaluate the effectiveness of HNAP interventions.
- Reporting Mechanisms: Establish clear reporting mechanisms to communicate progress to stakeholders and the public.

5.2 Coordination Mechanism

The Climate change and health project, "Building Resilience of Health Systems in Asian LDC to Climate Change of Bangladesh" at MOHFW will provide the necessary technical guidance and oversight for all climate change and health (CC&H) activities. The coordination of HNAP implementation activities will be led by the proposed Directorate General of Primary Health Care and Public Health (DGPHCPH), HSD, Ministry of Health and Family Welfare. This "Climate Change & Health Project" Project Director and Program Manager will also link with the focal point of the 'National Adaptation Plan, Bangladesh (2023-2050), Bangladesh for the alignment of the HNAP activities. Figure 20 provides a simplified diagram of the organizational structure for HNAP implementation. The coordination mechanism for implementation of the HNAP will be based on existing institutional arrangements and structures within the health sector and proposed institutional arrangements and structures of DGPHCPH to ensure alignment with national priorities. The MOHFW will also contribute to ensure effective coordination between MOHFW, DGPHCPH, and other relevant stakeholders across ministries (e.g MoLGRD, MoEFCC and MoF), departments, and institutions that will lead the updating, monitoring, and evaluating progress.

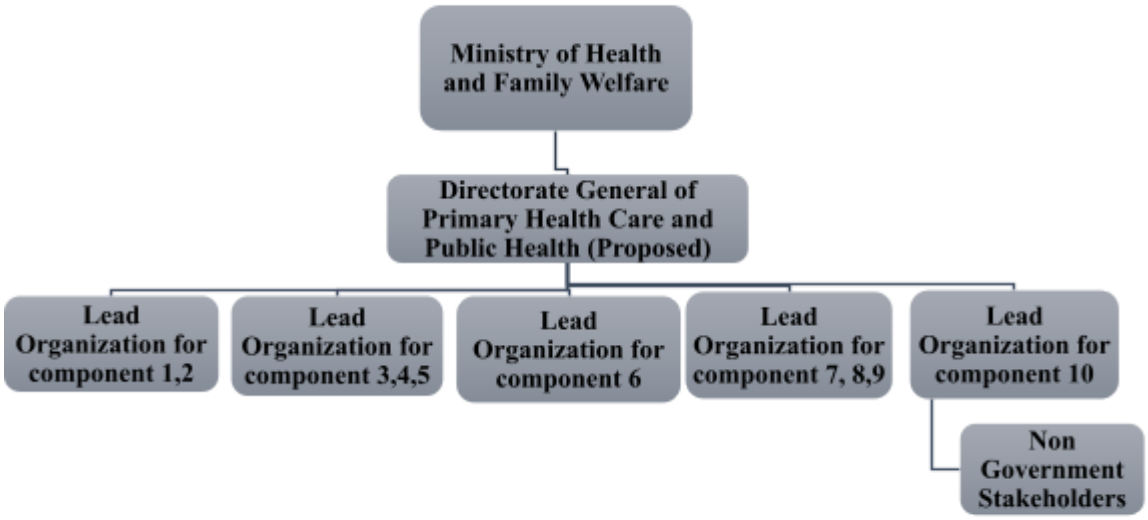


*Figure SEQ Figure * ARABIC 20: Organogram for HNAP implementation*

5.3 Stakeholder Engagement

Stakeholder engagement is a central pillar of the Health National Adaptation Plan (HNAP) for Bangladesh, ensuring that climate-related health risks are addressed through inclusive, coordinated, and evidence-based action. The HNAP promotes active participation from a wide range of stakeholders, including government ministries, public health institutions, local government bodies, development partners, academia, civil society organizations, and community representatives. Through consultations, workshops, and collaborative planning, these stakeholders contribute diverse expertise and on-the-ground perspectives that strengthen the plan's relevance and feasibility. Engaging frontline health workers, vulnerable communities, and organizations working in climate-sensitive sectors further ensures that adaptation strategies reflect local needs and realities. This participatory approach not only enhances ownership and accountability but also supports

stronger cross-sectoral coordination, which is essential for building a climate-resilient health system in Bangladesh. The proposed climate change and health stakeholders is attached in Annex-1.

5.4 HNAP Action Plan 2026-2031

The HNAP Action Plan outlines key short-and-medium term health adaptation activities to be carried out over a five-year period (2026-2031). The prioritized actions build from the strategic objectives presented in Part 4, with the aim of building a climate-resilient and low carbon health system in Bangladesh. The action plan in Table 12 also provides intended deliverables for each action, as well as the institution responsible.

Implementation Timeline

- **Short-Term (2026-2027):** Initiate policy integration, establish coordinating bodies, and begin capacity-building activities.
- **Medium-Term (2027-2029):** Scale up health system strengthening, surveillance, and community-based interventions.
- **Long-Term (2029-2031):** Achieve full integration of climate resilience into the health sector and ensure sustainability of adaptation efforts.

Table 13: HNAP 2026-2031 Action Plan Outlin

Actions	Deliverable	Time frame	Responsible institutions
COMPONENT 1: Climate-transformative leadership and governance			
Objective 1: Governance			
Climate change and health focal points designated within the Ministry of Health with specific Program of action and budget allocation	- "Climate change related health issues" incorporated in the OP of proposed DGPHCPH - Competent and functional CCHPU with adequate human and financial resources	2026-2029	*Lead:* MOHFW; *Other:* DGPHCPH, IEDCR, CCHPU, NCDC, CDC, Other key stakeholders
Health sector commitment to achieve climate resilience in the health system	Develop and implement health policies that integrate climate risks and adaptation strategies.		
Health sector commitment to transition the health system (including health care facilities and supply chains) to low carbon or net-zero emissions	Develop low carbon or net-zero emissions implementation strategy		
Climate change and health focal points or units, working in collaboration with relevant climate sensitive health programs (e.g., vector-borne diseases, nutrition, infectious diseases, disaster risk reduction) to build climate resilient and low carbon	Health Focal Points identified from the relevant climate sensitive health programs		

Actions	Deliverable	Time frame	Responsible institutions
Programs			
Gender-sensitive approach adopted in the regulations and strategies on climate change and health	Gender-inclusive strategies and policy developed		
Meaningful participation of the health sector in main climate change processes at national, regional, and global levels with UNFCCC global negotiations, National Adaptation Plan, National Communications (NCs), Nationally Determined Contributions (NDCs), and promote long-term low-emission development strategies (LT-LEDS)	- Focal/Responsible person identified Cross sectoral/departmental members, with established TOR, and regular meetings. - Develop long-term low-emission strategies (LT-LEDS)		
Objective 2: Policy development			
Develop National strategy on health and climate change (covering both resilience and low carbon sustainability approaches)	- Finalized HNAP - Developed National Strategy for implementation of HNAP	2026-2027	*Lead:* MOHFW; *Other:* DGPHCPH, IEDCR, CCHPU, BFD, DDM, BMD, DoE, Other key stakeholders
Health component of National Adaptation Plan (HNAP) developed and integrated as a chapter in the overall NAP	- Health component (HNAP) incorporated as a section in National Adaptation Plan (NAP), Bangladesh		
Health is integrated into the Nationally Determined Contributions (NDCs)	Inclusion of Health-Specific Targets and Indicators		
Develop a roadmap or action plan for building climate resilience in health systems in collaboration with health-determining sectors and community actors to support HNAP implementation	Comprehensive vulnerabilities assessment in the health system related to climate change for the Multisectoral approach action plan developed		
Establish coordinated strategies within the health sector and in health-determining sectors to develop policies for building a climate-resilient and low carbon health system, maximizing health co-benefits	Coordinated strategies established		
Develop a roadmap or transition plan for reducing GHG emissions in the health system in collaboration with health-determining sectors, including decarbonization targets	A roadmap or transition plan for reducing GHG emissions in the health system developed		
Established mechanism to estimate GHG emissions in the health system	Mechanism to estimate GHG emissions in the health system established		

Actions	Deliverable	Time frame	Responsible institutions
Objective 3: Cross-sectoral collaboration			
Agreements (e.g. Memoranda of Understanding) established between the Ministry of Health and key stakeholders at national level (e.g. meteorological and hydrological services, ministries of environment, food and agriculture, energy, transport, planning), including specific roles and responsibilities in relation to protecting health from climate change and/or reducing the GHG emissions of health sector operations	Establishing formal collaboration mechanisms, such as inter-sectoral committees or working groups, to facilitate communication and joint planning between the health sector and related sectors.	2026-2027	*Lead:* MOHFW; *Other:* DGPHCPH, NCDC, CCHPU, DPHE, BFD, Municipalities, DDM, BMD, DoE, Other key stakeholders
Multisectoral governance and coordination (involving people, communities, civil society, private sector, and all other engaged stakeholders) mechanisms established to support climate resilience and decarbonization in the health system	Multisectoral Engagement Framework Governance Body Formed		
Main policies and strategies from health-determining sectors reflect climate change and health considerations both in relation to adaptation (e.g. climate-resilient water and sanitation safety plans) and mitigation (e.g. promotion of policies maximizing health co-benefits in the transport sector)	Inclusion of Health and Climate change considerations in Policy Frameworks		
Inter-ministerial group on climate change and health established and promoting health in all adaptation and mitigation policies of key health-determining sectors	Formation of the Inter-Ministerial Group		
Health impact assessments (HIA) conducted for new mitigation and adaptation policies and Programs in all health-determining sectors, in accordance with article 4.1.f. of the UNFCCC (minimize adverse effects on public health)	A comprehensive HIA done and guidelines tailored to the specific needs of different health-determining sectors developed		
COMPONENT 2: Climate-smart health workforce			
Objective 1: Health workforce capacity			
Develop a training course on climate resilience of health systems and integrate it in health	Percentage of health workers having received training on climate resilience in the past two years	2026-2028	*Lead:* DGPHCPH

Actions	Deliverable	Time frame	Responsible institutions
workforce annual training program			*Other:* IEDCR, CCHPU, DGME, DGNM, DGFP, NCDC, PHC, MOEFCC, icddr,b, NIPSOM
Develop training course on low carbon sustainability	Percentage of health workers having received training on low carbon sustainability in the past two years		
Develop training course **for** health workers in specific Programs have information and training on the interlinkages between specific health outcomes and climate variability and change	Percentage of Programs specific 'Trained workforce'		*Lead:* PHC (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, MOEFCC, BHE, IPH, NIPSOM, NGOs
Develop training course on Health workforce capacity developed on decarbonization opportunities in health systems and health care facility operations, the supply chain and in-service delivery	Percentage of Health professionals with better awareness and understanding of CC&H issues and in-service delivery		
Develop training Curricula on climate change and health covering both resilience and low carbon sustainability issues developed	Percentage of Communities with better awareness and understanding of CC&H issues		
Develop training capacity on Minimum Initial Services Package (MISP	Percentage of nurses, midwives and doctors trained on MISP		
Objective 2: Organizational capacity development			
Contingency plans for the deployment of sufficient health personnel for acute shocks (e.g., extreme weather events and outbreaks) developed at the relevant level (i.e., national, provincial, union and community levels)	Assessment based Contingency Plans developed	2026-2029	*Lead:* Hospital and clinics Unit, DGPHCPH *Other:* CDC, IEDCR, NCDC, PHC, BHE, IPH, NIPSOM, NGOs MOEFCC
Innovative approaches to reducing GHG emissions at health system or health care facility level (e.g., teams sharing best practices across different domains, and a system of rewards) promoted	Case studies of successful innovative approaches documented and disseminated		
Health workforce participating in decision-making, planning and management of climate change risks	Total number of health workers involved in decision-making, planning, and management		
Capacity building initiatives integrating climate change and health at early stages of professional health training	Documentation of initiatives health topics integrated in Training Materials		

Actions	Deliverable	Time frame	Responsible institutions
Innovative capacity building plans responding to identified human resources and institutional capacity gaps	Innovative Capacity Building Plans after assessment developed		
Objective 3: Information, awareness and communication			
Training programs of health professionals, the media and community leaders on climate change risk communication, including communication of uncertainty	Training Program/plan developed for Health professionals, the media and community leaders	2026-2029	*Lead:* MOHFW *Other:* DGPHCPH, IEDCR, CDC, NCDC, PHC, IEDCR, CCHPU, BHE, IPH, MOEFCC, Ministry of information, NGOs, and other relevant stakeholders
Establishment of stakeholder forum on climate change and health as a way to engage health determining sectors, the media and community groups	Stakeholder forum on climate change and health established		
Development of internal and external health communication plans with focus on raising awareness of climate change risks and health outcomes and implementing efficient strategies to build climate-resilient health system	Communication material developed with focus on raising awareness of climate change risks, health and GHG emissions		
Development of internal and external health communication plans with focus on measuring GHG emissions and implementing strategies to reduce health system emissions			
Health workers and communities understand potential future health risks related to climate change and the actions	Comprehensive guides, educational materials and resources developed Training Programs conducted and Risk Communication Campaigns executed		
Raising awareness among decision-makers, health workers, the media and community leaders on climate change and health	Comprehensive awareness campaigns done with decision-makers and other relevant stakeholders		
Establishment of initiatives with focus on climate change risk communication among different target audiences in the health action plan	Comprehensive risk communication strategy developed		
COMPONENT 3: Assessments of climate and health risks and GHG emissions			
Objective 1: Health risks			
Conduction of Climate change and health vulnerability and adaptation assessments, providing evidence on current and future health risks from climate	Climate change and health vulnerability and adaptation assessments conducted, and a report prepared and communicated with health ministry and ministry of forest environment and	2026-2029	*Lead:* Hospital and clinics Unit,

Actions	Deliverable	Time frame	Responsible institutions
variability and change	climate change		DGPHCPH *Other:* CDC, IEDCR, NCDC, PHC, IPH, DDM, DoE, DPHE, BUET, NGOs, and other relevant stakeholders
Assessment of baseline rates and climate sensitivity of health conditions, allowing the selection of priority risks, and continuous monitoring of changing risk conditions and health outcomes	Baseline assessment detailing the current baseline rates of various health conditions and statistics, done		
Assessment of information on health system's capacity to address the increased health risks from climate change	Information on health system's capacity assessment done		
Results of V&A assessments integrated into health system planning and into key climate change processes (e.g. HNAP)	Updated HNAP and other programs as per V&A assessments into key climate change processes		
Mapping of vulnerable populations and areas prone to high current and future climate-related health risks	Vulnerable populations and areas mapped		
Assessment of health trends in climate-sensitive diseases, particularly focusing on vulnerable population groups including (pregnant) women, children, people with disability	Trends in climate-sensitive diseases assessment done		
Objective 2: GHG emissions			
Assessment of GHG health sector emissions conducted	Health sector GHG emissions assessment report done	2026-2029	*Lead*: IEDCR (DGPHCPH) *Other:* Hospital and clinics Unit, IPH, DDM, DPHE, BUET, icddr,b, NGOs, academic institutions and other relevant stakeholders
Publicly report a GHG inventory for a base year of emissions.	GHG Inventory Report (website, newspaper publication, scientific journal etc.) published		
Information on the environmental impact, including GHG emissions, of products and services used or delivered by the health system	Environmental Impact information report prepared		
Information on key GHG emissions in health systems and/or health care facilities available and used to inform interventions aiming to reduce emissions	GHG emissions in health systems and/or health care facilities information use information report		
Identification of low regret interventions for reduction in GHG emissions for each of the key GHG emission hotspots (e.g. access to renewable energy, energy efficiency, greener waste management practices, transition to low carbon transport, reducing emissions from anesthetic gases and inhalers)	A comprehensive report that identifies and analyzes the key GHG emission hotspots within the health system, developed		

Actions	Deliverable	Time frame	Responsible institutions
Identification of interventions to reduce supply chain emissions including through more efficient use of resources; low carbon substitutions and product innovation; and requirements for health system suppliers to reduce GHG emissions	**Interventions identified to reduce supply chain emissions**		
Agreements with health system suppliers to reduce GHG emissions in the supply chain	The Agreements reached		
Number of health facilities with GHG emissions assessment	The health facilities with GHG emissions assessed		
Objective 3: Progress tracking			
Usages of assessments' results to identify a set of key indicators to be tracked over time both for health systems' climate resilience and reductions in GHG emissions	'Key indicators' for progress tracking identified	2026-2029	*Lead*: Hospital and Clinics Unit (DGPHCPH) *Other: IEDCR,* CCHPU, DoE, IPH, DPHE, DDM, icddr,b, NGOs, and other relevant stakeholders
Identification of coordinating agencies for implementation of the climate strategy and monitoring progress	Coordinating climate change agencies identified		
Usage of assessments' results to prioritize allocation of resources and effective climate change and health interventions both for resilience and low carbon sustainability	Report on resource allocation as per assessment priorities (Public and NGOs/Academic)		
Establishment of plan and mechanism for iterative assessments of health risks from climate variability and change	A comprehensive plan with 'Risk Assessment Methodology' and 'Stakeholder Engagement Strategy' developed		
COMPONENT 4: Integrated risks monitoring, early warning, and GHG emissions tracking			
Objective 1: Integrated disease surveillance and early warning			
Implementation of an integrated climate and health surveillance system for specific climate sensitive diseases	Health integrated surveillance system developed	2026-2029	*Lead:* IEDCR *Other:* Hospital and Clinics Unit, CDC, CCHPU, DPHE, BMD, DoE, DDM, icddr,b, and academic institutions
Development and implementation of Early detection tools (e.g., rapid diagnostics, Syndromic surveillance) to identify changing incidence and early action	Early detection tools developed		
Development and implementation of climate-informed health early warning systems that predict the risk of outbreaks of priority infectious diseases (e.g., malaria,	Climate-Informed Early Warning System developed		

Actions	Deliverable	Time frame	Responsible institutions
dengue, cholera)			
Usage of climate and weather information to assess risk of outbreaks of climate-sensitive diseases (i.e., integrated health and climate surveillance systems)	Integrated Surveillance System developed		
Participation of the Ministry of Health in cross-sectoral groups receiving warnings on extreme weather events	Ministry of Health participation with cross-sectoral working group, operational		
Tracking of geographic and seasonal distribution of health risks and outcomes (e.g. risk mapping) for priority climate-sensitive diseases	Risk Mapping and Geospatial Analysis Tools developed		
Objective 2: Monitoring and progress tracking			
Establishment of Monitoring process with a clearly defined mechanism for the tracking system to measure progress in GHG emissions reduction	Monitoring Framework Document and Action Plan for identifying and addressing Gaps, developed	2026-2031	*Lead*: DGPHCPH *Other:* Hospital and Clinics Unit, IEDCR, NCDC, CDC, IPH, BMD, DoE, DDM, and other relevant stakeholders
Monitoring of impacts from main climate-related determinants of health (e.g. water availability and quality, air quality, food) by the health sector	Monitoring of impacts from main climate-related determinants, documented		
Inclusion of indicators on climate change risks, impacts, vulnerability, capacity of health systems, and emergency preparedness capacity, as well as climate and environmental variables in relevant monitoring systems at the national level and reported over time	Developed, Indicator based Monitoring Systems		
Periodic reviews for identification and improvement or deterioration in capacities through V&A assessments	Periodic reviews assessments report for identification and improvement or deterioration		
Objective 3: Communication			
A communication plan or strategy on climate risks to health (both for acute shocks and stresses) developed and implemented, outlining the scope of information for diverse audiences (e.g. media, public, health personnel and other sectors) and events, including who should communicate, and the means of communications –	A communication plan or strategy on climate risks to health developed	2026-2028	*Lead:* DGPHCPH *Other:* BHE, IEDCR, CCHPU, CDC, NCDC, PHC, IPH, NIPSOM, ICMH, MOEFCC, City Corporation, icddr,b, Health based NGOs

Actions	Deliverable	Time frame	Responsible institutions
developed and implemented			
A communication plan or strategy on health system de-carbonization – outlining the scope of information for diverse audiences (e.g. media, public, health personnel and other sectors) and events, including who should communicate, and the means of communication – developed and implemented	A communication plan or strategy on health system de-carbonization developed		
Information on the health system's carbon emissions and best reduction practices and opportunities shared with relevant stakeholders and communities	Health System Carbon Footprint report shared		
Community engagement and feedback mechanisms established to empower affected populations to respond to warnings, and to guide future development of monitoring and warning systems including with regards to environmental impacts of health care	Community Engagement Strategy and Feedback Mechanism		
COMPONENT 5: Health and climate Research			
Objective 1: Research agenda development and implementation			
Development of national research agenda on climate change and health	National Research Agenda on climate change and health developed	2026-2031	*Lead:* PMR (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, PHC, NNS, IPHN, BNNC, NIPSOM, ICMH, MOEFCC, icddr,b, Health based NGOs
Development of National research agenda on climate change and health incorporates health system decarbonization	National research agenda on climate change and health incorporates health system decarbonization developed		
Dedicate a budget for climate and health research agenda	Climate and Health Research Budget allocated		
Usage of results of a V&A assessment to inform a national research agenda on climate change and health	V&A Assessment Report utilized for Research Agenda		
Research agenda incorporating the need to identify technologies for climate resilience with GHG emission reduction potential in priority areas	Research Agenda document on Climate-Resilient Technologies developed		
Objective 2: Research capacity			

Actions	Deliverable	Time frame	Responsible institutions
Establishment of multidisciplinary research partnerships, rosters of national experts, and knowledge management networks to support research agenda development and implementation	Multidisciplinary Research Partnership developed	2026-2029	*Lead:* PMR (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, PHC, NIPSOM, MOEFCC, BMD, icddrb, academic institutions, Health based NGOs
Provide incentives for tertiary educational institutions to offer research Programs on climate change and health	Plan developed for tertiary educational institutions to offer research Programs on climate change and health		
Establishment of data-sharing agreements within and outside the health sector for supporting research on GHG emissions and low carbon technologies	Data-sharing mechanism and agreements established		
Establishment of data-sharing agreements within and outside the health sector for supporting research on climate sensitive disease surveillance and monitoring	Research data-sharing agreements for surveillance, monitoring developed		
Establishment of data-sharing agreements within and outside the health sector for supporting research on climate resilience			
Establishment of financial investment mechanisms to support research Programs and postgraduate research training programs			
Objective 3: Research into policy			
Establishment of Mechanism for researchers to inform planning, policy, and stakeholder groups	Research data-to-Policy translation mechanism established	2027-2031	*Lead:* PMR (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, CDC, PHC, PMR, IPHN, NIPSOM, ICMH, DDM, MOEFCC, icddr,b, Health based NGOs
Establishment of mechanisms to support, spread and scale innovation across the health system that supports climate resilience and/or health care de-carbonization	Innovative Support system and Funding Programs developed		
Dissemination of Research findings on climate change and health and develop key health (e.g. health sector strategic plans, strategies of priority vertical Programs) and climate change (e.g. NAP, NDCs, LT-LEDs) plans, policies and strategies	Report on research findings on climate change and health dissemination program		
Development of evidence-based capacity for decision-making within and outside the health	Evidence-Based Decision-Making policy developed		

Actions	Deliverable	Time frame	Responsible institutions
sector to contribute to policy outcomes			
Promotion of health services-oriented climate and health research	Promotion programs on climate and health research established		
Conduction of research on climate change and health and translation into health policy	Research on climate change and health and translation into health policy document		
Implementation of adaptation and mitigation decision-making based on the results of the research agenda	Action Plans for 'Adaptation and Mitigation' developed		
Conduction of research on climate change and health responds to needs by policy makers	Policy makers need based research report on climate change & health, document		
COMPONENT 6: Climate resilient and low carbon infrastructures, technologies, and supply chain			
Objective 1: Adaptation of current infrastructure, technologies, and supply chain			
Implementation of climate resilience interventions at health system and/or facility level	Climate Resilience interventions Action Plan	2027-2031	*Lead:* MOHFW *Other:* Hospital and clinics unit, CCHPU, IEDCR, CDC, NCDC, PHC, DPHE, HEU (Health Engineering Unit), MOEFCC, DDM, BUET and other relevant stakeholders
Regularly review and revise specifications for siting and construction of health facilities in line with projected climate risks	Health facilities 'Construction Guidelines' in line with projected climate risks developed		
Regularly review and revise specifications for technologies and selection of products and processes of services in line with projected climate risks	Specifications for technologies and selection of products in line with projected climate risks, guidelines developed		
Retrofit health facilities to meet climate-resilient and low-carbon standards	List health facilities for retrofit developed		
Regularly review and revise specifications for siting and construction of health facilities, and energy, water, waste management and sanitation provisions in line with (i) projected climate risks, and (ii) the latest standards for low or zero carbon and environmentally sustainable buildings	Revised, specifications for siting and construction of health facilities as per the Climate Risk and Sustainability Assessment Reports		
Revision of training and recommendations for prescription of pharmaceuticals during extreme heat	Guidelines for Pharmaceuticals prescription during 'Extreme Heat'	2028-2031	
Development of improvement plan for ensuring health service delivery during extreme weather events and outbreaks of	Improvement Plan for ensuring health service delivery during extreme weather events are in place, developed		

5.5 Costing of HNAP Implementation plan

The Costed Implementation Plan in Table-13 outlines key short, medium and long term health adaptation activities to be carried out over a five-year period (2026-2031). The prioritized actions build from the strategic objectives presented in Part 4, with the aim of building a climate-resilient and low carbon sustainable health system in Bangladesh. It is estimated that about US$ 1.4 billion will be needed to implement the activities under this action plan in five years.

This estimated cost USD 1.4 billion will be needed to implement the activities described in Table 13, under this action plan over the period of five-years and it is validated through the workshops conducted during the HNAP updating process, draft HNAP 2018 and climate change & health expert's opinions. National budget allocation for the health sector was also considered to develop this estimated cost.

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Table 14: HNAP 2026-2031 Action Plan Outline

SI No.	Component	Objectives	Budget in US$	Total Budget US$
1	Component 1 Climate-transformative leadership and governance	1. Governance	Total US$46.36	140 m
		2. Policy development	Total US$37.73	
		3. Cross-sectoral collaboration	Total US$55.91	
2.	Component 2 Climate-smart health workforce	1. Health workforce capacity	Total US$54.21 m	210 m
		2. Organizational capacity development	Total US$62.26 m	
		3. Information, awareness and communication	Total US$93.53 m	
3.	Component 3 Assessments of climate and health risks and GHG emissions	1. Health risks	Total US$ 6 m	14 m
		2. GHG emissions	Total US$ 6 m	
		3. Progress tracking	Total US$ 2 m	
4.	Component 4 Integrated risks monitoring and early warning, and GHG emissions tracking	1. Integrated disease surveillance and early warning	Total US$ 80	266 m
		2. Monitoring and progress tracking	Total US$ 120	
		3. Communication	Total US$ 66	
5.	Component 5 Health and climate research	1. Research agenda development and implementation	Total US$ 30	112 m
		2. Research capacity	Total US$ 52	
		3. Research into policy	Total US$ 30	
6.	Component 6 Climate resilient and low	1. Adaptation of current infrastructure, technologies, and supply chain	Total US$ 155	350 m

Sl No.	Component	Objectives	Budget in US$	Total Budget US$
	carbon infrastructure, technologies, and supply chain	2. Promotion of new technologies	Total US$ 82	
		3. Environmental sustainability of health operations	Total US$ 113	
7	Component 7 Management of environmental determinants of health	1. Monitoring	Total US$ 15	70 m
		2. Regulatory mechanisms	Total US$ 5	
		3. Coordinated cross-sectoral management	Total US$ 50	
8	Component 8 Climate- informed health programs	1. Health programming	Total US$ 49	70 m
		2. Delivery of interventions	Total US$ 21	
9	Component 9 Climate-related emergency preparedness and management	1. Policies and protocols	Total US$ 50	98 m
		2. Risk management	Total US$ 25	
		3. Community empowerment	Total US$ 23	
10.	Component 10 Sustainable climate and health financing	1. Health specific funding and financing mechanisms	Total US$ 15	70 m
		2. Climate change funding streams	Total US$ 25	
		3. Funding and financing for health-determining sectors	Total US$ 30	
GRAND TOTAL				**USD 1. 4 b**

5.6 Cost Benefit Analysis of HNAP Implementation plan

Table 13 already identified the sectors for investment and associated cost. The table below (Table-14) analyses the cost related to those identified sectors and their corresponding benefits. In addition, proper availability of required funds and timely utilization for the relevant events and components for building climate resilient and low carbon health systems will contribute to improved capacity to recover quickly due to climate impact on overall heath events and hazards. This will lead to cost saving in health sector for healthy population and eventually contribute and benefit to national GDP.

In the context of Bangladesh, the **costs** of climate change on health are immense, particularly for the poor and vulnerable populations. However, **benefits** can arise from targeted adaptation strategies, infrastructure improvements, and global cooperation that foster a more resilient and health-conscious future for the country. Addressing these health impacts will require adequate funding, strong policy and international support, and community-based efforts.

However, quantitative analysis of the cost-benefits of climate change on health is a complex task due to some challenges such as data unavailability and quality, uncertainty in climate projections, economic costs, dynamic and evolving risk factors etc. Quantifying the costs of mitigating climate-related health impacts is challenging due to the nature of climate change and health dynamics. In addition, a baseline survey is required to have evidence-based cost-benefit analysis

Table 15: Proposed Cost and Benefit Analysis for climate change in Bangladesh

Sectors for Investment	Corresponding Benefits
1. **Disease Burden**: ○ **Waterborne Diseases**: Frequent flooding and rising sea levels can contaminate drinking water, leading to an increase in waterborne diseases such as cholera, diarrhea, and dysentery. ○ **Vector-Borne Diseases**: Climate change is expanding the range of vectors like mosquitoes, increasing the prevalence of malaria, dengue, and chikungunya. Prolonged monsoon seasons and warmer temperatures provide favorable conditions for these diseases. o **Respiratory Issues**: Rising air pollution levels, combined with higher temperatures, may exacerbate respiratory diseases like asthma and bronchitis, especially in urban areas.	**Resilient Health System**: o Increased climate-sensitive health initiatives o Improved early warning systems o Developed heat action plans o **Decreased climate sensitive disease burden**
2. **Heat-Related Illnesses**: Bangladesh is experiencing more frequent and intense heat waves, which can lead to dehydration, heat exhaustion, and heatstroke among the vulnerable populations including the elderly, children and comorbid people and people with outdoor profession. A large portion of Banglaesh's workforce is employed in agriculture. Rising temperatures can increase heat stress among farmers. Investment for ○ **Green Belt** ○ Increase use of Solar energy ○ Reduction of GHG effect	**Reduced heat related illness:** ○ **Cleaner air and decreased temperature** ○ Reduced respiratory illnesses and cardiovascular diseases associated with pollution. o Reduced indoor air pollution- reduce reliance on biomass for cooking and switching to cleaner energy solutions

Sectors for Investment	Corresponding Benefits
○ Cleaner energy	
3. **Food and Nutritional Insecurity**: ○ **Crop Failures**: Climate change, including erratic rainfall, floods, and droughts, can lead to crop failures. This threatens food security, leading to malnutrition, especially in rural and impoverished communities. o **Increased Hunger**: The rise in food prices due to climate-induced agricultural losses could lead to increased hunger and undernutrition, which disproportionately affects children, leading to long-term developmental impacts.	**Climate-Adapted food industry and Agriculture**: ○ **Increased food availability and different varieties** ○ **Increased production of nutrient-rich crops e.g-** climate-resilient, drought-resistant crops. ○ Adapted new innovative agricultural approach o Decreased hunger ensuring climate-smart agriculture, forestry, and fisheries
4. **Mental Health Impact**: ○ **Displacement Stress**: Bangladesh faces severe displacement due to rising sea levels, cyclones, and riverbank erosion. Climate refugees experience heightened stress, anxiety, and depression due to loss of livelihoods and homes. o **Community Disruption**: Forced migration can lead to social instability, disruption of support systems, and additional mental health challenges. o **Investment in mental health workforce**	**Improved Mental Health Services:** ○ **Increased trained mental health workforce** ○ **Increased a number of facilities available for mental health services** ○ **Available support services to address disruption and livelihoods**
5. **Health Infrastructure Strain**: ○ **Damage to Healthcare Facilities**: Floods, cyclones, and storm surges can damage healthcare infrastructure, disrupting essential services and making it difficult to respond to disease outbreaks or provide regular care. o **Overburdened Health Systems**: As more people fall ill due to climate-related factors, Bangladesh's healthcare system, which is already under strain, will face even greater pressure. o **Health infrastructure: Resilient healthcare infrastructure.**	**Improved health infrastructure:** ○ Increased number of climate resilient infrastructure o Increased undisrupted essential health services o Increased logistic support to ensure essential health services
6. **Community-Led Adaptation**: ○ **Local Health Solutions**: Community-led adaptation strategies, such as building raised platforms for homes and water systems to withstand floods, could improve public health outcomes. These grassroots initiatives also help to empower local communities to manage health risks associated with climate change.	**Ensured Community engagement and Participation** ○ Increased number of homes and water sources and distribution centers ○ Increased number of community led innovative programs (e.g- floating farming)
7. Workforce development	**Trained relevant health care service providers** ○ Increased number of trained workforces o Early Response capacity ○ Disease decreased (mortality, morbidity) ○ Increased number of treated patients

5.7 HNAP Financing Strategies

The HNAP implementation process will strengthen the climate-inclusive public financial management (PFM) system through an updated climate fiscal framework to access, allocate, prioritize and utilize climate funds from public, private and international sources, efficiently and in a transparent way. Also, it will bolster efforts to access climate finance from international climate funds (GEF, Adaptation Fund, GCF, etc.), and bilateral and multilateral sources. Potential options for harnessing climate funds under readiness support or through direct access should be further explored.

5.7.1 Potential Sources of Funding for Climate Change Adaptation

There is a wide range of potential funding sources, from national to bilateral to multinational organizations, and from non-governmental organizations and other sources. The adaptation funds under the UNFCCC are a significant international source of adaptation funding. The four funds (Least Developed Country Fund, Special Climate Change Fund, Adaptation Fund, and Green Climate Fund) have different rules and accessing mechanisms. Many bilateral aid organizations provide adaptation funding, including the UK Department for International Development, US Agency for International Development, and development organizations from high-income countries. Some of their adaptation funding may go through another organization, such as the Climate and Development Knowledge Network etc. National governments and non-governmental organizations also may have adaptation funding (WHO, 2014).

Table 16: Potential sources of funding for climate change adaptation

Government Sources/Domestic Fund	Development Partners (DPs)	Global Climate Fund	New scope for funding on Climate change
• **Use of National Revenue Budget** • **Use of fund allocated to MP/Local Government representative/organisations or leaders** • **Corporate social responsibility fund (Pool fund) e.g. Business enterprises** • **Use of locally available funds e.g. Local Elite Person/ Local Society Welfare/ Cooperative Society** • **Bangladesh Climate Change Trust Fund (BCCTF) is based on revenue from the national budget.** • **Government Organization** • **NGO/ International organizations** • **Local Elite Person/ Local Society Welfare/ Cooperative Society** • **Business enterprises** • **Others**	• World Bank, and other development banks, • Bilateral donors, multilateral and UN organizations, • Asian Development Bank (ADB), • World Health Organization, • International Monetary Fund (IMF), • Japan International Cooperation Agency (JICA), • Korea International Cooperation Agency (KOICA), • The European Union (EU), • USAID's Bureau for Humanitarian Assistance (BHA), • The International Federation of Red Cross and Red Crescent Societies (IFRC), • Swiss Red Cross (SRC), • Embassy of Sweden, • The Government of France, • Foreign, Commonwealth and Development Office (FCDO).	• The United Nations Framework Convention on Climate Change (UNFCCC) • Green Climate Fund (GCF) • The Adaptation Fund (AF) • The Global Environment Facility (GEF) • The Least Developed Country Fund (LDCF) • Special Climate Change Fund (SCCF) • The Canadian Climate and Nature Fund	FCDO EU BHA of USAID French Govt. IFRC, Swiss Red Cross

Source: BBS: Statistics for Disasters and Consultants' suggestions

Box : Mobilize Climate Finance for Nutrition Adaptation

Outcome Indicators

- Volume (USD/BDT) of climate finance mobilised for nutrition-related adaptation actions
- Number of externally funded climate-nutrition projects approved or implemented

Output Indicators

- Number of climate-nutrition investment proposals developed and submitted
- Number of financing agreements incorporating nutrition adaptation components

Process Indicators

- Existence of an approved nutrition adaptation investment framework within HNAP financing strategy
- Frequency of coordination meetings between MoHFW and climate finance entities

Data Sources

- MoHFW and ERD financial reports
- Development partner project documentation

5.7.2 Resource Mobilization Strategy

While HNAP development and implementation activities may be included in national budget allocations, many countries are likely to face funding gaps. For this, a resource mobilization strategy can be used to plan for short-medium- and long-term resourcing requirements, and seek external funding. The HNAP outlines existing funding sources and funding gaps and presents a plan for addressing the gaps and for scaling up adaptation activities into the future.

This may include actions to streamline adaptation for health into national budget allocation processes, and planning for access to external funding sources, such as the GCF, GEF or the Adaptation Fund, among others. A robust HNAP is an essential tool for presenting a strong case to donors to support funding proposals. Cost–benefit analyses of action and inaction as well as the return on investment may be useful to assist the investment case (WHO, 2021c).

5.7.3 Mobilizing Innovative Finance

Mobilizing Innovative Finance requires special attention to ensure that funds are distributed in an inclusive manner, benefit the most vulnerable and improve the enabling conditions for fostering investments. These include improved transparency and policy coherence to strengthen the bankability of projects. It also requires building capacity to improve know-how of the value of integrated approaches and using this knowledge for scaling of climate financing, especially considering the interdependencies and mutual (financial) benefits among the sectors in investment planning.

6. Monitoring and Evaluation

6.1 Purpose of M&E

The Health National Adaptation Plan (HNAP) of Bangladesh is a framework designed to enhance the resilience of the health sector to the impacts of climate change. This plan outlines strategic actions to safeguard public health, ensure robust health systems, and adapt to evolving environmental challenges. Effective monitoring, evaluation, and reporting (MER) are essential components to assess the progress and impact of the HNAP. Effective monitoring, evaluation, and reporting are crucial for the success of the Health National Adaptation Plan in Bangladesh. By systematically assessing progress, evaluating effectiveness, and transparently reporting findings, Bangladesh can strengthen its health sector's resilience to climate change and ensure a healthier future for its population. Continued commitment to these MER activities will be essential in adapting to ongoing and emerging challenges.

A key component to the successful implementation of the HNAP is a detailed and functional monitoring and evaluation (M&E) plan. The M&E framework should be flexible and practical, and aim to promote an iterative process, engage a broad range of stakeholders, and align with existing M&E mechanisms, as well as global and regional reporting commitments. Further, it is recommended that indicators be both process and outcome based. Objectives of the M&E plan include:

- To track the progress of implementation of the HNAP action plan on the level of input and output;
- To evaluate the effectiveness and appropriateness of the adaptation actions to the strategic objectives and the overall objectives of the HNAP, including the allocated resources;

To provide transparent progress updates to the beneficiaries, implementing agencies and financiers on the progress of HNAP actions.

6.2 M&E Framework

6.2.1 HNAP review process

The HNAP will be reviewed once a year by a steering committee and chaired by the MOH&FW. The DGPHCPH will coordinate the review process to ensure all relevant stakeholders are engaged. DPs will also be members of the review committee to provide technical support and guidance. A timeline has to be developed to review and revise the HNAP every 5-years.

6.2.2 HNAP reporting

The HNAP reporting mechanisms will focus on quarterly and annual reports to monitor the progress of implementation of the Action Plan (2026-2031) based on the indicators described in the M&E Plan. DGPHCPH will include this responsibility in the technical group ToR.

6.2.3 Monitoring and Evaluation Plan (2026-2031)

Based on the Action Plan and identified deliverables, the M&E plan outlines indicators, including baseline, means of verification, frequency of reporting, and responsible institutions.

Table 17: M&E Plan of HNAP Implementation

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Long-term HNAP Strategic Objective					
To build low carbon, sustainable and climate resilient health system in Bangladesh.					
COMPONENT 1: Climate-transformative leadership and governance					
Governance – Specific responsibility and accountability mechanisms on climate change and health established within the Ministry of Health.	Technical group (TWG) established with approved TORs	No Technical group (TWG) established	Government order for the establishment Technical group (TWG) Approved Meeting minutes written ToRS	Yearly	*Lead:* MOHFW; *Other:* DGPHCPH, IEDCR, CCHPU, NCDC, CDC, Other key stakeholders
Policy development – Climate change considerations, both for resilience and low carbon sustainability, reflected in main health policies and Programs.	Policy Formulation and Approval Rate	National Adaptation Plan 2022	Approved Policy Documents and Records	Yearly	*Lead:* MOHFW; *Other:* DGPHCPH, IEDCR, CCHPU, BFD, DDM, BMD, DoE, Other key stakeholders
Cross-sectoral collaboration – Cross-sectoral collaboration strengthened, and synergies maximized to ensure that decisions taken in other sectors protect and promote human health.	Frequency of Inter-Sectoral Meetings and Workshops Number of Inter-Sectoral Agreements Health & Climate change Forum	Low frequency	Meeting minutes Workshop reports Agreements document Multisectoral (GO & NGOs Private Sectors) Health & Climate change Forum formation with ToR.	Quarterly	*Lead:* MOHFW; *Other:* DGPHCPH, NCDC, CCHPU, DPHE, BFD, Municipalities, DDM, BMD, DoE, Other key stakeholders
COMPONENT 2: Climate-smart health workforce					
Health workforce capacity – Sufficient number of health workers with the required technical capacity to deal with the health risks posed by climate variability and change and to lead reductions in GHG emissions.	Professionals possess the competencies and skills necessary for climate adaptation and resilience. Proportion/Number of health professionals trained on MISP	No data-base document available	Training and Development Records Competency Assessments reports	6-monthly	*Lead:* DGPHCPH *Other:* IEDCR, CCHPU, DGME, NCDC, PHC, MOEFCC, icddr,b, NIPSOM
Organizational capacity development – Resources, information, knowledge, and	The number and scope of organizational capacity-building programs, trainings and initiatives	No assessment document available	Records and documentation of capacity-building programs	6-monthly	*Lead:* Hospital and

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
processes employed by health organizations used in an efficient and targeted manner to promote climate resilience and reduce their own GHG emissions and environmental impacts.	focused on enhancing the skills and knowledge of the health workforce				clinics Unit, DGPHCPH *Other:* CDC, IEDCR, NCDC, PHC, BHE, IPH, NIPSOM, NGOs MOEFCC
Information, awareness and communication – Improved information, awareness and communication on health impacts from climate change and opportunities for reducing emissions targeted among different target audiences (e.g. policymakers, health facility managers, media and communities).	Effectiveness of Awareness Campaigns Quality and Relevance of Information Disseminated	CC&H Awareness Campaigns meetings record not available	Documentation and evaluation of materials and channels used for communication and awareness Reports and records of awareness campaigns and their impact on the health workforce	6-monthly	*Lead:* MOHFW *Other:* DGPHCPH, IEDCR, CDC, NCDC, PHC, IEDCR, CCHPU, BHE, IPH, MOEFCC, Ministry of information, NGOs, and other relevant stakeholders
COMPONENT 3: Assessments of climate and health risks and GHG emissions					
Health risks – A sound understanding of the main hazards, exposures, current and future health risks, vulnerabilities of different population groups, geographical areas, and health systems available in the country or region.	Frequency and Severity of Climate-Related Health Events report with vulnerabilities of different population groups, geographical areas	V&A assessments conducted in 2011 and 2015, 2021	V&A assessments reports	3-yearly	*Lead:* Hospital and clinics Unit, DGPHCPH *Other:* CDC, IEDCR, NCDC, PHC, IPH, DDM, DoE, DPHE, BUET, NGOs, and other relevant stakeholders
GHG emissions – Information on key hotspots of GHG emissions at national health system level and facility level available in the country or region.	The total amount of GHG emissions produced by the health sector or relevant sectors report.	No information/ report available	GHG emissions assessments reports	3-yearly	*Lead*: IEDCR (DGPHCPH) *Other:* Hospital and clinics Unit, IPH, DDM, DPHE, BUET, icddr,b, NGOs, academic institutions and other relevant stakeholders
Progress tracking – A process and system established to track progress in overall climate resilience and GHG emission in health systems as well as to assess health risks in an	Completion Rate of Climate and Health Risk Assessments. Process and system established to track progress	No Process and system established	Process and system progress track report	Annually	*Lead*: Hospital and Clinics Unit (DGPHCPH) *Other: IEDCR,* CCHPU, DoE, IPH, DPHE, DDM, icddr,b, NGOs, and other relevant stakeholders

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
iterative manner					
COMPONENT 4: Integrated risks monitoring, early warning, and GHG emissions tracking					
Integrated disease surveillance and early warning – Data on climate-sensitive environmental risks, hazards, and epidemiological trends collected, analyzed and interpreted on a continual basis, and timely response to risks promoted.	Integrated Disease surveillance systems in place to monitor climate-sensitive diseases across different regions and populations in place.	No Integrated Disease surveillance systems in place	Reports of the Integrated Disease surveillance systems	Annually	*Lead:* IEDCR *Other:* Hospital and Clinics Unit, CDC, CCHPU, DPHE, BMD, DoE, DDM, icddr,b, and academic institutions
Monitoring and progress tracking – Information on climate change, health risks, impacts, vulnerability, health systems capacity, environmental impacts and GHG emissions of health sector operations monitored and reported over time.	Integrated risk monitoring and GHG emissions tracking systems plan	Not in place	Integrated risk monitoring and GHG emissions monitoring Reports	Annually	*Lead*: DGPHCPH *Other:* Hospital and Clinics Unit, IEDCR, NCDC, CDC, IPH, BMD, DoE, DDM, and other relevant stakeholders
Communication – Timely warnings communicated to health decision-makers, the media and communities and translated into effective action to prevent negative health outcomes	Risk communication strategy (for VBD, WBD, and nutrition/food security) developed and approved by MOHFW	No risk communication strategy exists	Risk communication strategy Dissemination of relevant information to target audiences report	Annually	*Lead:* DGPHCPH *Other:* BHE, IEDCR, CCHPU, CDC, NCDC, PHC, IPH, NIPSOM, ICMH, MOEFCC, City Corporation, icddr,b, Health based NGOs
COMPONENT 5: Health and climate research					
Research agenda development and implementation – Multidisciplinary national research agenda on climate change and health defined, endorsed and implemented in collaboration with decision-makers and key stakeholders.	The formulation and formal adoption of a comprehensive research agenda focused on health and climate change	Not in place	Multi-disciplinary national research agenda on climate change and health document. Number and diversity of stakeholders participating in the agenda-setting process	Annually	*Lead:* PMR (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, PHC, NNS, IPHN, BNNC, NIPSOM, ICMH, MOEFCC, icddr,b, Health based NGOs
Research capacity – Research capacity on climate change and health developed, covering climate resilience, low carbon sustainability and	Multidisciplinary Researchers with specialized training in health and climate change research.	No CC&H research agenda exists	Number of researchers with specialized training in health and climate change research Number of	Quarterly	*Lead:* PMR (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, PHC, NIPSOM, MOEFCC, BMD, icddrb, academic institutions, Health

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
built by supporting relevant multidisciplinary networks, making available financial resources and creating training opportunities.			multidisciplinary networks research done		based NGOs
Research into policy – Research on climate change and health integrated and translated into policies to build evidence-based capacity on adaptation and mitigation options and inform decision-making within and outside the health sector to transform practices and contribute to policy outcomes.	Health and climate research data integrated into policies, strategies, or action plans for decision-making	No CC&H Research into policy document exists	List and number of health and climate policies, strategies, or action plans integrated and translated into policies.	Annually	*Lead:* PMR (DGPHCPH) *Other:* IEDCR, CCHPU, NCDC, CDC, PHC, PMR, IPHN, NIPSOM, ICMH, DDM, MOEFCC, icddr,b, Health based NGOs
COMPONENT 6: Climate resilient and low carbon infrastructures, technologies, and supply chain					
Adaptation of current infrastructures, technologies, and supply chain – Current and future climate risks systematically considered in the context of revising and upgrading of infrastructures, technologies, products, and processes for climate resilient and low carbon sustainable health service delivery	Assessment of Vulnerability and Risk of Existing Infrastructure Implementation of Climate-Resilient Infrastructure	No baseline information	Number of health facilities or infrastructures upgraded with climate-resilient features Percentage of health facilities that have adopted low-carbon technologies Green hospital assessment	Annually	*Lead:* MOHFW *Other:* Hospital and clinics unit, CCHPU, IEDCR, CDC, NCDC, PHC, DPHE, HEU (Health Engineering Unit), MOEFCC, DDM, BUET and other relevant stakeholders
Promotion of new technologies – Innovative climate resilient and low environmental impact technologies, including low carbon measures, promoted and deployed by the health sector through transformative health service delivery.	Innovative climate resilient and low environmental impact technologies, and low carbon measures, promoted	MOHFW Assessment report	Number of pilot projects or demonstrations conducted, including their geographic distribution and scale, tracked through project reports and evaluations Percentage of health facilities or supply chains that have integrated new technologies	Annually	*Lead:* MOHFW Other: Hospital and clinics unit, CCHPU, IEDCR, CDC, NCDC, PHC, DPHE, HED (Health Engineering Department), MOEFCC, DDM, BUET and other relevant stakeholders

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Environmental sustainability of health operations – Low environmental impact technologies procured and promoted by the health sector to enhance resilience to climate change and contribute to long term sustainability.	Reduction in GHG emissions resulting from technologies and practices in health operations	No baseline data	Reduction in GHG emissions report Percentage of total energy use derived from renewable sources	Annually	*Lead:* MOHFW & *Co-lead*: MOEFCC *Other:* CCHPU, IEDCR, CDC, NCDC, PHC, MOE, DDM, NIPSOM, Health based NGOs
COMPONENT 7: Management of environmental determinants of health					
Monitoring – Joint monitoring of climate-sensitive environmental risks based on evidence-based standards strengthened.	Risk assessment that integrate climate-sensitive environmental risks, reviewed	No baseline information	Risk assessment reports, publications and review records	Quarterly	Lead: MOHFW Co-Lead: LGED Other: Hospitals and clinics unit, IEDCR, CBHC, DoE, HED, NIPSOM, Municipalities, NCDC
Regulatory mechanisms – Regulatory policies protecting populations from climate-sensitive environmental risks defined, revised, and enforced.	Regulatory policies developed and enforced	No baseline document	Regulatory policies List of places enforced	Quarterly	Lead: MOHFW Other: DPHE, DoE, HED, IPH, IEDCR, CCHPU
Coordinated cross-sectoral management – Environmental determinants of health jointly managed, with clear roles and responsibilities defined across sectors.	Initiatives or projects involving multiple sectors working together with clear roles and responsibilities	No baseline document	Number of Cross-Sectoral Collaboration Initiatives Frequency of Cross-Sectoral Meetings and Coordination	Quarterly	Lead: MOHFW, IEDCR Other: CCPHU, DoE, HED, IPHN, BRTA, DAE, IPH, DDM, LGED, DPHE and academic institution
COMPONENT 8: Climate-informed health Programs					
Health programming – Information on current and projected (future) climatic conditions integrated into strategic planning of health Programs for climate-sensitive diseases.	Climatic conditions strategic planning of health Programs developed	No baseline document	Prevalence of Climate-Related Health Conditions report Future projected Climate-Related Health Conditions report The proportion of the population with access to health services	Annually	*Lead:* MOHFW *Other:* DGPHCPH, CCPHU, IEDCR, DoE, IPH, CDC, DPHE, DGME, DDM, IPHN, identified Health Programs, academic institution and other relevant stakeholders
Delivery of interventions – Public health Programs revise their standard operating procedures	Population receiving services of Climate-Related Health Interventions	No baseline document	- Proportion of the target population receiving specific climate-related health	Annually	*Lead:* MOHFW *Other:* DGPHCPH, IEDCR, CCPHU, DoE, IPH, CDC, DPHE, DDM, IPHN, identified

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
to integrate climate change considerations both in relation to resilience and low carbon sustainability in the delivery of interventions.			interventions - Timeliness of Intervention Implementation - Quality of Service Delivery		Health programs, academic institution
	Skilled Birth Attendance during climate emergencies a) Proportion of health facilities providing BEmONC services that remain functional (within 2 hours of travel time) during climate shocks	No baseline document	Civil Surgeons and local health managers to report on this based on information from emergency response in their districts.		
	a) Proportion of health facilities providing BEmONC services that remain functional (within 2 hours of travel time) during climate shocks	No baseline information	Number of health facilities (UHCs, district hospitals) that can be accessible within 2 hours of impacted locality that is providing a) 7 signal functions of Basic Emergency Obstetric Care		
	Proportion of health facilities providing CEmONC services (within 2 hours of travel time) that remain functional during climate shocks	No baseline information	Number of health facilities (district hospitals, Medical College Hospitals – UHCs in special cases) that can be accessible within 2 hours of impacted locality that is providing a) 9 signal functions of Comprehensive Emergency Obstetric Care		
	Stock-out rate of modern contraceptives in climate-vulnerable districts	No baseline information	Using information from DGFP eLMIS		
	Health Sector response to GBV (at least clinical management of rape) available in District Hospitals of climate vulnerable districts	Information can be collected from DHIS2	Use the National Health Sector Response to GBV to identify the services needed at the district level for effective and evidence-based care (specifically for clinical management of		

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
			rape).		
COMPONENT 9: Climate-related emergency preparedness and management					
Policies and protocols – Climate sensitive health risks and low-carbon operations included within national disaster reduction strategies, plans and protocols and wider development processes.	National disaster reduction strategies, plans and protocols with Climate sensitive health risks and low-carbon operations Policies and protocols	MOHFW assessment report	National disaster reduction strategies, plans and protocols document	Annually	Lead: MOHFW Other: DGPHCPH, IEDCR, CCPHU, DoE, IPH, CDC, DPHE, HED, CMSD, DDM, IPHN, identified Health Programs and other relevant stakeholders
Risk management – Strengthen health system capacity to manage risks so that overall vulnerability and exposure to climate hazards are reduced and residual risks and uncertainties effectively managed.	Health system capacity Strengthen to manage vulnerability and exposure to climate hazards	MOHFW assessment report	Comparative assessment reports showing improvements in health facility infrastructure, equipment, and resource availability before and after interventions	6-montly	*Lead:* MOHFW *Other:* DGPHCPH, CCPHU, IEDCR, DoE, IPH, CDC, DPHE, DDM, BDRCS, NGOs and other relevant stakeholders
Community empowerment – Empower communities to effectively prevent and respond to health risks from extreme weather events	Community members trained in emergency preparedness and response	No baseline document	Report of community members trained in emergency preparedness and response. Meetings minutes from established community-based emergency committees	Annually	*Lead:* MOHFW *Other:* DGPHCPH, CCPHU, IEDCR, DoE, IPH, CDC, DPHE, DDM, BHE, LGED, BDRCS, NGOs identified Health programs
COMPONENT 10: Sustainable climate and health financing					
Health specific funding and financing mechanisms – Climate change considerations for both resilience and low carbon sustainability included in relevant proposals submitted to and funded by health funding mechanisms.	Funds secured through health-specific financing mechanisms (e.g., national budgets, international donors, public-private partnerships) for climate-related health initiatives.	Government assessment report (if available)	Official government or health sector budget documents showing the allocation of funds. Signed agreements with domestic or international funding agencies	Annually	Lead: MOHFW Other: PMR, DGPHCPH, IEDCR, CCHPU, HEU, DAE, DPHE, DDM, MOEFCC, ERD, MoP, MoF, development partners and other identified Health programs
Climate change funding streams – Climate change finance accessed by the health sector.	Funding secured from climate change-specific funding streams (e.g., Green Climate Fund, Adaptation Fund) for health-related projects.	Government assessment report (if available)	Funding Agreements and Commitments. Official budget documents allocation	Annually	Lead: MOHFW Other: PMR, DGPHCPH, IEDCR, CCHPU, HEU, DAE, DPHE, DDM, MOEFCC, ERD, MoP, MoF, development partners and other identified Health programs

Objective	Indicator Output	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Funding and financing for health-determining sectors – Health and climate change considerations incorporated in projects and Programs supported through funding for health-determining sectors.	Proportion of the total budget of health-determining sectors specifically allocated to climate adaptation and health-related initiatives.	Government assessment report (if available)	Official budget allocation of funds to health-determining sectors. Sector-Specific Financial Reports	Annually	Lead: MOHFW Other: DGPHCPH, IEDCR, CCHPU, HEU, DoE, DAE, DPHE, DDM, IPHN, development partners and other identified Health Programs

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Annex 1:Review of HNAP in Global NAPs

Global Lesson Review

The increasing recognition of climate change as a major public health threat has led many countries to integrate health considerations into their National Adaptation Plans (NAPs), giving rise to dedicated Health National Adaptation Plans (HNAPs) or health components within broader adaptation strategies. A review of HNAPs across global NAPs reveals how nations are prioritizing climate-sensitive health risks, strengthening resilience of health systems, and aligning national policies with international frameworks such as the WHO's guidance on climate-resilient health systems. This section examines global trends in the inclusion of health in adaptation planning, highlights best practices from countries that have advanced health-focused adaptation efforts, and identifies gaps and opportunities that can inform and strengthen Bangladesh's own HNAP process. The summary is attached in the Annex-7.

1. National Adaptation Plan of Brazil

To increase the climate resilience, the NAP of Brazil identified 11 thematic sectors, namely Agriculture, Biodiversity and Ecosystems, Cities, Disasters, Industry and Mining, Infrastructure (Electric Power, Transport and Urban Mobility), Vulnerable Populations, Water Resources, Health, Food and Nutritional Security, and Coastal Zones.

2. National Adaptation Plan of Philippines

The National Adaptation Plan (NAP) of the Philippines provides a strategic, long-term framework to strengthen the country's resilience to climate change and reduce vulnerability across key sectors. Building on existing policies such as the National Climate Change Action Plan (NCCAP), the Philippine NAP emphasizes risk-informed planning, climate-responsive development, and the integration of adaptation into national and local decision-making processes. It prioritizes sectors including agriculture, water resources, health, coastal and marine ecosystems, and urban development, with a strong focus on protecting vulnerable communities. The NAP also highlights the importance of local government engagement, indigenous knowledge, gender-responsive approaches, and climate finance mobilization, aiming to ensure that adaptation actions are inclusive, evidence-based, and aligned with the country's sustainable development goals.

3. National Adaptation Plan of Thailand

Thailand's National Adaptation Plan (NAP) provides a strategic framework for strengthening climate resilience by mainstreaming adaptation into national and sectoral development planning. Aligned with the Climate Change Master Plan, it prioritizes key sectors including water resources, agriculture and food security, public health, natural resources, and urban development. The NAP emphasizes risk-based planning, improved climate information, institutional coordination, and the involvement of local authorities and communities, while promoting capacity building and access to climate finance for effective and sustainable adaptation.

4. National Adaptation Plan of Timor Leste

The HNAP was produced by the Ministry of Health and is currently being finalized. The HNAP provides some baseline information on health indicators and describes the primary threats to health associated with changing climate and environmental conditions. The HNAP acknowledges the need for intersectoral coordination since some environmental health issues are not within the control of MoH. The HNAP provides the overall strategic direction for strengthening health systems to protect

health from climate change. It identifies and addresses medium- and long-term adaptation needs, including upstream drivers of health risks, taking into consideration the physical, social, and biological determinants of health. It is envisaged that the HNAP will facilitate increased access to climate adaptation finance by identifying entry points in the health sector.

5. National Adaptation Plan of Ethiopia

Ethiopia's National Adaptation Plan (NAP-ETH) builds upon existing climate change initiatives, such as the Climate Resilient Green Economy strategy and sector-specific resilience plans. It aims to reduce the vulnerability of climate change impacts by integrating adaptation measures into long-term development pathways. NAP-ETH emphasizes effective governance, financing, capacity building, and disaster risk management. Guided by principles of participation, coherence, gender sensitivity, and partnership, the plan focuses on vulnerable sectors such as agriculture, forestry, health, transportation, energy, industry, water, and urban development.

6. National Adaptation Plan of Japan

The government of SVG has sought to deliver proper health care based on the needs of its citizens. To achieve this goal, the Ministry of Health, Wellness and the Environment (MOHWE) is pursuing preventive medicine through public education. The country is divided into nine health districts served by one general hospital, one mental hospital, five district hospitals, two nursing homes, and forty health centers (outpatient clinics). Additionally, there is one private hospital that works in tandem with the state facilities to deliver what the Pan American Health Organization (PAHO) considers adequate health coverage for the country.

7. National Adaptation Plan of Kenya

Kenya’s recent improvements in malarial control, water-borne diseases, infant mortality and malnutrition are vulnerable to setbacks from climate change. Impacts on water quality, water resources, changes in habitat, increasing exposure of vulnerable groups, sanitation and drainage, and vector-borne diseases are all areas for concern. These and many other potential impacts require not only continued investment and focus on climate sensitive health issues, but also full integration of climate change into Kenya’s many existing health programs and policies.

8. National Adaptation Plan of Kuwait

The overall objective of the National Adaptation Plan (NAP) of Kuwait is to provide an integrated development plan and subsequent programmes targeting local communities and environmental components in areas under the threat of climate change. NAP covers four sectors: Marine and fisheries, water resources, coastal zone, and health.

9. National Adaptation Plan of Liberia

The objectives for the NAP document are to:

Provide a framework and procedures for sharing of information of scientific, technical, and traditional knowledge on climate change risk management and develop capacity-building measures;

Coordinate sectors and related government and private land-use institutions on climate change risk management using awareness with a focus on the improvement of climate risk management actions and

Work with the priority sectors to identify and propose measures to promote adaptation to reduce climate change risk.

In the NAP of Liberia, health is mentioned as one of the climate-sensitive factors.

10.National Adaptation Plan of Nepal

The formulation of the National Adaptation Plan (NAP) of Nepal aims to support the country in adapting to the impacts of Climate Change through (i) short-term priority actions (until 2025), (ii) medium-term priority programmes (until 2030) and (iii) long-term adaptation strategic goals (until

2050). Its objective is to enhance the incorporation of actions and strategies in addressing climate risk and vulnerability in development planning and implementation in the country. The short-term and medium-term actions are designed to help the Government of Nepal achieve the adaptation actions set out in its 2020 Nationally Determined Contribution (NDC). Nepal's NAP process aligns with the key principles of the 2030 Agenda, including the commitment to leave no one behind. Moreover, the priority thematic areas identified in this NAP directly corresponds to the Sustainable Development Goals (SDGs).

11.National Adaptation Plan of Sierra Leone

Sierra Leone has one of the highest malnutrition and child mortality rates in the world, making the country's population extremely vulnerable to climate shocks. Incidents of high-temperature morbidity and mortality are projected to increase. Rising temperatures are also associated with increased episodes of diarrhoeal diseases, seafood poisoning and increases in dangerous pollutants. As temperatures increase above 25°C, malaria infection is expected to rise. The country's Ebola outbreak revealed a deficient health system, including understaffed, unavailable, or unaffordable health care that will be further stressed by climate change impacts (USAID, 2016).

12.National Adaptation Plan of South Africa

Health is considered a priority adaptation-related sector for South Africa, as identified in the NCCRP.

13.National Adaptation Plan of Sri Lanka

Sri Lanka has reported relatively high achievements in the health sector compared with other developing nations. The country has recently experienced an outbreak of diseases that are closely connected with the environment and weather patterns. Sri Lanka has an ageing population which would particularly be vulnerable to climate-related health hazards. Hence, serious effort towards adaptation against potential health hazards associated with climate change is a priority.

Annex 2: Proposed climate change and health stakeholders

MoH&FW	Ministry of Health and Family Welfare
DGPHCPH	Directorate General of Primary Health Care and Public Health
DGME	Directorate General for Medical Education
DGFP	Directorate General for Family Planning
DGNM	Directorate General for Nursing and Midwife
DGDA	Directorate General for Drug Administration
HED	Health Engineering Department
EDCL	Essential Drug Company Limited
TEMO	Transport and Equipment Maintenance Organization
NEMEW&TC	National Electro-Medical Equipment Workshop & Training Centre
DPHE	Department of Public Health Engineering
DDM	Department of Disaster Management
IEDCR	Institute of Epidemiology Disease Control and Research
icddr.b	International Centre for Diarrheal Disease Research, Bangladesh
CDC	Communicable Disease Control Program
NCDC	Non-Communicable Disease Control Program
PHC	Primary Health Care Program
BHE	Bureau of Health Education
IPH	Institute for Public Health
IPHN	Institute for Public Health Nutrition
BNNC	Bangladesh National Nutritional Council
NIPSOM	National Institute for Preventive and Social Medicine
BMD	Bangladesh Meteorological Department
ICMH	Institute for Child and Mother Health
NIPORT	National Institute of Population Research and Training
BBS	Bangladesh Bureau of Statistics
DoE	Department of Environment
DoF	Department of Forest
DSCR	Department of Disaster Science and Climate Resilience
Private Sector	INGO/NGO/CSO/Youth Forum
BACHA	Bangladesh Alliance for Climate and Health Adaptation Development
DP	Development Partners

Annex 3: Technical Working Group (TWG)

Technical Working Group (TWG) for the updating "Health-National Adaptation Plan (H-NAP)" (Not According to seniority)

Representative from the MOHFW

1. Joint Secretary (WHO), — Chairperson
Climate Change Focal Point,
Program Director, "Building Resilience of Health Systems in Asian LDC to Climate Change of Bangladesh", Climate Change Project, MOH&FW
Health Services Division, Ministry of Health and Family Welfare.
Bangladesh

2. Line Director/ Director — Member
Non-Communicable Diseases Control (NCDC),
Directorate General Primary Health Care and Public Health (DGPHCPH)
HSD, MOHFW

3. Director — Member
Institute of Epidemiology, Disease Control & Research (IEDCR)
Directorate General Primary Health Care and Public Health (DGPHCPH), HSD, MOHFW

4. Director (Disease Control) & LD CDC, DGPHCPH — Member
Directorate General Primary Health Care and Public Health (DGPHCPH), HSD, MOHFW

5. Program Manager Climate Project. — Member Secretary
Senior Scientific Officer (SSO)
Institute of Epidemiology, Disease Control & Research (IEDCR)
DGPHCPH, HSD, MOHFW. Mohakhali, Dhaka
Program Manager, "Building Resilience of Health Systems in Asian LDC to Climate Change of Bangladesh", Climate Change Project, MOH&FW

1. Director (Planning & Development) — Member
Directorate General of Medical Education (DGME)
Medical Education and Family Welfare Division, MOHFW, Dhaka
Representative from NIPSOM

7. Head of the Department — Member
Department of Occupational and Environmental Health (OEH)
National Institute of Preventive and Social Medicine (NIPSOM)
Mohakhali, Dhaka 1212, Bangladesh

Representative from the Department of Environment (DoE)
8. Director (Climate change & International Convention) — Member
Department of Environment
Ministry of Environment, Forest and Climate Change
Government of the People's Republic of Bangladesh

Representative from Bangladesh Meteorological Department (BMD),
9. Meteorologist Scientist — Member
Bangladesh Meteorological Department (BMD), Dhaka

Representative from icddr,b
10. Project Coordinator — Member

Environmental Health and WASH
Health Systems and Population Studies Division, icddr'b. Dhaka

Representative from WHO Country Office
11. Focal Person HNAP Member
EHU Technical Unit of WHO
WHO-Bangladesh Country Office
Dhaka Bangladesh

Terms of Reference:

1) The Chairperson will lead the Technical Working Group (TWG) for the Bangladesh 'Health National Adaptation Plan (HNAP)' and Member Secretary will work in consultation with the Chairperson.
2) Member Secretary, will plan the necessary coordination-meetings and workshops with members and review the progress of the activities.
3) The committee members will finalize the 'Action Plan' for successful implementation of the 'Health National Adaptation Plan (HNAP) 2026; through necessary stakeholders consultation meeting / Workshop).
4) The committee members will engage in 'Monitoring & Evaluation" of the H-NAP activities
5) The committee members can Co-opt member(s) or representative as and when necessary

Annex 4: Independent Review Committee

Professor Dr. Md. Aminul Haque
Professor,
Department of Population Sciences
University of Dhaka

Md Mohiuddin Al Helal
Sr Assistant Secretary,
Ministry of Health & Family Welfare

Representative
World Health Organization (WHO),
Bangladesh

Representative
Swedish International Development
Cooperation Agency (SIDA)

Dr. Md. Shafiqul Islam
Health Advisor,
British High Commission, Dhaka

Dr. Md. Rezaul Hasan
Deputy Project Coordinator
Environmental Health and WASH
Health Systems and Population Studies
Division, Icddr,b

Dr. Mohammad Zahirul Islam
Health Advisor
Embassy of Sweden, Dhaka

Abu Sayed Md Hasan
SRIIR Specialist
UNFPA

Annex 5: List of stakeholders participated in KII

The Technical team conducts 7 selective key informant interviews with representatives from both Government (5) and non-government sectors (2).

i. Additional Director General, DGPHCPH, HSD, MOHFW
ii. Director NIPSOM, HSD, MOHFW
iii. Director Disease Control, DGPHCPH, HSD, MOHFW
iv. Director IEDCR, DGPHCPH, HSD, MOHFW and
v. The Program manager, Climate Change Project and SSO, IEDCR, DGPHCPH
vi. Country Director, WaterAid Bangladesh
vii. Senior Director-Strategic Planning & Head of Climate Action, Friendship Bangladesh

Annex 6: Literature Review

1. National Adaptation Plan (NAP), Bangladesh, 2022
2. Health National Adaptation Plan (H-NAP), 2018 Bangladesh;
3. Vulnerability and Adaptation to Climate Change in Coastal and Drought Prone Areas of Bangladesh: Health and WASH, EHU, WHO, 2015;
4. Health Vulnerability and Adaptation Assessment of Climate Change Impact in Bangladesh, 2021, IEDCR, EHU;
5. Nationally determined contribution (NDC) 3.0, 2025 of Ministry of Environment, Forest and Climate Change
6. Nationally determined contribution (NDC), 2021 of Ministry of Environment, Forest and Climate Change
7. Climate Change and WASH Initiatives in Bangladesh EHU, WHO;
8. National Health Policy
9. Health Population Nutrition Sector Development Program (HPNSDP).
10. Climate change adaptation in Bangladesh: Current practices, challenges and the way forward
11. A review of the global climate change impacts, adaptation, and sustainable mitigation measures
12. Climate Change in Bangladesh: Impact on Infectious Diseases and Mental Health
13. Public health emergencies: preparedness and response - Report by the Director-General
14. Public Health Impact and Health System Preparedness within a Changing Climate in Bangladesh: A Scoping Review
15. World Health Organization's Operational framework for building climate resilient and low carbon health systems, 2023
16. World Health Organization's Operational framework for building a climate-resilient health system, 2015
17. Climate Change Health Adaptation Strategies and Action Plans of Nepal (2016-2020)
18. National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016 – 2025
19. National Adaptation Plan Pakistan
20. Philippines National Climate Change Adaptation in Health (CCAH) Strategic Plan
21. Climate Change Adaptation on Health Sector in Indonesia
22. Health Adaptation and Resilience to Climate Risks India
23. Climate Related Health Adaptation and Resilience in India: Southern Region
24. Framework for action in building health systems resilience to climate change in South East Asia Region
25. The Philippine National Adaptation Priorities
26. Costing Methodology for Fiji's National Adaptation Plan, 2020
27. Communicating climate change: A practitioner's guide Insights from Africa, Asia and Latin America, 2019
28. Review Health in National Adaptation Plans, 2021
29. First Biennial Update Report of Bangladesh to the UNFCCC, June 2023 United Nations Framework Convention on Climate Change
30. 8th five-year plan
31. Bangladesh Climate Prosperity Plan
32. 3rd country investment plan.
33. Climate Change and Gender Action Plan (CCGAP)
34. Poverty Reduction Strategy
35. Standing order on disaster (SOD) 2019
36. Guideline for Participatory Water Management
37. Current version of One heath strategic plan
38. 5th Health Sectoral Program

Annex 7: Financial analysis

Health Services Division

Ensuring affordable and culturally appropriate healthcare services for all through the development of health, nutrition, and population sectors is mentioned as the mission statement of Health Services Division to establish a healthy, robust, and productive community. With the aim of keeping the population capable and healthy, Health Services Division emphasizes climate resilience, climate change adaptation, and health risks in the context of ensuring health security. To achieve this objective, various activities have been undertaken in this sector to make it climate-responsive, benefiting particularly vulnerable populations, especially impoverished women and children who need these services the most. In combating the adverse effects of climate change, assistance is provided in implementing maternal health voucher programs in 53 vulnerable upazilas to support pregnant and underprivileged women. Community clinics and specialized hospitals provide medical services to the most marginalized population in society who are the most affected by climate change. Measures are being taken to control vector-borne diseases such as dengue, which have seen an increase due to climate change. Training is provided at the grassroots level to ensure competent healthcare delivery enabling effective response to climate-relevant health risks for the poorest and most vulnerable communities (Ministry of Finance, 2023).

Budget allocation for Climate Change

❑ **Budget allocation for FY2024-2025**

➢ The climate relevant allocation has increased significantly over time. The cumulative budget allocations for the 25 Ministries/Divisions in FY25 account for BDT 4,18,160.64 crore of which 10.09% (BDT 42206.89 crore) are climate relevant.

➢ However, the climate-relevant budget allocation for 25 Ministries/Divisions has decreased by 0.72% compared to the revised budget for FY24, where it constituted 10.81% of the total climate-relevant allocation. ➢ Sectoral allocation as a share of total budget and GDP has stagnated over time. Total revised budget for climate relevant allocation as a share of total budget increased from 5.63% in FY23 to 5.81% in FY24.

➢ However, as a share of GDP, the total allocation as % of GDP decreased from 0.84% in FY23 to 0.82% in FY24.

❑ **Climate Budget Utilization**

➢ 25 Ministries/Divisions performed well in utilizing climate relevant budgets in FY22 and FY23 when utilization rates were 93% and 91%, respectively. However, the climate budget utilization decreased from 93% in FY22 to 91% in FY23.

➢ Development budget utilization has remained stagnant around 85% during FY21-FY23.

➢ Given the country's climate vulnerability, development budget utilization should be increased in the coming years by enhancing designated ministries/divisions' capacity.

❑ **Budget Allocation for the MOEFCC**

➢ The allocation for the MOEFCC has increased to 0.27% of total budgetary allocation in FY25 from 0.23% in FY24.

➢ However, the allocation for the ministry as a share of GDP falls behind the targets stated in 8FYP which are 0.10% of GDP by 2025 (actual 0.038% in FY25) and 0.5% of GDP by 2041.

➢ The allocation for strengthening institutional capacity for climate risk management increased by 44.36% from BDT 104.61 crore in RBFY24 to BDT 151.01 crore in FY25.

❑ **BCCSAP thematic areas in the budget**

➢ Considering the six BCCSAP thematic areas, 13.66% of the climate budget is allocated to mitigation and low-carbon development thematic areas whereas only 6.35% is allocated to comprehensive disaster management.

❑ **Allocation for Renewable Energy and Fossil Fuel in ADP**

➢ The allocation for renewable energy in ADP shows a fluctuating trend over the years.

➢ Only 4.26% of total allocation for the energy sector was allocated for renewable energy in FY25.

➢ The share of allocation for renewable energy in ADP should be increased in order to achieve the target of 40% power generation from clean energy by 2041.

❑ **ADP Allocation for Improving the Capacity of the MOEFCC**

➢ The MOEFCC undertakes coordinating functions and plays the lead role in developing and enforcing environmental policies. The 8FYP proposed a significant increase in the ADP allocation for environment and climate change. However, the proposed ADP allocation in the budget for the ministry continues to fall behind the target as stated in 8FYP.

Annex 8: Climate-related health risks in Bangladesh

Related Climate Hazard	Climate-Sensitive Health Risk	Projected Future Risk
Increased frequency and intensity of heat waves	Heat-related illnesses	Rising temperatures are projected to exacerbate heat-related morbidity and mortality, especially among vulnerable groups such as children, the elderly, and outdoor workers.
Increased temperature, rainfall variability, and humidity	Vector-borne diseases (e.g., dengue, malaria)	Warmer temperatures and altered rainfall patterns are likely to expand the range and transmission season of vector-borne diseases, increasing outbreaks.
Flooding, heavy rainfall, and saline water intrusion	Waterborne diseases (e.g., cholera, diarrhea)	More frequent and severe flooding and water salinity are expected to increase contamination of water sources, leading to higher risks of waterborne diseases.
Air pollution and dust storms	Respiratory illnesses	Climate-induced changes in air quality, coupled with urbanization, may worsen respiratory illnesses like asthma and bronchitis.
Drought, crop failures, and rising food prices	Malnutrition and under nutrition	Reduced agricultural productivity and food insecurity caused by climate-related hazards will likely increase malnutrition, particularly among children and women.
Displacement from extreme weather events	Mental health impacts	Recurrent cyclones, floods, and sea-level rise may lead to forced displacement, increasing the incidence of anxiety, depression, and other mental health issues.
Cyclones, storm surges, and extreme flooding	Injury and mortality	Rising sea levels and stronger storms are projected to increase the frequency of natural disasters, resulting in higher rates of injuries and deaths.
Habitat changes and migration of wildlife	Zoonotic diseases	Changes in land use and habitat disruption due to climate change may increase the risk of zoonotic diseases as human-wildlife interactions become more frequent.