

Kingdom of Cambodia
Nation Religion King



Ministry of Health

National Climate Change Action Plan for Public Health 2020-2024



Ministry of Health
2019

Preface

Royal Government of Cambodia has strong commitment to address the impacts of climate change and consider the health of people as core of economic and social development. Climate change is an inter-sectorial issue that requires the participation of all sectors.

Ministry of Health has contributed to address climate change issue through the development of strategic plan to response the changing climate and in collaboration with relevant institutions and development partners to implement the projects to improve people's well-being by building climate change resilience in the Health Sector.

The technical working group on climate change and health of the Ministry of Health has prepared this document in accordance with the guidance of the Royal Government of Cambodia and did consultations based on relevant documents such as climate change vulnerability assessment on the health sector report, National Strategic Development Plan 2020-2024, Health Strategic Plan 2016-2020, Climate Change Strategic Plan for Health Sector 2018-2023, and the latest research reports.

The National Action Plan of Climate Change for Public Health aims to ensure ownership, implementation accountability and as an important tool for mobilizing resources to address climate change issues in the health sector.

I would like to thank Excellencies, Lok Chumteavs, Professors, Doctors, Ladies and Gentlemen and all development partners for the efforts in preparing this important document. We encourage all relevant institutions and partners to actively participate in the successful and effective implementation of the National Action Plan responding to Climate Change.

Phnom Penh, 04 Sept 2020



Minister of Health

Prof. ENG HUOT
SECRETARY OF STATE

Acknowledgement

The Preventive Medicine Department led the development process of National Climate Change Action Plan for Public Health (NCCAPPH) 2019-2023 with active participation from the MOH's Technical Working Group on Climate Change and Health (TWGCCH), relevant departments and bodies under MOH, and concerned stakeholders. Their contributions are invaluable to guide the strategic alignment of the NCCAPPH with the national policy and priority to address climate change and public health. The TWGCCH members and national and international experts on climate change and public health under ADB (GMS RETA-8898), WHO and UNDP have provided numerous suggestions and comments in the consultations and peer reviews, that further enhance the quality of the NCCAPPH to be more technically sound and suitable for implementation.

The development team of NCCAPPH expresses the highest gratitude and appreciation to **H.E. Dr MAM Bunheng**, Minister of Health for valuable advice and guidance in the preparation of NCCAPPH.

The Ministry of Health wishes to thank all members of TWG on Climate Change and Health and Preventive Medicine Department for continuous contribution to the development of this important planning document. The Ministry extends the appreciation to the Asian Development Bank for financial and technical support through its RETA-8898 – Strengthening Resilience to Climate Change in the Health Sector in the Greater Mekong Subregion, and the consultant team of Conseil Santé S.A, and World Health Organisation.

Summary

The Ministry of Health has taken necessary measures to address the risks of climate variability and change on public health, which is a highly vulnerable sector to climate change. The impacts of climate induced events, such as severe floods, droughts and windstorms, have negative effects on public health and the economy of Cambodia. The Vector-borne diseases, particularly malaria and dengue remain a significant health risk in Cambodia.

The preparation of the National Climate Change Action Plan for Public Health (NCCAPPH) 2019-2023 is a continuous effort in addition to the implementation of projects and programmes to address the climate change in public health. The NCCAPPH is aligned with the Health Strategy Plan Three, the Cambodia Climate Change Strategic Plan 2014-2023, and other relevant national development plans.

The Technical Working Group on Climate Change and Health (TWGCCH) led the development process of this document through consultative processes with Departments, General Department, Centres, representative from relevant ministries and development partners. The development process is based on the development of the first National Climate Change Action Plan for Public Health 2014-2018 (NCCAPPH) in 2013, and recent development of National Strategic Plan for Climate Change Adaptation and Disaster Risk Reduction in Health. The ADB (RETA-8898 – Strengthening Resilience to Climate Change in the Health Sector in the Greater Mekong Subregion) has provided technical and financial support.

The goal of the NCCAPPH is to reduce morbidity, mortality, injuries and health vulnerability to climate variability and extreme weathers.

The NCCAPPH 2019-2023 is building on the previous planning documents, up-to-date information and data, research and the recent vulnerability assessment report. The NCCAPPH has identified 18 actions covering Coordination, Capacity Building, Research, Knowledge Management, Intervention & Infrastructure, and Finance and M&E. Addressing gender and communication are cross-cutting issue in the NCCAPPH. The current NCCAPPH 2019-2023 requires an estimation of budget around USD 16.6 million for implementation. The estimated of USD 16.6 million does not include the costs of two actions, on improving healthcare coverage and promoting climate and disaster proofing of HCF and infrastructures.

The impact indicators of the NCCAPPH are contributing to improve health vulnerability and exposure, health adaptation and resilience, and burden of climate sensitive health outcomes. The indicators are:

- Percentage of communes that are vulnerable to climate change and health
- Percentage of budget in health sector responding to climate change
- Incidence of dengue fever
- Incidence of malaria
- Association of diarrhoea with weather data (modelled) (time-series analysis)

The MOH will amend the Decision (Sechkdei Samrech) on the establishment of TWGCCH to cover the purpose, composition, duties and modus operandi. The amendment of TWGCCH will enable them to continue to play a pivotal role in coordination the implementation of NCCAPPH more effectively.

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Acronym and Abbreviation

ADB	Asian Development Bank
AF	Adaption Fund
AIDS	Acquired Immune Deficiency Syndrome
CBA	Cost Benefit Analysis
CC	Climate Change
CC&H	Climate Change and Health
CCA	Climate Change Adaptation
CCCA	Cambodia Climate Change Alliance
CCCSP	Cambodia Climate Change Strategic Plan 2014-2023
CIF	Climate Investment Fund
CNM	National Center for Parasitology, Entomology and Malaria Control
DP	Development Partner
DPHI	Department of Planning and Health Information
DRR	Disaster Risk Reduction
EU	European Union
EWARN	Early Warning Alert and Response Network
GCF	Green Climate Fund
GEF	Global Environment Facility
GEF Project MOH)	Building resilience of health system in Asian LDCs to climate change (WHO-UNDP-
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GSSD	General Secretariat of National Council for Sustainable Development
HCF	Healthcare Facility
HIV	Human immunodeficiency virus
HSP	Health Strategic Plan
H-NAP	Health National Adaptation Plan (National Climate Change Action Plan for Public Health)
IIED	International Institute for Environment and Development
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LCDF	Least Developed Country fund
M&E	Monitoring and Evaluation
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEF	Ministry of Economy and Finance
MOH	Ministry of Health
MOWRAM	Ministry of Water Resources and Meteorology
MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
NCCAPPH	National Climate Change Action Plan for Public Health (H-NAP)

NCDDS	National Committee for Sub-National Democratic Development
NDCP	National Dengue Control Program
NGO	Non-Governmental Organization
NIPH	National Institute of Public Health
NSDP	National Strategic Development Plan
PMD	Preventive Medicine Department
PPP	Public Private Partnership
RGC	Royal Government of Cambodia
SCCF	Special Climate Change Fund
SIDA	Swedish International Development Agency
TB	Tuberculosis
TDR	Tropical Disease Research
TWGCCH	Technical Working Group on Climate Change and Health
UKAID	United Kingdom Aid
UNFCCC	The United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
V&A	Vulnerability and Adaptation
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

Background

Public health in Cambodia has improved tremendously in the last decades evidently in the achievement of the health-related indicators of the Cambodian Millennium Development Goals [1]. The Goals on reducing child mortality and improving maternal health were fully achieved, while Goal on combatting HIV/AIDS, malaria and other diseases was partially achieved. MOH's annual report 2017 highlights the improvement of public health due to the overall improvement of the health system and the continuous political support from the government [2]. However, public health still faces challenges relevant to epidemiology and the health system, particularly the malnutrition among the vulnerable group, and emerging diseases resulting from environmental health risks and climate change [3].

As a tropical country, monsoon has strongly affected Cambodian public health directly through flood and drought events, and indirectly through the spread of waterborne and water-related diseases. The Cambodian Second National Communication to the UNFCCC indicates that climate change has affected the public health in Cambodia, directly through economic losses and damages of extreme weather events and indirectly through many infectious diseases such as malaria, dengue fever, diarrhoea, and other water- and food-borne diseases [4]. However, the impacts of climate change on Cambodian public health are not yet fully understood due to limited data availability, climate projections (downscaled climate projections) and the complexity of issue at hand. According to WHO, the changes in weather and climate conditions present inevitable risks for human health in the form of direct impacts, environmental system mediated impacts, and socially mediated effects [5]. The IPCC also states that climate change is adversely affecting human health by increasing exposure and vulnerability to climate-related stresses, and decreasing the capacity of health systems to manage changes in the magnitude and pattern of climate-sensitive health outcomes [6].

The Royal Government of Cambodia, in the Rectangular Strategy IV, acknowledges the impacts of climate change on its development, including health sector, and calls for the climate change responses [7]. In addition, it approved the Cambodia Climate Change Strategic Plan 2014-2023 (CCCSP) as an overarching climate change response framework in the country in 2013 [8]. To operationalize the CCCSP, MOH developed a first National Climate Change Action Plan for Public Health 2014-2018 (NCCAPPH) in 2013. The development of the first NCCAPPH followed the guidance from the Secretariat of the National Climate Change Committee (later, reformed to the National Council for Sustainable Development) and encompassed comprehensive consultations with relevant stakeholders under close coordination of the MOH's climate change technical working group [9]. MOH began implementation since the approval of the NCCAPPH 2014-2018, notably with the support from the Department of Climate Change (administered by the Cambodia Climate Change Alliance) to pilot selected actions and conduct researches.

As the NCCAPPH 2014-2018 was drawing to the end of its implementation in 2018, the MOH started the process of preparing a second NCCAPPH for 2019-2023 with financial and technical support from ADB (RETA-8898 – Strengthening Resilience to Climate Change in the Health Sector in the Greater Mekong Subregion) in consultation with the WHO (GEF Project – Building resilience of

health system in Asian LDCs to climate change). The NCCAPPH 2019-2023 is building on the previous documents, baseline information and latest information and data. The development process encompasses a series of consultations with relevant stakeholders in-and-outside MOH, while the defined actions align the existing policy framework on health and climate change through integration in the existing national health actions/programmes and defining new actions/programmes to respond to emerging health risks imposed by climate change.

The goals of the NCCAPPH are to reduce morbidity, mortality, injuries and health vulnerability to climate variability and extreme weathers [9] and to contribute to the implementation of strategic objectives as set in the present Climate Change Strategic Plan for Public Health, the Cambodia Climate Change Strategic Plan 2014-2023, and the Health Strategic Plan 2016-2020 (HSP3).

National Policy on Climate Change and Public Health

Improving public health and nutrition and addressing climate change are the main priority for the Royal Government of Cambodia (RGC) as stated in the Rectangular Strategy phase IV (2019-2023) [7]. “Improving Public Health and Nutrition” is the third angle in the Rectangle 1 “Human Resource Development” with a goal to enhance public health and nutrition of the people to support sustainable human resource development, economic growth, and social development. Climate change is the fourth angle “Ensuring Environmental Sustainability and Pre-emptive Response to Climate Change,” of the Rectangle 4 “Inclusive and Sustainable Development” with a goal to minimize environmental impacts, enhance the capacity to adapt to climate change, and contribute to reducing global climate change to ensure sustainable development. The RGC calls for the full implementation of the Cambodia Climate Change Strategic Plan 2014-2023 and the Health Strategic Plan 2016-2020.

Addressing the risk of climate change on public health is stated in the key national policy documents on climate change. The Cambodia Climate Change Strategic Plan 2014-2023, approved by the Prime Minister in 2013, sets an overarching framework for national and sectoral responses to climate change. The strategic objectives of the CCCSP highlight the urgency to address the impacts of climate change on public health in Cambodia [8] with a strategy to improve healthcare infrastructure and capacity of health personnel to cope with vector-borne and water-borne diseases in the context of climate change. The Cambodia’s Intended Nationally Determined Contribution (INDC), a Cambodia’s commitments to implement the climate change Paris Agreement under the UNFCCC, indicates the need to address the direct and indirect impacts of climate change on human health [10].

The Health Strategic Plan 2016-2020 has suggested to promote the implementation of measures to prevent and reduce communicable diseases by cooperating with the community and stakeholders to raise awareness on hygiene, food safety, healthcare, effects of chemical products, alcohol and tobacco, and impact of climate change on human health [3]. The MOH re-iterates the priorities to build resilient health system and reduce communicable diseases, i.e. dengue and malaria, in the National Strategic Development Plan (NSDP) 2019-2023 [8].

Situation Analysis

Climate Change in Cambodia

Climate change is evident in Cambodia, where the mean annual temperature has increased by 0.8°C since 1960, at a rate of approximately 0.18°C per decade. All areas of Cambodia are expected to experience further temperature increases in the 21st century by 0.7 to 2.7°C by the 2060s, and 1.4 to 4.3°C by the 2090s [11].

Average annual rainfall is expected to increase in Cambodia with climate change, with shorter, more intense wet seasons, but longer, drier dry seasons. Accordingly, the risk of extreme weather events such as floods and droughts is expected to increase [11–12]. Heatwaves are also a growing threat. The frequency of hot days and nights has increased significantly since 1960, with further increases expected; days considered ‘hot’ in the current climate will occur on 14-49% of days by the 2060s, and on 20-68% of days by the 2090s [11].

Cambodia’s coastline is vulnerable to an expected sea-level rise of up to 0.98m by 2100, causing saline intrusion and increasing the risk of coastal inundation during storms and typhoons. While future projections for tropical storms (typhoons, cyclones) are subject to a greater uncertainty, Cambodia remains at risk of these natural disaster events. The latest IPCC report highlights the expected impact of global warming of 1.5°C increase in Southeast Asia region [13].

Cambodia has been identified as one of the countries that is most vulnerable to the impacts of climate change in Southeast Asia [14]. According to some of the latest data on the disaster riskscape across Asia-Pacific report, Cambodia remains among the most vulnerable Southeast Asia countries, thus calling for further action to ensure the achievement of SDGs 2030 [15]. Factors contributing to this vulnerability include population growth, high rates of poverty, low levels of education, food insecurity and malnutrition, and existing high burdens of disease. Other factors include rapid urbanisation, low levels of development, the tendency of communities to live in coastal, low-lying and flood-prone areas, and widespread reliance on agriculture for food and income.

The repeated nature of disasters such as droughts and floods in Cambodia perpetuates and amplifies existing vulnerabilities to climate change, including poverty, food insecurity and poor health status. The increasing frequency and severity of extreme weather events caused by climate change will further exacerbate this cycle, compromising resilience and adaptive capacity, and contributing to a perpetual state of recovery.

Key climate change vulnerability in health sector

The WHO 2010 climate change and health in Cambodia vulnerability and adaptation assessment identified four high-priority health impacts of climate change: vector-borne diseases, particularly dengue fever and malaria; water-borne diseases; effects of extreme weather events; and food insecurity [16]. Three of these areas (vector-borne diseases; water-borne diseases; effects of extreme weather events) were reiterated in the National Climate Change Action Plan for Public Health 2014–2018.

In 2017-2018, a literature review conducted by the Department of Preventive Medicine with technical support from WHO has demonstrated a broad range of potential health impacts of

climate change in Cambodia, including existing priorities such as vector-borne diseases, malnutrition and diarrhoeal disease, along with other conditions such as rodent-borne diseases, respiratory tract infections, non-communicable diseases, heat-related illness, and mental health problems. .

Furthermore, the recent development of a National Strategic Plan for Climate Change Adaptation and Disaster Risk Reduction in the Health Sector 2019-2023 has paved the way for better integration of responses to climate change and disasters. The Strategic Plan also focuses on addressing the three-priority climate related health challenges:

- Vector-borne diseases
- Waterborne and foodborne diseases
- Health impacts of extreme weather events

Further information about each of these priorities is provided below.

Vector-borne diseases

The risk of vector-borne diseases is expected to increase in Cambodia with climate change, as a result of increasing temperatures, changing patterns of precipitation, increasing urbanization and population migration. The two major vector-borne diseases in Cambodia are malaria and dengue, but other diseases such as Japanese encephalitis, chikungunya and Zika are also expected to be impacted by climate change.

Dengue poses a significant health and economic burden in Cambodia [17]. Endemic dengue transmission peaks during the rainy season, with high transmission epidemics occurring periodically in Cambodia. The annual age-adjusted incidence ranges from 0.7 to 3 per 1000 population, and increased incidence is observed during rainy seasons. Almost 80% of reported dengue cases occur in children aged 9 years or younger, with the highest age-specific incidence occurring in children aged under 1 year. Dengue incidence is associated with weather variables, particularly temperature, rainfall and relative humidity. The association has lag times of up to three months, indicating potential for a dengue early-warning system (EWS) [18].

As per September 2019, there have been 59,202 dengue cases including 40 deaths (case fatality rate (CFR) 0.07%) reported through the National Dengue Surveillance System. The National Dengue Control Program (NDCP) at the National Center for Parasitology, Entomology and Malaria Control with the strong support from WHO and other stakeholders have been working on different aspects of dengue response activities, including clinical case management, risk communications and vector control intervention across the country since January 2019. WHO Cambodia is supporting MOH Cambodia's response activities in line with these identified priorities.

As the climate changes, changing rainfall patterns will alter potential breeding sites for the *Aedes* mosquitoes that transmit the dengue virus. In rural areas, entomological surveys have found that traditional rainwater-collection jars account for 80–90% of larvae. Ongoing urbanization is expected to increase proximity of breeding sites to human populations. Given the prevalence of piped water systems in cities, it is expected that cryptic sites are responsible for a larger proportion of larvae in urban areas. Internal and cross-border travel patterns will alter population immunity and susceptibility to different dengue serotypes and will alter the distribution of dengue types,

potentially increasing the risk of outbreaks. Dengue surveillance has improved over the years, but significant underreporting to the National Dengue Surveillance System occurs. Actual incidence of dengue may be 29 times higher than that reported [19].

Malaria continues to pose a threat despite recent declines in disease incidence and a switch in national focus from control to elimination [20]. The relationship between malaria transmission and weather variables is complex, with risk highly dependent on socioeconomic factors and disease control programs. In Cambodia, malaria risk has been demonstrated in association with weather variables, with the highest monthly incidence observed during the wet season [21]. As with dengue, increased incidence is observed during rainy seasons, with the highest monthly malaria (*P. falciparum* and *P. vivax*) incidence observed between June and January [21]. In the National Strategic Plan For Elimination of Malaria in the Kingdom of Cambodia 2011-2025, malaria incidence is highest in the forested north-eastern provinces on the border with Vietnam, the Lao People's Democratic Republic and Thailand [22].

Approximately three-quarters of cases occurring from 2004 to 2013 were caused by *Plasmodium falciparum*, 28.1% were caused by *Plasmodium vivax* and 5.7% were mixed infection. In 2015 the countrywide incidence of Malaria was 2.29 per 1000. However, it is assumed that many cases go unreported and villages most at risk are in areas with limited access to health care services.

The burden of disease attributable to malaria may increase as the climate changes, particularly when considering other associated impacts of climate change such as population displacement and disruption of health services, including disease surveillance and vector-control programmes. Although models are subject to significant uncertainty, the distribution of the *Anopheles* mosquitoes that transmit *Plasmodium* malaria may change, exposing non-immune populations to the risk of infection.

Other vector-borne diseases may pose a growing threat in Cambodia with climate change, however further research is required to better understand the current burden of disease and projected risk of transmission. For example, Japanese encephalitis is suspected to be responsible for a significant burden of disease in Cambodia, particularly among children with cases most likely during the rainy season [23]. Chikungunya and Zika virus infection have both been documented in Cambodia, though both are likely under-recognized and under-reported [24].

Waterborne and foodborne diseases

Water-related diseases known to exist in Cambodia include diarrhoeal disease (caused by a range of pathogens, including rotavirus, *Escherichia coli*, Shigella, cholera and typhoid), melioidosis, leptospirosis, hepatitis E, schistosomiasis and arsenicosis. For example, diarrhoea is the second most common diagnosis recorded by the Ministry of Health (after acute respiratory illness) [25]. The burden of waterborne diseases may increase as water scarcity is exacerbated and extreme weather events threaten safe water and sanitation services. Recent projections suggest that climate change will cause an increasing risk diarrhoeal disease particularly in the north of the country [16].

Foodborne diseases are related to quality of food, storage conditions (such as exposure to insects, mould and moisture), water contamination and the direct effects of temperature. Water

scarcity also limits hygiene activities such as washing and the use of flushing toilets, which contributes to food- and waterborne diseases.

Vulnerabilities is seen in the lack of climate resilience, with rural and poorer households most vulnerable to food and waterborne diseases, due to insecure water supply arrangements, limited access to safe sanitation and hygiene facilities. More importantly, population knowledge of safe water, sanitation and hygiene practices is limited, as is health stakeholder knowledge of and capacity to manage water-related diseases.

WASH facilities in health care centres are essential for improving quality within the context of universal health coverage. Currently, access to basic water supply reached 90 per cent, however, less than 50% of health care facilities reported having enough water for the whole year. While only 36 per cent of health centres have access to basic sanitation facilities [26].

Manifestations of waterborne and foodborne diseases range from acute diarrhoeal illness or food poisoning to chronic gastrointestinal infection contributing to malnutrition. Children are particularly vulnerable to waterborne diseases, because a high prevalence of undernutrition increases the risk of waterborne diseases [25]. In addition, chronic diarrhoea has significant consequences for children's health, including malnutrition, poor growth, cognitive deficits and poorer schooling outcomes.

Food insecurity is associated with malnutrition and related adverse health outcomes. Analysis of data collected during the most recent Cambodia Demographic and Health Survey, performed in 2014, demonstrates significant improvement in markers of child nutrition since the year 2000. However, the prevalence of stunting among children aged less than five years remains high at 32.9% of boys and 32.2% of girls, while wasting (indicative of acute malnutrition) occurs in nearly 10% of children. Risk factors for malnutrition among children in Cambodia are multitude and include poverty, poor access to sanitation services, residence in rural areas, and low levels of maternal education [27].

A range of other diseases linked to poor standards of water and sanitation remain a concern in Cambodia, such as melioidosis, schistosomiasis, hepatitis A and E, and arsenicosis. Climate change may increase the risk of these diseases, due to increasing temperatures, worsening extreme weather events such as floods, droughts and storms, increasingly insecure water supplies, and growing demands on health care services.

Health impacts of extreme weather events

The health consequences of extreme weather events include increased morbidity and mortality from heatwaves, floods and droughts; food shortages as a result of crop destruction, leading to malnutrition; and mental health impacts. Particular health concerns are heat-related illness, respiratory disorders, mental health and other chronic disease [28].

For example, climate change will bring increasing temperatures and more extremely hot days and hence an increasing risk of heat-related illness [12]. Almost half of Cambodia's labour force is employed in the agricultural sector, with exposure placing them at high risk of heat-related illness.

Vulnerability to the health impacts of extreme weather events is compounded further by low levels of education on health and related issues, particularly among women. About 84% of the population lives in rural areas, many of which are located in risk-prone areas [16].

Respiratory tract infections peak in incidence during the rainy season. In particular, the transmission of influenza is likely sensitive to weather and climate variables. A surveillance study along the Thai-Cambodia border from 2010 to 2012 found that nearly all cases of influenza occurred during the months of June to November, coinciding with the rainy season [29]. Similarly, analysis of influenza surveillance data collected from 2006-2008 and 2009-2011 identified a peak in confirmed influenza cases between June and November/December [30].

The risk of respiratory diseases such as asthma, chronic obstructive pulmonary disease and lung cancer will increase due to worsening air quality caused by increasing temperatures, fossil fuel combustion and extreme weather events such as forest fires, as well as changing patterns of allergen production and distribution [16].

Mental health: Cambodia already has a high burden of mental illness; the nationally representative Cambodian Mental Health Survey, performed in 2012, found 31.7% of women and 18.4% of men to have a probable anxiety disorder, and 19.7% of women and 10.2% of men to have a probable depressive disorder. More than half of respondents had experienced or witnessed fire, flood or other natural disasters. More recently, the Global Burden of Disease study estimated the prevalence of depressive and anxiety disorders in Cambodia to be 2.86% and 3.37%, respectively [31].

Climate change has the potential to cause significant distress for people in Cambodia; a study conducted in Kampong Cham province found the most frequently experienced traumatic events to be lack of food and water, lack of access to medical care, and lack of shelter [32], all of which may be exacerbated by climate change. Capacity to manage mental health problems is very limited in the country, and most of specialist mental health practitioners are mainly available in the city, (and very few at the rural areas/provinces). Elsewhere, general health services are inadequately equipped and staff insufficiently skilled to provide quality mental health care services; rural areas are particularly underserved.

Programme and subprogramme of MOH

The MOH has four priority programmes and 22 sub-programmes according to the programme-based budgeting published in the national budget law annually.

Programme 1: Reproductive health, maternal and new-born care, child health including immunization, and nutrition

- Subprogramme 1: Nutrition
- Subprogramme 2: Reproductive health
- Subprogramme 3: Maternal and new-borne health
- Subprogramme 4: Child health
- Subprogramme 5: Supporting services on reproductive health, youth, maternal, new-born, child and nutrition to all capital and provinces

Programme 2: Communicable disease prevention and control

- Subprogramme 1: Prevent and care the HIV
- Subprogramme 2: Prevent and care the TB
- Subprogramme 3: Prevent and care the malaria and dengue
- Subprogramme 4: Prevent and respond to other communicable diseases
- Subprogramme 5: Supporting service to combat the communicable diseases at provincial and capital level

Programme 3: Non-communicable disease prevention and control, and public health interventions

- Subprogramme 1: Eyes care
- Subprogramme 2: Mental health and drug addiction
- Subprogramme 3: Mouth and teeth care
- Subprogramme 4: Chronic diseases
- Subprogramme 5: Other public health illnesses
- Subprogramme 6: Supporting service to combat the non-communicable diseases at provincial and capital level

Programme 4: Strengthening health system

- Subprogramme 1: Provision of health service
- Subprogramme 2: Health financing
- Subprogramme 3: Human resource development
- Subprogramme 4: Health information system
- Subprogramme 5: Health sector governance
- Subprogramme 6: Supporting service to improve the health system at provincial and capital level

Priority Issues on Climate Change and Health

The MOH with support from the ADB (TA 8898-REG) conducted a national and provincial vulnerability and adaptation assessment in Cambodia [16] based on the WHO guidance document [33]. The V&A assessment focuses on the dengue, diarrhoea, respiratory illnesses (including influenza-like illnesses, acute respiratory infections), and malaria because of the data availability and granularity, and considering the top ten diseases for outpatient and, in-patient departments, as well as the list of diseases tracked by CamDi. These diseases were identified as the priority of climate-sensitive health outcomes.

The assessment identifies priority adaptation options (by using six criteria namely technical feasibility, operational feasibility, effectiveness, environmental acceptability, financial feasibility and social acceptability) against the climate change-related health outcomes as in Table 1. The climate change-related health outcomes are grouped into vector-borne diseases, water-borne diseases, acute respiratory infections, heat stress and emerging diseases.

Table 1: Priority adaptation options against climate change-related health outcomes

Climate change-related health outcome	Potential adaptation options
Vector-borne diseases (dengue)	Integration of climate and temperature data in Dengue Early Warning System

	Linking the Early Warning System of Ministry of Water Resources and Meteorology (MOWRAM) to other MOH Surveillance and Early Warning Systems (e.g CamEWARN) for disaster related health emergencies
	Strengthen vector surveillance and control programmes as well as optimize and link current Dengue surveillance mechanisms
Water-borne diseases (diarrhoea)	Increased focus on rehydration and counselling mothers on child nutrition
	Provision of climate resilient water, sanitation and hygiene infrastructure and health care facilities
Acute Respiratory Infections (ARI)	Full immunization of children as overcrowding in higher grounds during flooding may increase the incidence of measles, acute respiratory infections or tuberculosis
Heat stress	Possible revision of the Health Information System to capture health effects of heat stress
	Epidemiological studies of daily mortality and morbidity in relation to weather variables
	Address the need for a special case count in major hospitals in urban centres on daily temperature and heat exhaustion and cardio-vascular diseases
	Design of urban areas, housing and work places to minimize heat exposure
Emerging diseases (Leptospirosis, Melioidosis, Legionellosis):	Adapt case management to account for changes in climate
	Improve clinician awareness of these diseases and relationships with climate change
	Improve laboratory capacity

(source: MOH (unpublished): national and provincial vulnerability and adaptation assessment in Cambodia)

Strategic Direction

The MOH has the Sectoral Climate Change Strategic Plan, which was updated to include the disaster risk reduction. The National Strategic Plan for Climate Change Adaptation and Disaster Risk Reduction in Health Sector has six strategic objectives:

1. To promote better governance, coordination, and partnership for climate change adaptation and disaster risk reduction in the health sector.
2. To build institutional capacity and skills of medical personnel and relevant stakeholders to effectively plan and implement climate change adaptation and disaster risk reduction in the health sector.
3. To strengthen research, surveillance, and vulnerability assessment capacity to support decision making for adaptation to climate change impacts and disaster risks.
4. To promote knowledge sharing, awareness, and web-based information management systems related to health vulnerabilities associated with climate change and disaster risks.
5. To build resilience of the existing health service delivery system to respond to and cope with the impacts of climate change and disaster risks.
6. To develop effective financing mechanisms and an M&E framework for climate change adaptation and disaster risk reduction.

Gender

Since climate change affects men and women differently coupled with existing gender inequality in communities and societies, the policies and programmes should address the issues in a holistic approach, particularly in the context of climate change and public health. The people with special need of health supports are usually the most vulnerable groups, namely disabled people, pregnant women, elder people, children and migrants, toward the climate risks. For example, women especially pregnant women have a relatively limited access to health centre during flooding and facing malnutrition.

The list of activities below is meant to address gender inequality in the context of climate change and public health.

- Provide gender and climate change adaptation focusing on health and domestic violence capacity building for MoH Gender Working Group, PHD Gender Focal points and Gender Focal points of Health Centre and Commune Women and Children Focal points in the target communes.
- Disseminate gender and climate change adaptation on health sector and domestic violence to communities with support from the PHD as well as from the MoH.
- Ensure that disaggregated data is included in the HC report as well as the PHD report.
- Include gender components in surveys or assessments ensuring that different issues and need of males and females are collected. Conduct Focus Group Discussion with women' groups separately for any assessment with female facilitators where possible, study or research to find out issues and needs of women, especially elderly women and pregnant women for the CCA focuses on their health issues.
- Ensure the participation of at least 40% of men in dissemination on gender in CCA and domestic violence in communities.
- Training materials should include more pictures ensuring that participants, especially women and elderly women who may be illiterate understand the message delivery.
- Livelihood activities should be provided for communities, especially for women and girls.
- Establish the coordination between health centre and commune women and children Focal Points for gender in CCA on target diseases including malaria, dengue, diarrhea, etc. and domestic violence awareness raising at communities.
- Provide support to improve the nutritional status of pregnant women, elderly women who taking care of their small children while their parents migrate to other towns looking for work.
- Follow up the gender mainstreaming as well as gender action plans to provide feedback for the improvement of gender mainstreaming activities.

Communication

Communication is an effective tool to address the impacts of climate change on public health. Three levels of communication—namely health centres, public health practitioners and mass-media, should be considered for communication mechanisms to have timely effect measures on climate change and health.

1. For health centres across the country:

- Develop a climate change master guide for the public health sector;
- Provide series of communication trainings and tools, which will be accompanied by hand book (master guides) to help local health centres develop key messaging and strategies to foster awareness of the health benefits of climate change preparedness and mitigation.

2. Public health practitioners have a unique opportunity to talk to local authorities and policy makers about proactive climate change and health adaptation and preparedness. Activities for consideration include:

- Employ a variety of media outreach strategies (radio, TV, social media platform, and newsletter);
- Organize climate change and public health forums or dialogues;
- Develop climate change and health (CC&H) web portal to share CC&H stories;
- Develop success stories of current or past CC&H projects to share with donors and other interested agencies; and
- Organize Cambodia showcase at the global climate change and health events.

3. Examples of potential media outlets and/or needs for communication on climate change and health adaptation activities include:

- Wireless access at local health centre;
- Telephone alerts for EWS;
- Radio or digital video at local health centre;
- Banners posted at the main roads in communities that are vulnerable to climate change; and
- Continued technology development.

Action Plan

Scope of Action Plan

The NCCAPPH 2019-2023 follows the government mandate and carries the same title as National Climate Change Action Plan for Public Health, and the strategic objectives of the National Strategic Plan for Climate Change Adaptation and Disaster Risk Reduction in Health Sector. The NCCAPPH 2019-2023 is building on the previous planning documents, up-to-date information and data, research and the vulnerability and adaptation assessment (V&A) [16], and experiences gained from implementation of climate change responses in health sector. The key documents reviewed to generate a long list of actions are the:

- National and Provincial Vulnerability and Adaptation Assessment in Cambodia [16];
- Public Investment Programme of MOH;
- National Climate Change Action Plan for Public Health 2014-2018;
- Health Strategic Plan 2016-2020 (HSP-3);
- Cambodia's Nationally Determined Contribution relating to public health;
- MOH's priority actions in the NSDP 2019-2023; and

- Project documents of the existing climate change and health in MOH.

Goal

The goals of the NCCAPPH are to reduce morbidity, mortality, injuries and health vulnerability to climate variability and extreme weathers and to contribute to the implementation of strategic objectives in the Climate Change Strategic Plan for Public Health, the Cambodia Climate Change Strategic Plan 2014-2023, and the Health Strategic Plan 2016-2020 (HSP3). The defined actions will continue to build the resilience of health system, reduce the vulnerability of health public to changing climate and climate variabilities—floods, drought, and extreme weather events, and build the adaptative capacity of the medical personnel and MOH as a whole.

The actions are grouped into Activity Clusters, in which are categorized to Strategic Objectives, representing: Coordination, Capacity Building, Research, Knowledge Management, Intervention & Infrastructure, and Finance and M&E.

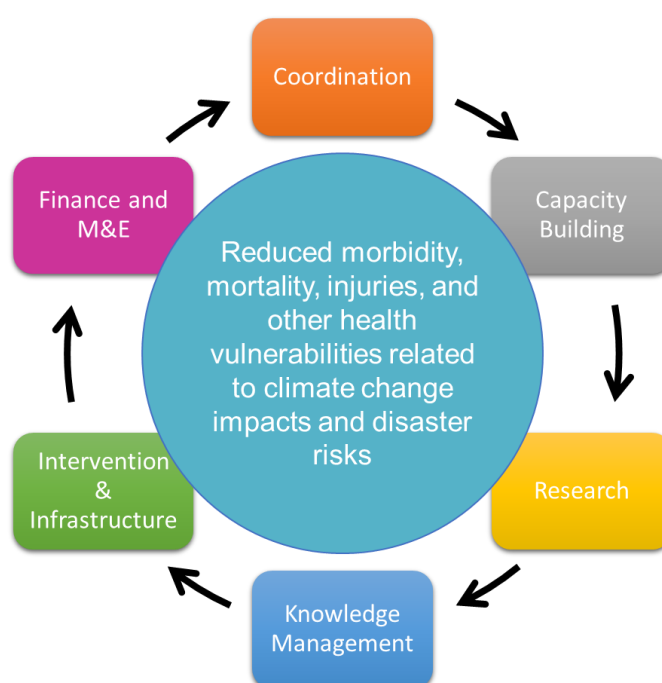


Figure 1: Main Activity Clusters and Goal of the NCCAPPH

Action Plan Matrix

Table 2 lists the Activity clusters and the indicators to address climate change in public health in Cambodia for 2019 - 2023. The priority actions focusing mainly on the adaptation to climate change in public health were based on the consultative processes led by the Department of Preventive Medicine with support from ADB (RETA 8898-REG) and the technical working group on climate change and public health of the MOH. The prioritization methodology was maintained to be consistent with the prioritization processes used in the development of first NCCAPPH, which was guided by the Secretariat of the National Climate Change Committee (later, reformed to the

National Council for Sustainable Development) and encompassed the comprehensive consultations with relevant stakeholders under close coordination of the MOH's climate change working group.

Table 2: Actions Matrix

Activity Cluster	Indicators
Output I: Better governance, coordination, and partnership for climate change adaptation and disaster risk reduction in the health sector.	
1.1 Mainstreaming climate change adaptation and disaster risk management in MOH sector planning and budgeting. • Conduct cost-benefit analyses and evidence-based studies to generate evidences to advocate for planning and budgeting • Prepare and disseminate advocacy materials (i.e. brochure of CBA, case studies, policy leaflets) to MOH's high-level decision makers, MEF, and other stakeholders • Work with planning and budgeting department to integrate action on CC and DRR in planning and budgeting, and annual operation plan.	• Number of CBA and evidence-based studies conducted to support the mainstreaming CCA and DRR in planning and budgeting • Number and types of advocacy materials on the relationship between Climate Change and health developed and utilized • Number of health sector policies/ strategies/ programs that incorporated the health issues in relation to climate change and DRR. • Percentage of the national health budget for climate change adaptation and DRR
1.2 Improving coordination within MOH, with MOH's provincial department of Health and Healthcare centres/hospital, and with other key sectors to ensure coherence in response to climate change related health impacts and disaster risks. • Update the Decision (Sechkdei Samrech) on TWG on CC and Health, and get approval from minister of health¹ • Establish a joint multisectoral working group for information exchanges and joint actions to address health impacts of climate change disaster risks • Establish coordination mechanism between health care staff and provincial	• Approved the Decision (Sechkei Samrech) on TWG on CC and Health • Number of collaboration mechanism for CC&H and DRR established with relevant government agencies and with designated focal points for specific programme of action and budget allocated. • Joint multisectoral risk management approaches to health risks related to disasters, water, waste, food and air pollution (e.g. food safety, diarrhoeal disease control, integrated vector management, joined up risk communication) undertaken.

¹ An Update of TWG on CC and Health has taken place within the framework of GEF Project

committee for disaster management to better address climate change related impacts and disaster risks	
1.3 Promote public and private partnerships to support implementation of climate change adaptation and disaster risk reduction. • Prepare a roadmap to engage private sector and their contributions in addressing CC impacts on health sector • Sensitize and orient the private health care providers and facilities in preparedness and vulnerability reduction measures	• Roadmap to engage private sector to address climate change risk in public health • Number of PPP established to support implementation of climate change adaptation and disaster risk reduction.
Output II: Strengthened institutional capacity and skill of medical personnel and relevant stakeholders to effectively plan and implement climate change adaptation and disaster risk reduction in the health sector.	
2.1 Assessing the capacity need of health staff (national and sub-national) through working with existing academia (i.e. NIPH), relevant government agencies and WHO aiming to update the health technical guidelines and implementation practices	• Number of technical guideline and implementation practices updated to include the capacity need of national and sub-national health staff to effectively address climate change and DRR.
2.2 Incorporate climate change related health impact into academic programmes for public health and medical and to the curriculum of general education	• Climate change and health is integrated in the university programme for public health and medical school • Climate change and health is integrated in the curriculum of general education

2.3 Building capacity of national and sub-national levels for improving programs and system performance to better cope with climate change and disaster risks. • Develop training materials and train health staff and relevant stakeholders at different levels on climate change, public health and disaster risks	• Number of training materials developed • Percentage of health staff with awareness of CC impacts in health and the potential for vulnerability assessments, interventions, and the use of climate data for early warning, surveillance and planning. • Percentage of health staff with capacity to detect and respond to climate stress.
2.4 Developing early warning systems and preparedness plans on potential health effects of climate change, upcoming disasters and health related risks. • Integration of climate data in Dengue Early Warning System (advocated by the WHO TDR) • Linking the Early Warning System of MOWRAM to the MOH Early Warning System (CamEWARN) for disaster related health emergencies	• Functional alert system for early warning regarding the quality of the ambient air, water, extreme events such as, drought, landslides, floods etc, epidemic preparedness to protect health
Output III: Strengthened research, surveillance and vulnerability assessment capacity to guide decision making for adaptation to climate change impacts and disaster risks.	
3.1 Conducting research and implementing surveillance plans on key climate related diseases and health risks at national and sub-national levels, especially in the high climate risk areas. • Strengthen vector surveillance and control programmes	• Number and types of researches and surveillance conducted • Changes in or scale up of diseases control programmes especially in the high climate risk areas
3.2 Conducting health vulnerability assessment and developing composite health climate vulnerability indices • Epidemiological studies of daily mortality and morbidity in relation to weather variables	• Number of health vulnerability assessment completed at national and sub-national levels • Plans developed and implemented based on the results of assessment • Availability and recently update of composite health climate vulnerability indices

3.3 Assessing the resilience and adaptive capacity of healthcare facilities to climate risks and maps the vulnerability of healthcare facilities	• Number of HCF assessed per province • Maps of vulnerable HCF produced
Output IV: Knowledge sharing, awareness, and web-based information management systems related to health vulnerabilities associated with climate change and disaster risks.	
4.1 Improving health database systems and web-based management information systems by incorporating climate change variables, disaggregated gender data and health climate indicators. • Updating Health Database with inclusion of climate change variables and associated diseases;	1.4 Availability of updated essential baselines for monitoring the health risks of climate change (e.g. priority climate-related diseases), environment (e.g. Climatic variables), socioeconomics (e.g. poverty, demographics and occupation), and current level of interventions and health systems capacity
4.2 Developing knowledge products relating to climate impacts, health implications, vulnerability assessment and successful responses to CCA and DRR in the health sector.	• Types and number of knowledge products to raise awareness of health and climate change and response options targeting key audiences such as health professionals, communities, media and other sectors developed and utilized
4.3 Promoting awareness among communities and healthcare personnel on possible health implications, prevention and treatment of climate related diseases.	• Number and types of awareness raising materials developed and utilized on possible health implications, prevention and treatment of climate related diseases. • Percentage of healthcare personnel with information and training to address climate change and health links, appropriate to their role and function • Percentage of community members (men, women, boys, girls and indigenous people) reached through awareness raising activities
Output V: Enhanced resilience of the existing health service delivery system to respond to and cope with the impacts of climate change and disaster risks.	
5.1 Improving healthcare coverage with adequate medical staffing, stock of medicines and treatment guidelines in climate health sensitive areas, especially at the sub-national levels.	• Percentage of HCFs with adequate medical staffing and stock of medicine • Percentage of HCFs following treatment guidelines in climate health sensitive areas

5.2 Promoting climate and disaster proofing of healthcare infrastructure and facilities at national and sub-national levels. Integrating climate change consideration in the design of the HCF construction and operation guideline	- Percentage of healthcare facilities incorporating climate Change and DRR in siting, construction, technologies and procedures to ensure provision of basic services (including energy, water and sanitation). - Percentage of HCFs that meet the criteria of climate appropriate and resilient to local current and expected disasters - Percentage of HCFs with access to energy and functional WASH services and practices that enable essential, quality health services for everyone
5.3 Promoting interventions at community to reduce health risks associated with foodborne, waterborne and vector-borne disease - Awareness campaigns at the local communities on the health risk associated with foodborne, waterborne and vector-borne disease (linking to Action 4.3) - Provision of climate resilient water, sanitation and hygiene infrastructure in HCF in vulnerable setting	Number of interventions implemented at the community
Output VI: Effective financing mechanisms and a M&E framework for climate change adaptation and disaster risk reduction	
6.1 Establishing a viable financial and mechanism for implementation of health adaptation /DRR plans.	- Percentage of budget allocated to increase resilience to climate change and DRR in national and/or subnational health investment plans. - Number of Projects / Programmes on building health system resilience submitted to and granted by the main international climate change funds (e.g. the GCF, GEF, Adaptation Fund, bilateral donors).
6.2 Developing M&E framework for tracking effectiveness and efficiency of climate change adaptation and disaster risk reduction in the health sector.	Number of climate sensitive diseases for which there are monitoring systems that are able to forecast and monitor risks and/or to monitor disease risks posed by

• Develop tools for M&E framework • Operate M&E frame • Field data collections • Produce annual report and MTR • Design an M&E framework for assessing the climate sensitive morbidity and mortalities rate.	climate change and disaster risks • Indicators on climate change impacts, vulnerability, response capacity and emergency preparedness capacity included in relevant monitoring systems at national level and reported over time. • Essential baselines for monitoring the implementation of actions in the H-NAP 2019-2023
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Management and Financing Mechanisms

Analysis of Management Arrangement

National Health System and Structure of MOH

The MOH is the only government agency with a mandate to lead and manage the entire health sector in the Kingdom of Cambodia delivered by both public and private entities [3]. Since the public health reform in 1995, the RCG adopted three levels of the public health system (Figure 2). Since the NCCAPPH is at the national level, Figure 3 illustrates the institutional arrangement of



Figure 2: Three Levels of Public Health System in Cambodia

Source: HSP3

the Ministry of Health.

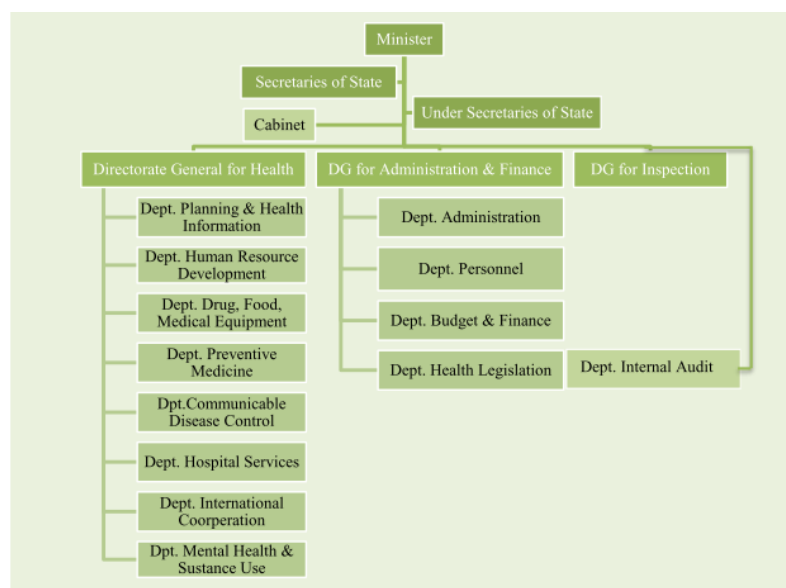


Figure 3: Organization Chart of the MoH

Source: HSP3

Climate Change and Health Technical Working Group

MOH created a Technical Working Group on Climate Change and Health (TWGCCH) on 09 July 2015, with the duties to coordinate, prepare and implement the action plan on climate change and public health with line ministries and relevant national and international organizations [34]. The Technical Working Group will play pivotal roles in coordination and implementation of the actions across the departments and agencies under MOH and the ministries. The TWGCCH is led by the Preventive Medicine Department (PMD) with representatives from the National Centre for Parasitology Entomology and Malaria Control, Department of Health Information and Map, Hospital Service Department, Communicable Disease Control Department, Department of Drugs and Food, National Centre of Maternal and Child Health, CNM, other Ministry such as Ministry of Water and Meteorology, Ministry of Forest and Fishermen, Ministry of Environmental, Ministry of Education Youth and Sports, Ministry of Rural Development, and National Committee for Disaster Management.

The PMD serving as a *de facto* secretariat to the TWGCCH has gained substantial capacity on climate change and health, notably since the development of Climate Change and Health Strategic Plan 2014-2018 in 2012/2013. Additionally, the department has experience in managing and implementing climate change projects (mostly with technical support from WHO and financial support from CCCA). Recently, the department has launched the implementation of a four-year project, building the climate-resilience of health systems, funded by GEF. Here are the projects that PMD has implemented:

- Strengthening Country Capacity to Deal Effectively with Climate-sensitive Vector-borne and Waterborne Diseases and Reducing the Health Impacts of Disasters;
- Vulnerability and Impact Research Targeting Usability and Effectiveness (VIRTUE);

- Strengthening Resilience to Climate Change in the Health Sector in the Greater Mekong Subregion (ADB, TA-8898); and
- Building climate-resilient of health systems (GEF Project).

Analysis of Financing Mechanisms

National Budget of MOH

Ministry of Health is a dominant receiver of the national budget from the Royal Government of Cambodia. The current expenditure of MOH has increased three folds in the last 11 years, from around 500 Million Riel (around USD124 Million²) in 2009 to about 1.5 Billion Riel in 2019 (See Figure 4³). The growth of budget of MOH goes along the general trend of increasing public expenditure of the government thanked to the robust economic growth at 7% annually. MOH was among the first ministries that implemented the programme-based budgeting and has four programmes and 22 sub-programmes. Table 3⁴ provides the details of current expenditures for the four programmes for 2016 to 2019.

Programme 2, communicable disease prevention and control, containing a subprogramme on malaria and dengue, is the most relevant to climate change. However, the expenditure for the programme is at 1.29% of the total budget of MOH in 2019. The bulk amount of MOH expenditure is for strengthening health system, mainly for providing health service and supporting health system at capital and provinces.

² The exchange rate is USD1 = 4060 Riel (this is an indicative, not official exchange rate)

³ The data are from the National Budget Law for 2009 to 2019.

⁴ The data are from <https://www.mef.gov.kh/budget-in-brief.html> (accessed in July 2019).

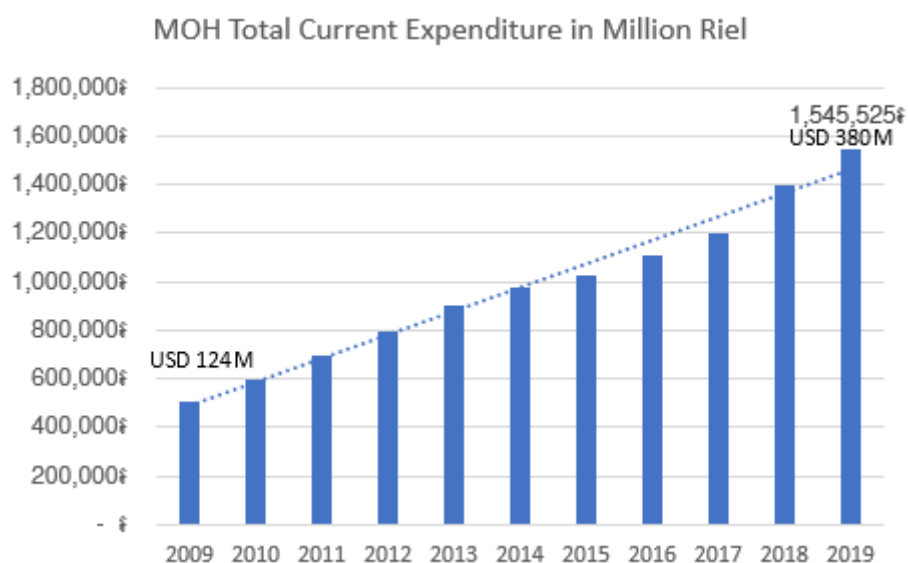


Figure 4: MOH's Total Current Expenditure

Table 3: Expenditure for Programmes of MOH in Million Riel (and in USD)

Programme	2016	2017	2018	2019
1. Improving reproductive health, maternal and new-born care, child health including immunization, and nutrition	74,353.20 (\$18.31M ⁵)	73,075.60 (\$18 M)	95,924.80 (\$23.63M)	116,612.80 (\$28.72M)
2. Communicable disease prevention and control	18,156.50 (\$4.47M)	18,288.20 (\$4.5M)	16,493.60 (\$4.06M)	19,869.90 (\$4.48M)
3. Non-communicable disease prevention and control, and public health interventions	3,329.10 (\$0.82M)	3,014.60 (\$0.74M)	2,527.60 (\$0.62M)	3,256.80 (\$0.8M)
4. Strengthening health system	1,014,952.50 (\$249.99M)	1,107,476.20 (\$272.78M)	1,279,028.00 (\$315.03)	1,405,785.50 (\$346.25M)

Climate Financing in Public Health

The Climate Change Public Expenditure Reviews indicate that MOH has received fluctuating amount from 3.3% (16.9 Billion Riel) in 2012 to 3.4% (29 Billion Riel) in 2016 of the total climate financial for Cambodia from the national budget and donors [35]. The social sector (health, education and gender) shares smaller percentage in climate change expenditure compared to urban and rural infrastructures, irrigation, agriculture, fisheries and forestry. In 2017, MAFF, MOWRAM, MPWT, MRD received more than 80% of total climate change expenditure at 10.5%, 39.6%, 20.8% and 10.3% respectively, while MOH got 3.4%.

⁵ The exchange rate is USD1 = 4060 Riel (this is an indicative, not official exchange rate)

The financing gap for 2016 implementation of the MOH's climate action (NCCAPPH 2014-2018) was at 99.1% according to the study of General Secretariat of National Council for Sustainable Development with support from GIZ [36].

Table 4: Climate Change Expenditure in MOH

	2012	2013	2014	2015	2016	2017
<i>MOH's climate change expenditure in billion Riel</i>	16.9 (\$4.16M ⁶)	32.7 (\$8.05M)	28.5 (\$7.02M)	46.2 (\$11.38M)	29.7 (\$7.32M)	29 (\$7.14M)
<i>MOH's climate change expenditure in percentage of total</i>	3.3%	4.7%	3.2%	5.3%	4.3%	3.4%
<i>Total climate change expenditure in million USD</i>	134.6	189.2	248.1	244.4	192.6	228.0

Potential Sources of Finance for NCCAPPH

National budget continues to play a more important role in the implementation of NCCAPPH 2019-2023. As the national budget is projected to increase annually, the budget allocations to MOH and for climate change actions are expected to increase in the same trend (possibly at 7% growth rate). Aligning with national budget, the health pooled fund is equally important to fund the NCCAPPH. Thus, it is important to ensure that actions in the NCCAPPH are mainstreamed in the planning and budgeting of strategic plans, health pooled fund and programmes/projects under the Health Strategic Plan 3.

Multilateral climate funds are the major financial sources for the climate change interventions in Cambodia. The funds presented here are the funds that have financed many adaptation projects in Cambodia and continued to play important role in financing adaptations. The financial mechanisms under the UNFCCC are Green Climate Fund (GCF), Adaption Fund (AF), Least Developed Country fund (LCDF), Special Climate Change Fund (SCCF) and Global Environment Facility (GEF). These funds focus mainly on the adaptation and particularly in the vulnerable countries like Cambodia. In addition, other sources of multilateral climate funds are from the World Bank through its Climate Investment Fund (CIF) and the Asian Development Bank (ADB).

Bilateral funding is another potential source of financing the NCCAPPH. As at the time of writing, key bilateral development partners assisting Cambodia on climate change are USAID, UKAID, SIDA, and EU. Yet, China Aid is starting to play a more dominant role in funding infrastructures, for example the construction of China-Cambodia Friendship Preah Kossamak Hospital in Phnom Penh.

Furthermore, the alignment of actions in NCCAPPH with the works of DPs and NGOs working on health is another potential to support the full implementation of NCCAPPH 2019-2023.

⁶ The exchange rate is USD1 = 4060 Riel (this is an indicative, not official exchange rate)

Entry points for climate change mainstreaming in management and financing mechanisms

The current NCCAPPH 2019-2023 requires an estimation of budget around USD 16.6 million for implementation. The estimated of USD 16.6 million does not include the costs of two actions, namely action 5.1 and 5.2 on improving healthcare coverage and promoting climate and disaster proofing of HCF and infrastructures, respectively. The details of the costing are in the Annex.

The Preventive Medicine Department leading the Climate Change and Health Technical Working Group of the MOH will manage and coordinate the NCCAPPH implementation building on their experiences and capacity from implementation of previous climate change responses by the MOH. A strong coordination with the relevant departments/programmes is critical to ensuring the integration and alignment of climate change actions in the budget plans and programmes/sub-programmes of MOH. Regular meeting of the TWGCCCH led by the PMD are intended to build ownership of the climate change actions by relevant agencies and to ensure the integration of NCCAPPH into the annual planning and budgeting process and the programme-based budgeting of MOH.

The integration of climate change actions in the budget programme may require Cost-Benefit Analysis (CBA) of the interventions to generate evidence for the budget negotiation with the MEF.

The short-fall fund for implementation will be discussed with the development partners (DP) in regular meetings between Health-TWG and DP, and Climate Change-TWG and DP. Bilateral partners and UN Agencies are important to assist the MOH in mobilizing resources.

The MOH will seek the support from the National Implementing Entities (NIE) and the Multilateral Implementing Entity under GCF to develop projects or programmes to implement the unfunded actions. As of now, there are two government agencies—NCDDS and GSSD, applying to be NIE under GCF.

Monitoring and Evaluation

Indicator Framework

The M&E framework of the NCCAPPH follows the Monitoring and Evaluation Framework for Health Adaptation in Cambodia [37], aligned with the national climate change M&E framework [38] developed by the Department of Climate Change (of NCSD) with technical support from the IIED, UK. The Monitoring and Evaluation Framework for Health Adaptation in Cambodia was updated by MOH in collaboration with WHO under a research project called “Vulnerability and Impact Research Targeting Usability and Effectiveness (VIRTUE)” carried out in 2017 with funding from Cambodia Climate Change Alliance [37]. The updated indicator framework focuses on the ownership, sustainability and capacity building of the MOH to continuously tracking long-term trends related to the impacts of climate change on health. Since the health risks of climate change are not new, the indicators are based on data that are or could be collected. This framework outlines four indicator categories:

- Health vulnerability and exposure
- Burden of climate sensitive health outcomes
- Health adaptation and resilience

Impact Indicators

Table below presents the impact indicators.

	Indicator	Definition	Data Source
Health vulnerability and exposure	Percentage of communes' health that are vulnerable to climate change	Vulnerability index score calculated yearly	Vulnerability index for health risks of climate change
Health adaptation and resilience	Percentage of budget in health sector responding to climate change	Total climate change expenditure by MOH (from donors and national budget) in percentage of total national climate change expenditure	Climate Public Expenditure Review conducted by MEF and GSSD
Burden of climate sensitive health outcomes	Incidence of dengue fever	Incidence of dengue fever per 100,000 population per month, stratified by province	MOH; NDCP/CNM; DPHI; MOWRAM
	Incidence of malaria	Incidence of malaria fever per 100,000 population per month, stratified by province	MOH; NDCP/CNM; DPHI; MOWRAM
	Association of diarrhoea with weather data (modelled) (time-series analysis)	Changes in slope of association of diarrhoeal disease and mean precipitation and temperature per 1000 population per month	MoH, CDC CamEWARN; DPHI MoWRAM

Result Indicators

The result indicators are listed in the Table 2: Action Matrix.

[Law and Regulation to Support the Implementation](#)

In Cambodia, several key policies, legislations and regulations have been developed and amended to govern the public health and professional health practitioners, serving as a backbone to support the implementation of this action plan. In addition, to effective implementation of actions, there is a need to amend the Decision (Sechkdei Samrech) on the establishment of technical working group on climate change and health on 09 July 2015 [34]. The amendment has to cover the purpose, composition, duties and modus operandi of the TWGCCH. The Department of Preventive Medicine shall draft the amendment in 2019 and get the approval from the Minister of Health before 2020.

Box: Proposed amendment to the Decision (Sechkdei Samrech) on the establishment of technical working group on climate change and health dated on 09 July 2015

Article 1: Purpose of the technical working group on climate change and health to facilitate and coordinate the health sectoral responses to climate change and provide advisory support on the climate change and health to the policy makers in the MOH.

Article 2: Composition of the TWGCCH shall lead by the Department of Preventive Medicine, and have representatives from

- 1) Department of Planning and Health Information,
- 2) Department of Communicable Disease Control,
- 3) Department of Hospital Services,
- 4) Department of Drug, Food and Medical Equipment,
- 5) National Centre for Parasitology Entomology and Malaria Control, and
- 6) Other relevant national centres and programmes under MOH.

Article 3: Key duties shall include:

- 1) Lead the coordination to support the implementation of and report on CCHNAP,
- 2) Prepare relevant policy documents on climate change and health,
- 3) Mainstream climate change into the planning and budgeting process of MOH,
- 4) Provide technical and advisory support to MOH on climate change and health
- 5) Facilitate and coordinate the health sectoral responses to climate change;
- 6) Advocate the climate-health related challenges in the higher national policy agenda; and
- 7) Promote information, knowledge and data sharing inter- and intra-MOH to support the implementation, monitoring and reporting on the CC-H interventions.

Article 4: TWGCCH shall have at least two meetings per year.

Conclusion

This action plan consists of the continuous long-term planning and builds on the exiting efforts to address the climate change and health impacts in Cambodia. The selected actions are primarily built on actions prioritized in the previous national climate change action plan for public health and the National Action Plan for Climate Change Adaptation and Disaster Risk Reduction (not yet approved at time of writing this document). The actions also align with the existing projects on climate change and health being implemented by MOH. In addition, this document is contributing to the implementation of Health Strategic Plan 3, Cambodia Climate Change Strategic Plan 2014-2023, and National Strategic Plan for Climate Change Adaptation and Disaster Risk Reduction in Health Sector (update to the National Climate Change Strategic Plan for Public Health).

This action plan is in line with the vision of WHO Western Pacific Region toward the healthiest and safest region, in particular addressing the climate change and health challenges and specifically for monitoring the health impacts of climate and environmental change on health, ensuring the resilience of health sector, and addressing the identified gaps for further advocating the health impacts of climate change to higher policy level.

The full implementation of the action plan will level-up the capacity of the MOH to address climate change issues for the public health of Cambodia. The institutional capacity will be improved in coordination, monitoring and resource mobilization for implementation of the actions. In turn, the success of action plan relies on an effective coordination of the TWGCCH in building staff capacity, research, knowledge management, and implementation of intervention. The role of TWGCCH is critical not only during the development, but also more importantly during the implementation of the action plan.

MOH believes that relevant government agencies, development partners and NGOs will support the measures identified in this document and together implement the actions in a timely and effective response, contributing to the reduction of the morbidity, mortality, injuries, and other health vulnerabilities related to climate change impacts and disaster risks in Cambodia.

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ANNEX: Detail of Actions

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
Output I: Better governance, coordination, and partnership for climate change adaptation and disaster risk reduction in the health sector.									
1.1 Mainstreaming climate change adaptation and disaster risk management in MOH sector planning and budgeting. • Conduct cost-benefit analyses and evidence-based studies to generate evidences to advocate for planning and budgeting • Prepare and disseminate advocacy materials (i.e. brochure of CBA, case studies, policy leaflets) to MOH’s high-level decision makers, MEF, and other stakeholders • Work with planning and budgeting department to integrate action on CC and DRR in planning and budgeting, and annual operation plan.	• Number of CBA and evidence-based studies conducted to support the mainstreaming CCA and DRR in planning and budgeting • Number and types of advocacy materials on the relationship between Climate Change and health developed and utilized • Number of health sector policies/ strategies/ programs that incorporated the health issues in relation to climate change and DRR. • Percentage of the national health budget for climate change adaptation and DRR	TWGCCH, And relevant stakeholders, PMD, DPHI	ADB, WB, WHO, UNDP, GIZ, etc. MEF NCS (MOE)	x	x	x	x	x	1000
1.5 Improving coordination within MOH, with MOH’s provincial department of Health and Healthcare centres/hospital, and with other key sectors to ensure coherence in response to climate change related health impacts and disaster risks. • Update the Decision (Sechkdei	• Approved the Decision (Sechkei Samrech) on TWG on CC and Health • Number of collaboration mechanism for CC&H and DRR established with relevant government agencies and with designated focal points for specific programme of action and budget allocated.	TWGCCH	WHO-UNDP: GEF project, etc. ADB, WB, GCF NCS	x	x	x	x	x	1000

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
Samrech) on TWG on CC and Health, and get approval from minister of health⁷ - Establish a joint multisectoral working group for information exchanges and joint actions to address health impacts of climate change disaster risks - Establish coordination mechanism between health care staff and provincial committee for disaster management to better address climate change related impacts and disaster risks	Joint multisectoral risk management approaches to health risks related to disasters, water, waste, food and air pollution (e.g. food safety, diarrhoeal disease control, integrated vector management, joined up risk communication) undertaken.								
1.6 Promote public and private partnerships to support implementation of climate change adaptation and disaster risk reduction. - Prepare a roadmap to engage private sector and their contributions in addressing CC impacts on health sector - Sensitize and orient the private health care providers and facilities in preparedness and vulnerability reduction measures	- Roadmap to engage private sector to address climate change risk in public health - Number of PPP established to support implementation of climate change adaptation and disaster risk reduction.	Department of international cooperation and ASEAN TWGCCH	UNDP, GIZ, WB, ADB, WHO, etc.		x	x	x		100

⁷ An Update of TWG on CC and Health has taken place within the framework of GEF Project

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
Output II: Strengthened institutional capacity and skills of medical personnel and relevant stakeholders to effectively plan and implement climate change adaptation and disaster risk reduction in the health sector									
2.1 Assessing the capacity need of health staff (national and sub-national) through working with existing academia (i.e. NIPH), relevant government agencies and WHO aiming to update the health technical guidelines and implementation practices	Number of technical guideline and implementation practices updated to include the capacity need of national and sub-national health staff to effectively address climate change and DRR.	TWGCCH	WHO, ADB, etc.		X	X	X	X	200
2.2 Incorporate climate change related health impact into academic programmes for public health and medical and to the curriculum of general education	- Climate change and health is integrated in the university programme for public health and medical school - Climate change and health is integrated in the curriculum of general education	TWGCCH	WHO-UNDP: GEF project, etc. MOEYS RUPP UHS NIPH	x	x	x	x		500
2.3 Building capacity of national and sub-national levels for improving programs and system performance to better cope with climate change and disaster risks. Develop training materials and train health staff and relevant stakeholders at different levels on climate change, public health and disaster risks	- Number of training materials developed - Percentage of health staff with awareness of CC impacts in health and the potential for vulnerability assessments, interventions, and the use of climate data for early warning, surveillance and planning. - Percentage of health staff with capacity to detect and respond to climate stress.	TWGCCH	WHO,						2000

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
2.4 Developing early warning systems and preparedness plans on potential health effects of climate change, upcoming disasters and health related risks. - Integration of climate data in Dengue Early Warning System (advocated by the WHO TDR) - Linking the Early Warning System of MOWRAM to the MOH Early Warning System (CamEWARN) for disaster related health emergencies	Functional alert system for early warning regarding the quality of the ambient air, water, extreme events such as, drought, landslides, floods etc, epidemic preparedness to protect health	TWGCCH DPHI, CNM, CDC	WHO-UNDP: GEF project, etc. UNDP MOWRAM NCDM	X	X	X	X	X	1000
Output III: Strengthened research, surveillance and vulnerability assessment capacity to guide decision making for adaptation to climate change impacts and disaster risks.									
3.1 Conducting research and implementing surveillance plans on key climate related diseases and health risks at national and sub-national levels, especially in the high climate risk areas. - Strengthen vector surveillance and control programmes	- Number and types of researches and surveillance conducted - Changes in or scale up of diseases control programmes especially in the high climate risk areas	TWGCCH NIPH UHS HCF	WHO-UNDP: GEF project, etc. ADB, GCF, WB, GIZ, Etc		x	x	x	x	2000
3.2 Conducting health vulnerability assessment and developing composite health climate vulnerability indices Epidemiological studies of daily mortality and	- Number of health vulnerability assessment completed at national and sub-national levels - Plans developed and implemented based on the results of assessment	TWGCCH	WHO, ADB, Etc.		x	x	x	x	500

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
morbidity in relation to weather variables	Availability and recently update of composite health climate vulnerability indices								
3.3 Assessing the resilience and adaptive capacity of healthcare facilities to climate risks and maps the vulnerability of healthcare facilities	- Number of HCF assessed per province - Maps of vulnerable HCF produced	PMD, NCSD, HSD	ADB, WHO-UNDP: GEF project, etc.	x	x	x	x	x	1000
Output IV: Knowledge sharing, awareness, and web-based information management systems related to health vulnerabilities associated with climate change and disaster risks									
4.1 Improving health database systems and web-based management information systems by incorporating climate change variables, disaggregated gender data and health climate indicators.	Updating Health Database with inclusion of climate change variables and associated diseases;	TWGCCH	WHO, ADB WHO-UNDP: GEF project, etc.	X	X	X	X	X	200
4.2 Developing knowledge products relating to climate impacts, health implications, vulnerability assessment and successful responses to CCA and DRR in the health sector.	Types and number of knowledge products to raise awareness of health and climate change and response options targeting key audiences such as health professionals, communities, media and other sectors developed and utilized	TWGCCH NCDM	WHO, ADB, WHO-UNDP: GEF project, etc.	X	X	X	X	X	500
4.3 Promoting awareness among communities and healthcare	Number and types of awareness raising materials developed and	TWGCCH	WHO-UNDP: GEF project,		X	X	X	X	1000

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
personnel on possible health implications, prevention and treatment of climate related diseases.	utilized on possible health implications, prevention and treatment of climate related diseases. - Percentage of healthcare personnel with information and training to address climate change and health links, appropriate to their role and function - Percentage of community members (men, women, boys, girls and indigenous people) reached through awareness raising activities		GCF, WB, ADB etc. HCF: Healthcare facilities PHD MRD, MOWA, NCDM						
Output V: Enhanced resilience of the existing health service delivery system to respond to and cope with the impacts of climate change and disaster risks.									
5.1 Improving healthcare coverage with adequate medical staffing, stock of medicines and treatment guidelines in climate health sensitive areas, especially at the sub-national levels.	- Percentage of HCFs with adequate medical staffing and stock of medicine - Percentage of HCFs following treatment guidelines in climate health sensitive areas	TWGCCH	WHO, ADB, WB, GIZ, etc. MEF China Aid	x	x	x	x	x	(tbc)
5.2 Promoting climate and disaster proofing of healthcare infrastructure and facilities at national and sub-national levels. Integrating climate change consideration in the design of the HCF construction and operation guideline	- Percentage of healthcare facilities incorporating climate Change and DRR in siting, construction, technologies and procedures to ensure provision of basic services (including energy, water and sanitation). - Percentage of HCFs that meet the criteria of climate appropriate and	TWGCCH	WHO, ADB, WB, GIZ, GCF Unicef, etc. WHO-UNDP: GEF project, etc. MEF, MRD China Aid		x	x	x	x	(tbc)

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
	resilient to local current and expected disasters Percentage of HCFs with access to energy and functional WASH services and practices that enable essential, quality health services for everyone								
5.3 Promoting interventions at community to reduce health risks associated with foodborne, waterborne and vector-borne disease - Awareness campaigns at the local communities on the health risk associated with foodborne, waterborne and vector-borne disease (linking to Action 4.3) - Provision of climate resilient water, sanitation and hygiene infrastructure in HCF in vulnerable setting	Number of interventions implemented at the community	TWGCCH	WHO, Unicef, ADB, WB, GIZ, etc. MRD		x	x	x	x	5000
Output VI: Effective financing mechanisms and a M&E framework for climate change adaptation and disaster risk reduction									
6.3 Establishing a viable financial and mechanism for implementation of health adaptation /DRR plans.	- Percentage of budget allocated to increase resilience to climate change and DRR in national and/or subnational health investment plans. - Number of Projects / Programmes on building health system resilience submitted to and granted by the main international climate change funds (e.g. the GCF, GEF, Adaptation Fund, bilateral donors).	TWGCCH	WHO, UNDP, UNFPA, ADB, GEF, etc. NCSD-CCCA		x	x	x	x	200

Activity Cluster	Indicator	Responsibility	Partners	Year					Total Cost (USD 000)
				2019	2020	2021	2022	2023	
6.4 Developing M&E framework for tracking effectiveness and efficiency of climate change adaptation and disaster risk reduction in the health sector. - Develop tools for M&E framework - Operate M&E frame - Field data collections - Produce annual report and MTR - Design an M&E framework for assessing the climate sensitive morbidity and mortalities rate.	- Number of climate sensitive diseases for which there are monitoring systems that are able to forecast and monitor risks and/or to monitor disease risks posed by climate change and disaster risks - Indicators on climate change impacts, vulnerability, response capacity and emergency preparedness capacity included in relevant monitoring systems at national level and reported over time. - Essential baselines for monitoring the implementation of actions in the H-NAP 2019-2023	TWGCCH	WHO, WHO-UNDP: GEF project, etc.		x	x	x	x	400