



Lao People Democratic Republic
Peace Independence Democracy Unity Prosperity

Ministry of Health

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Part 1

Introduction

The scientists have certified that the global climate conditions have been changed and trends were complicated, which observe from the increasing of the average temperature and frequently severe natural disaster e.g. storms, flooding and drought¹.

The climate change leads to changes in ecosystems that affect the livelihood and health of humans. Climate factors are an important factor in the transmission of many types of diseases like vector borne diseases, enteric diseases, and water borne diseases. Climate change affects people's health both directly and indirectly.

People are directly affected by climate change such as temperature, rainfall, rising seawater and increasing frequency of severe weather. The indirect part is the change in water, air and food quality and changes in ecosystem, agriculture and industry, settlement and economy. Direct and indirect contact can cause illness, disability, and death.

Health issues increased the weakness and reduced the strength of individuals and groups of people to adapt to climate change. The occurred evidence of climate change on human health (IPCC 2007) showed that climate change has changed the disease vectors, infectious diseases, changed the distribution of some pollens that caused some allergies and increased heat waves that associated with deaths. Therefore, there is a need to survive and to cope with the uncertainties of the effects of climate change without any other options.

In recent years, Lao PDR is one of several countries facing climate change issues that have an impact on overall health. The phenomenon of climate change, such as floods and droughts, has a high impact on the country's economy, including the health of the people².

Part 2

Climate Change Condition and Health Impacts

2.1 Global climate change

The fourth report of the International Panel on Climate Change in late 2007 stated that global temperatures are projected to increase by 1,1 - 6,4°C by the end of the 21st century if the necessary actions to prevent temperatures from rising are not taken.

For the South-East Asia region, the IPCC AR4 projects similar increases in temperatures, including an increase in annual rainfall in the region by about 7% per year, and increased frequency and intensity of temperature and precipitation extremes. As a consequence of this, it is assumed that climate change will have profound impacts in the following areas:

- **Water resources:** Water availability is projected to decrease by 10- 30% over mid latitudes and in dry tropics. Drought affected areas will likely increase in extent. At the same time, heavy precipitation incidents, also expected to increase in frequency, will augment flood risk.
- **Ecosystem:** The global average temperature exceeding 1.5-2.5 °C would trigger major changes in the various ecosystem structures and functions, with the ecological interaction between species and the distribution of the species, resulting in adverse effects on biodiversity and ecosystems.
- **Crop production:** Expected to decrease when the temperature rises to 1-2 °C, in the lower latitude of the world, particularly in dry areas and seasonally tropical areas.

From the above-mentioned impacts, the poorest countries and communities will be most affected due to geographic area, low incomes, and limited institutional capacity¹.

2.2 Climate Change condition and impacts in Lao PDR.

Refer to the WHO's climate change and health report for Lao PDR in 2015 described that:

2.2.1 Mean annual temperature

Under a high emissions scenario, mean annual temperature is projected to rise by about 4.6°C on average from 1990 to 2100. If emissions decrease rapidly, the temperature rise is limited to about 1.4°C. It is expected that the annual average temperature will be increase more in the southern part⁴.

2.2.2 Heat wave

Under a high emissions scenario, the number of days of warm spell is projected to increase from less than 10 days in 1990 to about 170 days on average in 2100. The heat-related deaths in the elderly (65+ years) are projected to increase to about 72 deaths per 100,000 by 2080 compared to the estimated baseline of about 3 deaths per 100,000 annually between 1961 and 1990. If emissions decrease rapidly, the days of warm spell are limited to about 50 on average. A rapid reduction in emissions could limit heat-related deaths in the elderly to about 15 deaths per 100,000 in 2080³. Heat waves also affect health problems causing illness, especially those with chronic respiratory and cardiovascular diseases. Children, elders, workers who working outdoor and people who have chronic diseases are among the most vulnerable groups in the heat wave⁴.

2.2.3 Health impact from extreme weather

Climate change is expected to increase the risk and severity of droughts and floods in Lao PDR. With pre-existing vulnerabilities like malnutrition and poor health care services, and a low level of adaptive capacity, Lao PDR is at high risk of the adverse health impacts of floods and droughts⁴.

2.2.3.1 Flooding

From 1966 to 2009, Lao PDR experienced 36 floods per year on average. Under a high emissions scenario, the number of days with very heavy precipitation (20 mm or more) could increase by about 8 days on average from 1990 to 2100, increasing the risk of floods. If emissions decrease rapidly, the risk is much reduced³. The climate change is also the major cause of the increasing the annual average precipitation in rainy season which associated to the increasing of flooding include longer dry season⁴.

It has been projected that by 2030, an additional 40,400 people may be at risk of floods, due to increases in flood area as a result of climate change (1). Provinces where many of the districts are expected to be at very high risk of flood include Savannakhet and Luangprabang. Other provinces with districts at very high risk of flood include Huaphanh, Khammuane, Luangnamtha, Saravane, Sekong and Vientiane provinces⁴.

Floods have direct and indirect effects on health. The direct impacts relate to the floodwater itself and can include drowning, physical trauma, and damage to housing and health care facilities. Indirect impacts of flooding include increases in water-related diseases (such as E. Coli and salmonella which cause diarrheal disease) due to the spread of faecal pathogens in areas with unsafe or insecure water and sanitation systems. In addition, Melioidosis and Leptospirosis are both endemic infections in Lao PDR, and there is an increase in outbreaks seen during the wet season. The risk of these diseases is likely to increase with an increase in flooding. Other effects of floods include an increased risk of skin, soft tissue and respiratory tract infections⁴.

2.2.3.2 Drought

Under a high emissions scenario, the longest dry spell is indicated to increase by about 10 days on average, from about 55 days on average in 1990, with continuing large year-to-year variability. If emissions decrease rapidly, the increase is limited to less than 1.5 days on average³. Droughts threaten safe water supply and compromise sanitation, increasing the risk of water-related diseases. Low crop yields and loss of livestock threaten food security and increase the risk of malnutrition⁴.

2.2.4 Vector borne diseases

Population at risk of malaria is projected to decline towards 2070. However, it is estimated that a low emissions scenario will lead to a great decline in population at risk. By 2070, under a high emissions scenario about 1.9 million people are projected to be at risk of malaria annually, this estimate drops to about 1.6 million annually if there is a rapid reduction in global emissions³.

2.2.4.1 Dengue fever

Increasing temperatures are expanding the geographical area for dengue transmission. Research in Yangon and Singapore showed that humidity and temperature increase in the rainy season leads to favorable conditions for dengue, which is responsible for around 8% of deaths in Lao PDR and still being the key issue of the public health.

In recent years there have been serious epidemics of dengue; in 2006 the rate of dengue infections was 96.9 per 100,000 people. In 2010, Lao PDR had the highest notification rate

of dengue in the Western Pacific region with 22,890 cases reported. In 2013 there were 44,171 recorded cases of dengue and 95 deaths.

Dengue transmission occurs mostly during the wet season between May and October. Usually, provinces with large cities and urban populations report the largest number of cases, however by 2009 there were reports of higher cases in rural areas of Lao PDR.

Climate change-related increases in temperature and precipitation in an area can substantially increase the transmission of dengue. Just a 1 degree Celsius increase in the average mean temperature can lead to an increase to the number of dengue cases worldwide⁴.

The studies found that, dengue cases are high in rainy season but the disease transmission has changed according to the region and there is significant associated with the average temperature, raining and humidity at National level, Northern and Middle Regional levels².

2.2.4.2 Malaria

The epidemiological profile published by the WHO in 2014 on malaria in Lao PDR describes the following statistics: 31% of the population live in a high transmission area, with more than 1 case per 1000 population; 61% live in a low transmission area with 0-1 cases per 1000; and 7% of the population was classified to be in a malaria-free zone. The two major malaria parasite species reported were *P. falciparum* and *P. vivax* representing 62% and 38% of the reported cases, respectively.

Due to the current intervention policies and strategies that are being used in Lao PDR, the population at risk of malaria is projected to decline towards 2070. However, malaria remains a leading cause of morbidity and mortality in the Laotian population. Currently 70% of the population are listed as at risk of malaria.

2.2.4.3 Other diseases

Other mosquito-borne diseases that may pose an increasing risk in Lao PDR due to climate change include Zika virus and Chikungunya including Japanese Encephalitis.

2.2.5 Malnutrition

In Lao PDR, the malnutrition is a primary health problem. In 2012, the prevalence of stunting, underweight and wasting of children under age 5 was 43.8%, 26.5% and 6.4%, respectively. Climate change, through higher temperatures, land and water scarcity, flooding, drought and displacement, negatively impacts agricultural production and causes breakdown in food systems. These disproportionately affect those most vulnerable people at risk to hunger and can lead to food insecurity. Vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme climate events. Moreover, the study stated that people affected by the typhoon were significantly more likely to be affected by acute malnutrition.

2.2.6 Water borne diseases

Extreme weather events and climate change have been identified as two of the major drivers of water-borne disease. Globally diarrhea is a leading cause of death following natural disasters particularly affects children under the age of 5.

In Lao PDR a combination of poor sanitation practices along with a projected increase in cycles of rainfall and drought are expected to increase the risk of diarrheal disease.

The health vulnerability assessment performed by the Department of Hygiene and Health promotion and WHO in Lao PDR in 2010 found rates of severe diarrhea were greatest during the dry season, while rates of food poisoning and typhoid fever peaked in the rainy

season. The risk of these conditions is expected to increase in Lao PDR due to climate change⁴.

The research also found that dysentery incidence was associated with mean temperature at the national level and in the northern and central regions. Hepatitis incidence was associated with humidity in the northern region only. A positive association between mean temperature, humidity and rainfall and typhoid incidence was demonstrated, except in the southern area at the national level, northern and central regions, but in the southern part, there are no interrelations².

2.2.7 Parasites

In Lao PDR nearly 50% of the population are at risk of helminth infections (10). As of 2012, only 59% of those who are at risk were reported to have received treatment.

Soil transmitted helminthiases (STHs) are prevalent in the poorest of countries. Children bear the highest burdens of these diseases which result in malnutrition, growth wasting and stunting. A number of studies indicate a high prevalence of intestinal helminths in Lao PDR. Between 2000-2002 the prevalence of helminth infections in schoolchildren aged 6-11 was 61.9%; by 2007-2011 this number had risen to 71.9%. In total, 10 million people in Lao PDR and neighboring Thailand are infected with some form of helminth.

Helminthic infections are currently listed as neglected tropical diseases and include foodborne liver flukes such as *Opisthorchis viverrini*, *Opisthorchis felinus* and *Clonorchis sinensis*. These diseases commonly affect those living in rural communities and those in low socioeconomic settings. One of the reasons behind the high prevalence of these infections in Lao PDR is the traditional consumption of raw fish. These fish become hosts to liver flukes, especially near the Mekong river basin⁴.

Research on liver flukes has found an association between the production of cercariae and rising temperatures. Other helminth infections that are found in Lao PDR include schistosomiasis, trichinella and lymphatic filariasis.

2.2.8 Mother and child health

Climate change is one of the biggest barriers to reaching the Sustainable Development Goals for improving maternal health. Extreme weather events also reduce access to safe drinking water which can lead to outbreaks of diarrheal diseases. Dehydration due to maternal diarrhea can undermine neonatal health.

Lao PDR has the highest estimated maternal mortality rates in Southeast Asia. In 2015, maternal mortality is 206 per 100,000 live births. Illnesses like malaria, dengue fever and schistosomiasis, all of which are endemic to Lao PDR, have a direct impact on maternal health, and are expected to increase due to climate change. A study of fever in pregnant Laotian women found that certain infectious diseases were more common or severe in pregnancy, including diseases that are sensitive to weather and climate, such as *P. falciparum* which causes malaria, *Listeria monocytogenes*, Hepatitis E virus (HEV), and the influenza virus (49). In pregnant women, *P. falciparum* and *P. vivax* malarial infections are associated with adverse outcomes such as maternal death, premature birth and low birthweight. In endemic areas, like Lao PDR, maternal malaria infection can lead to low birth weight, placental malaria and severe malarial anemia.

2.2.9 Respiratory diseases

Respiratory conditions are likely to be exacerbated by rising temperatures due to climate change. Moreover, field studies around the world, including Asia, have shown that allergens from pollens increase with higher atmospheric carbon dioxide (CO₂) concentrations. This increase in pollen concentrations is associated with higher presentations to hospital for

asthma and allergic rhinitis. During episodes of drought, dry conditions are associated with higher levels of dust, pollen and other particulates such as fungal spores in the air, which increase the risk of asthma and acute respiratory infections.

The main cause of hospital mortality reported in Lao PDR between 2010-2011 was acute respiratory infection (ARI), with 49% of these cases occurring in children under the age of five. Pneumonia is the most common post-neonatal cause of death among children under 5 years, accounting for 29% of deaths. In Lao PDR, 03 key factors that causes disease are indoor air pollution, smoking and food hazards.

In Lao PDR the etiology of respiratory infections is poorly documented; however, rhinovirus and human respiratory syncytial virus (HRSV) are the most frequently identified causes of acute respiratory infection.

Studies have reported that those living in damp indoor environments can experience an increase in asthma, coughing, wheezing, pneumonia and other respiratory conditions. This is problematic as Lao PDR is predicted to experience an increase in flooding that can exacerbate these respiratory conditions. Flooding not only increases the levels of mould and fungal growth in flooded areas, but can also limit access to crucial support such as health care providers and supplies.

2.2.10 Mental illness

Climate change also has significant direct and indirect effects on mental health. Direct impacts can include post-traumatic stress disorder (PTSD) following extreme weather events, while indirect impacts of climate change can come about through displacement, loss of income, community disruption, physical illness and loss of homes. Studies have shown that heat waves are associated with an increased rate of hospital admissions for mental health disorders. It has also been shown that occupational heat stress can cause psychological distress among workers. Individuals who have experienced a climate related disaster are at a greater risk of PTSD and depression. Depression is predicted to be more pronounced in those living in rural communities.

The study also found the high association between crop failures due to droughts and suicide in farmers. Crop failures impact farmers' livelihoods and the communal economy. Prolonged droughts can also lead to displacement as individuals and families search for better opportunities.

The majority of Lao PDR workers are employed in agriculture, which exposes them to occupational heat stress, and which may increase the risk of mental health problems. Long periods of drought in agricultural societies directly impacts the economy, which can negatively affect a community and reduce the ability to seek healthcare due to costs.

Mental health care services in Lao PDR are extreme limited, with only 2 psychiatrists, 1 neurologist, 8 general practitioners, 5 medical assistants and 21 nurses who form the entire mental health workforce for the country. There is currently little to no epidemiological data on mental health issues in Lao PDR, and the country's health system lacks the capacity to handle the increase in mental health conditions that may arise due to climate change. In addition, drought and flooding also causes more mental illness due to loss of housing, occupation and family resettlement.

2.2.11 Summary of health impacts from climate change in Lao PDR

The review meeting focus on the possible health impacts from climate change in Lao PDR as below:

1. Vector borne diseases: Malaria, Dengue, other disease from mosquito such as Japanese meningitis, chikungunya and zika virus

2. Diseases associated with inadequate water, sanitation and hygiene such as diarrhea and soil-transmitted helminth infections
3. Health impact from extreme weather events
4. Respiratory diseases
5. Noncommunicable diseases
6. Malnutrition and food insecurity
7. Reproductivity and women's health
8. Mental health problems

2.3 The responses to the climate change in Lao PDR

Regarding the meaning and significance of climate change issues, many countries in the world, region and Lao PRD have to pay more attention to the cooperation and mutual support on climate change which covers both aspects of adaptation to climate change and greenhouse gases mitigation. These activities require more attention to national capacity in the planning, implementation of appropriate activities, with broad coordination and coordination¹. Ministries and related departments developed the strategies and plans to prepare, response and restore the challenges from climate changes such as:

1. National Adaptation Program of Action (NAPA), 2009
2. Strategy on Climate Change in Lao PDR, 2010
3. Climate Change Action Plan of Lao PDR, 2013-2020

2.4 Constraints/Challenges related to the climate change adaptation

1. Lacking of information

- Lacking of reliable information on climate change and health impacts to develop the adaptation plan of health sectors e.g. the estimates information of parasite distribution.
- There is no information on impacts from climate change and environment associate the vectors and hosts, social-economic factors including the adaptation of population to the climate change.
- Estimated trends in the distribution of disease in each province, district and village by climate change.
- There is no information on outdoor air pollution.
- There is no information on drought and underground water.
- Population-based data on mortality is not available in Lao PDR due to limitations of civil registration, with the only available mortality data being that obtained from hospital records

2. Limited capacity

- There is limited capacity, knowledge and experience relevant to climate change adaptation at government, health sector and community levels in Lao PDR. This capacity gap likely extends to limited knowledge and experience of the monitoring, surveillance, control, prevention, diagnosis and management of climate-sensitive diseases and associated risk factors.

3. Social-economic factors and adaptation capacities

- High rates of poverty,
- Low levels of education
- High reliance on natural resources for livelihoods
- Limited access to health care and

- Access to clean water and sanitation greatly limit the ability of individuals, households and communities to respond to climate change.

4. The challenges in rural area

- Residents of rural areas in Lao PDR are at the greatest risk of climate change-related health issues such as the lack of access to health services and limited availability of resources, in the northern region, the house construction still not strong, remote and accessibility of road, foods, clean water and sanitation still limited and their daily living still high reliance of the natural resources.

Part 3 Vision, Mission, Goals and Principle Guideline

3.1 Vision:

- People are healthy and strong

3.2 Mission:

- To empower people to take care of their own health, strength, and resilience to climate change with a comprehensive range of disease prevention, treatment and rehabilitation services through a sustainable health care system.

3.3 Goal:

- To promote the capacity of the health sectors and community to prevent and protect the health of people from unstable and changing climate conditions.

3.4 Principle Guideline:

The National Strategic Plan for Adaptation of the Health Sector to Climate Change from 2017 to 2025 consists of six strategic directions that are aligned with the 5th Five-Year National Socio-Economic Development Plan (2016-2020) and towards the successful implementation of the Sustainable Development Goals.

- Any activities should be supported by the partners at national, provincial and local levels.
- Activities should be sustainable and built in an existing framework.
- Based on a combination of knowledge and experience in policy and practice.
- Networks and partners are the best mechanisms to use the limited resources to be the most benefits and provide the equal access to the products at national, provincial and local levels; And facilitating the implementation of the strategies.
- Consultation, coordination and support from state agencies include donors are the significant key successful.
- The distribution of power, planning from bottom to top, should be supported by increasing the local practices.
- Local capacities, communities and disadvantaged groups play an important role in planning, planning and implementation decisions.
- All active activities should be environmentally sustainable.
- Promote and empower gender in all activities at each level and in each sector.

Part 4

Main strategies and Components

The National Strategy for Adaptation to the Public Health Sector for Climate Change has been developed in accordance with the work plan for the World Health Organization's Operational Framework for Building Climate Resilient Health Systems (2015), which consists of 6 strategic directions and 10 components:

- 1. Strategic directions 1: Leadership and Governance**
 - 1.1. Component 1: Leadership and Governance
- 2. Strategic directions 2: Organizational and staff capacities strengthening.**
 - 2.1. Component 2: Organizational and staff capacities strengthening.
- 3. Strategic directions 3: Health information systems**
 - 3.1. Component 3: Vulnerability and adaptation capacity assessment
 - 3.2. Component 4: Integration of risk monitoring and early warning systems.
 - 3.3. Component 5: Health and climate research.
- 4. Strategic directions 4: Climate resilient and sustainable technologies and infrastructure.**
 - 4.1. Component 6: Climate resilient and sustainable technologies and infrastructure.
- 5. Strategic directions 5: Service delivery**
 - 5.1. Component 7: Management of Environmental determinants of health.
 - 5.2. Component 8: Climate informed health programs.
 - 5.3. Component 9: Emergencies preparedness and management
- 6. Strategic directions 6: Climate and health financing.**
 - 6.1. Component 10: Climate and health financing.

Details of each of the components are described below:

4.1 Component 1: Leadership and governance

The strategic direction is to set up the Public Health Adaptation Committees on climate change and identify roles and responsibilities, as well as the coordination mechanisms, from central to local levels, and collaborate with the relevant departments to deal with potentially harmful health risks from climate change.

Objectives:

1. To establish an organization responsible for the adaptation of the health sector to climate change and identify the roles and responsibilities, as well as the coordination mechanism in the Ministry of Health clearly.
2. To ensure that climate change and health have been incorporated into health strategic plans.
3. To strengthen the relationship, cooperate with the sector, concerned departments.
4. To ensure that judgments are carried out within and outside the Ministry of Health in preventing and protecting people's health from climate change.

Main Activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Establish committees, units and national coordinators for the adaptation of health sector to the climate change, from the central to local levels, include defining clear roles and responsibilities of each party. 2. Establish a team with staff and office equipment adequately. 3. Identify the coordination and report mechanism with the related departments and sectors. 4. Hold the meetings with relevant departments and sectors to sign a Memorandum of Understanding between the Ministry of Health and core partners. 5. Review the development project that still not making the health impact assessment reports and implement health impact assessments for the new relevant policies, programs and projects of the relevant sectors. 	<ol style="list-style-type: none"> 1. The National Committee, units and coordinators of the adaptation of the health sector to climate change, from the central to the localities, will be established by the end of 2017 and be active. 2. Units and coordinators have been worked closely with programs that are sensitive to climate change, such as vector borne diseases, waterborne diseases, nutrition, infections, disaster risk reduction, etc. 3. Memorandum of Understanding between Ministry of Health and key partners (Department of Meteorology, Ministry of Water Resources and Environment, Ministry of Agriculture and Forestry, Ministry of Energy and Mines, Ministry of Public Works and Transportation) has been signed. 4. Major development projects, such as dams, mining, roads, agriculture, and the creation of a special economic zone, have been prepared for the Health Impact Assessment and Public Health Plan 	<ol style="list-style-type: none"> 1. The Public Health Sector Adaptation Sub-Program on Climate Change is located in the Ministry of Health's program. 2. Climate change and health lie within the policy / strategy of the relevant sector.

Main Activities	Outputs	Outcomes
6. Attend seminars, seminars and trainings on the global, regional and national levels of climate change and health.	5. The Ministry of Health's Representative attended the Global, Regional and National Climate Change Conference, such as UNFCCC, Conference of the Parties (COP), NAP, national communications to the UNFCCC	

4.2 Component 2: Organizational and staff capacity strengthening

This strategic direction is to strengthen the organization and raising the knowledge, skills and experience of staff at each level to provide adequate knowledge, including adequate staffing to prepare and respond to emergencies, especially in vulnerable communities, ready to respond to climate change by themselves.

Objective:

1. To ensure that health workers have sufficient technical capacity to cope with health risks from climate change.
2. To upgrade the knowledge capacity building of relevant organizations
3. To enhance awareness and communication about climate change and health impacts.

Main activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Training for target staff (within and outside the Ministry of Health) about climate change and health. 2. Develop curriculum on climate change and health at the National University and the University of Health Science. 3. Develop / update technical recommendations on diagnosis, investigation, control, prevention and treatment (dengue, diarrhea, typhoid fever, leptospirosis), injuries and food borne. 4. Develop a communication strategy related to climate change and health (such as preparing, printing and distributing IEC materials, TV and radio broadcasting programs that reflect the effects of climate change and appropriate responses, preventive measures at high / low temperatures, in the event of floods and droughts and other measures to prevent diseases that are susceptible to climate change, attention should be given to disadvantaged groups 	<ol style="list-style-type: none"> 1. Training the target staff on climate change and health has been implemented. 2. Standard working procedures and guidelines for staff who working with the diagnosis, reporting and related investigations to diseases that are sensitive to the climate change are endorsed by relevant parties. 3. Teaching and training courses on climate change and health at the 	<ol style="list-style-type: none"> 1. Knowledge and capacity of health workers has been upgraded adequately to deal with health effects from climate change. 2. People have a good knowledge and understanding of the health problems

Main activities	Outputs	Outcomes
(elderly, children, women, and areas with high vulnerability to epidemics). 5. Develop a gender plan that related to the climate change and health	National University and University of Health Science have been created and endorsed by the Dean of the university and conduct the teaching regularly.	associated with the climate change.

4.3 Component 3: The vulnerability, capacity and adaptation assessment

This component is a range of assessments that will bring the impact of the assessment used to generate evidence on the size and nature of health risk assessments and identify the most vulnerable populations, taking into account the local climate and health conditions.

Objective:

1. To ensure that there is a basic understanding of the health risks caused by climate change and the most vulnerable population in the country.
2. To ensure that basic information on capacity and gaps is collected to analyze and develop an adaptation plans to appropriate climate change.
3. To summarize the basics for the main options for adaptation, including the comparing of the benefits obtained, the efficiency and the potential costs to the high level.

Main activities	Outputs	Outcomes
1. Identify the most vulnerable communities of fluctuations and changes in climatic conditions, climate and related health risks by existing data. 2. Assess the capacity of the health system to cope with health risks from climate change and make plans to undertake appropriate activities (such as diagnosis and treatment capabilities, clinics, etc.)	1. Basic rates and health conditions that are sensitive to climatic conditions and continuous monitoring of risk factors and health conditions have been assessed. 2. Most vulnerable groups and areas of health risk from climate change are identified. 3. Health impact assessments for health sector policy and adaptation programs and	1. The vulnerable community has been identified in the list, prioritized and created as a map using GIS.

Main activities	Outputs	Outcomes
<p>3. Hold a meeting with the Environmental and Social Impact Assessment Department and other relevant departments regarding the integration of health impact assessments into all development projects.</p> <p>4. Assess the health structure at all levels (especially disasters area) to respond to diseases that are susceptible to climatic conditions (dengue, diarrhea, typhoid fever, leptospirosis)</p> <p>5. Carry out after a severe weather event / assess damage caused by disasters and disseminate peasants for affected people, considering their susceptibility to climate conditions and mental illness.</p> <p>6. Develop project proposals and recommendations and strategies for adapting to identified defects.</p> <p>7. Analyze climatic conditions, diseases and other relevant information / parameters (eg, exposure, adaptation capacity).</p> <p>8. Develop community capacity by creating activities with adaptive measures in vulnerable communities.</p>	<p>reducing health impacts of the related sector have been implemented.</p> <p>4. Fundamentals of existing resources and the ability to provide health and technical services are identified, including outstanding issues.</p> <p>5. Recommendations on how to deal with outstanding issues, including the capacity of the health system, has been upgraded.</p> <p>6. The outcomes of the assessment are used to identify priorities for resource allocation and effective implementation in the health sector and other relevant sectors for vulnerable areas and disadvantaged groups.</p> <p>7. Plans and mechanisms have been created for a review of adaptive and defective options.</p>	<p>2. The disadvantage of the health system towards climate change is set out in the list and has been developed as a map.</p> <p>3. Proposals and plans for adaptation will be ready for implementation.</p> <p>4. Vulnerable communities in the map have the ability to adapt.</p> <p>5. Diseases that are susceptible to climate change have dropped.</p>

4.4 Component 4: The integration of risk monitoring and early warning system

This component means that the overview creation of health risks with clear and credible information, which can be used to design a pre-warning system to predict and warn health workers and the public that emergencies occur rapidly, such as severe weather or epidemics associated with the expected climate.

Objective:

1. To collect, analyze and translate information on environmental risks that are susceptible to climate change and the continuing trends of epidemics in response to timely risk.
2. To compile and disseminate information on the effects of climate change, vulnerability, responsiveness and ability to prepare emergency situations.
3. To communicate a warning system to public health directors, journalists and publics in timely manner to ensure that appropriate measures are taken to prevent health effects from climate change.
4. To strengthen the information system in detecting diseases and climate extremes quickly and correcting the problem.

Main activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Collect and analyze data of some key variables (such as extreme temperatures, rainfall, humidity, illness and death from diseases that are sensitive to climate change) that are related to communicable diseases, insects, and other hazards. 2. Create and test website reporting system for the symptoms, laboratory and environmental-health aspects of diseases that are sensitive to the climatic conditions. 3. Provide strong support for disease surveillance, reporting, monitoring and control activity and mitigation of vector and rodent borne diseases. 4. Follow the early warning systems by using mosquitos and weather forecast data 	<ol style="list-style-type: none"> 1. Risks associated with changing climatic conditions and continuing health effects have been continuously monitored. 2. Improving the health system's ability to prevent and mitigate the effects has been continuously carried out. 3. Interpretation of the data analyzed is regularly reported for decision making. 	<ol style="list-style-type: none"> 1. The information system for detecting diseases and quick climatic conditions risks and early resolution of problem is strengthened. 2. Monitoring and Evaluation guideline has been established. 3. Early warning system pilot projects based on climatic conditions for the outbreak of dengue fever were conducted. 4. Vector borne disease associated with climatic conditions are controlled.

4.5 Component 5: Health and climate research

This component is the basis of the resilience to climate change, which requires basic research and the use of research results to determine if the local environment may be affected by climate change and to understand local problem solving and local capacities as well as evidence based on evidence.

Objective:

1. To promote the use of surveillance data to understand the vulnerability of human health to climate change.
2. To ensure that research involving a variety of climate change and health change sectors is identified and endorsed by the Partnership and Adaptation Committee of the Public Health Sector with regard to climate change.
3. To ensure that policy makers and health care managers use the results of research on climate change and health for decision-making.

Main activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Hold a meeting with all relevant parties to create a national research. 2. Conduct research with a wide range of stakeholders to study the sensitivity of factors that affecting to health, such as water, sanitation and hygiene, food, vector borne diseases, non-communicable diseases, nutrition as well as social-mental illnesses caused by climate change. 3. Explore co-operation in research on the involvement of multiple sectors in order to create existing financial resources and create opportunities for training. 	<ol style="list-style-type: none"> 1. A national study on climate change and health was created by organizing meetings with partners from the Ministry of Health and relevant ministries, research institutes, non-governmental organizations, the private sector and disadvantaged groups. 2. Information on meteorology, data and information that affects health has been accessed and linked. 3. Multi-sectoral research studies, knowledge management network and list of Experts Created. 4. Financial support mechanisms for supporting research projects and post-training programs have been created. 	<ol style="list-style-type: none"> 1. Information on the vulnerability of factors that impact to health, such as water, sanitation and hygiene, food, vector borne diseases, non-communicable diseases, nutrition as well as mental and social illnesses caused by climate changes aspects are based on the evidence from research studies for decision-making of policy maker. 2. The research project gets the financial support including post-graduate training programs.

4.6 Component 6: The resilience to climate change and the sustainability of technology and infrastructures

This component states that in establishing a health system that is resilient to climate change, it is imperative to provide protection and treatment products, such as vaccines for diseases that are susceptible to climate change, provide services and provide basic infrastructure that is resilient to climate change, provide new technology and directions to effective solutions to mitigate the vulnerability of climate change within and outside the health sector.

Objective:

1. To revise existing infrastructure, technology and processes
2. To promote new technologies
3. To sustain the performance of health works

Main activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Regularly maintain public health facilities, install or upgrade to ensure clean water, electricity, communications, equipment, and medicine. 2. Use new technologies such as eHealth or satellite imagery to improve the efficiency of the public health system. 3. New public health facilities will be located in areas with no risk of climate change and access. 4. Explore opportunities to develop green health facilities, hospitals, safe and modern. 	<ol style="list-style-type: none"> 1. Standard Operating Procedures (SOPs) for specific location selection, construction of public health facilities, electricity, water and sanitation facilities have been developed to meet the expected climatic risk risks. 2. Proposals for the development of green health facilities, hospitals, safe and modern are progressing. 3. New technologies, such as eHealth or satellite imagery, have been widely used to improve the efficiency of the health system. 	<p>The list of reserve water resources, electricity, communications, equipment and medicines has been created.</p>

4.7 Component 7: Management of Environmental determinants of health.

This component indicates that the impact of climate change on health increases the illness and mortality associated with the environment. The primary health care, including action to improve health and environmental impacts, should begin with reviewing and improving the legislation, policies, measures and standards of all relevant sectors.

Objective:

1. To enhance health protection through the involvement of many sectors, including health care, in the policies of all relevant sectors, such as water resources and environment, labor health management, energy and mining, public transport and transport, industry and trade, agriculture and forestry.
2. To ensure that there is a consistent follow-up of several sectors of environmental risk by using legislation, standards and health risk management.
3. To enhance coordination, coordination with multiple sectors, including exchange of information to manage environmental risk factors for health.

Main activities	Outputs	Outcomes
<ol style="list-style-type: none">1. Cooperate with multiple agencies to strengthen joint monitoring with multiple sectors, including mechanisms.2. Organize meetings with relevant ministries and departments regarding the review and improvement of legislation related to air quality, water quality, food quality, housing security, waste management, urban development.3. Organize meetings with relevant ministries, departments and agencies on the promotion and use of health impact assessment policy and guideline in critical development projects such as dam projects, mining projects, road and rail construction projects, industry and trade projects, agriculture and forestry projects, hospital construction projects.	<ol style="list-style-type: none">1. Integrated monitoring systems that can be collect and analyze information on environmental hazards, socio-economic factors and health outcomes have been created.2. Environmental legislation affecting health (air quality, water quality, food quality, housing security, waste management) has been revised and enforced to reflect the broadly changing climatic conditions.3. Health assessments of relevant sectors such as energy and mining, industry, agriculture and transport have been carried out.	<ol style="list-style-type: none">1. The effects of environmental factors on health before, during and after the incident occurrences of severe weather conditions were monitored and controlled, taking into account the risk of climatic conditions.

4.8 Component 8: Climate informed health programs.

This component explains that in addition to work with relevant departments, the health sector is directly responsible for programs or projects related to health risks from climate change, such as vector borne diseases, waterborne diseases, malnutrition, etc.

Objective:

1. To strengthen coordination and reporting related to susceptible sources of diseases and risks sustainable to climate extremes in order to create effective and timely actions.
2. To introduce and develop laboratory and diagnosis to improve the treatment of infections caused by environmental factors.

Main activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Using the information from monitoring, epidemiological surveillance and environmental monitoring surveillance of health impacts, pre-events, during and after events occurrence of severe weather conditions in the identified risk areas for monitoring with many sectors that concerned to the environmental risk which is sustainable to climate conditions. 2. Use the information from Component 4 to develop a plan and an adaptation measure. <ol style="list-style-type: none"> 2.1. Develop a water, sanitation and hygiene plans for vulnerable communities and implement. 2.2. Develop a dengue control plan in vulnerable community and implement. 2.3. Develop a non-communicable disease plan in vulnerable community and implement. 2.4. Develop a nutritional plan in vulnerable community and implement. 2.5. Develop women's health, reproductive health and child health plans in a vulnerable community and implement. 2.6. Develop neglected tropical diseases in vulnerable community and implement. 2.7. Developing mental health plans in community and implement. 3. Introduce climate information into health strategies and public health plans, including strategies and information plans, especially clean water, sanitation and hygiene, nutrition, emergencies and communicable diseases. 	<ol style="list-style-type: none"> 1. Risk maps and seasonal disease trend analysis are used to identify resource targets and preventive measures for people who are at risk in the identified areas 2. Public health emergency plan for the climate extreme to control the outbreak of communicable diseases in newly resettlement area have been developed and tested. 1. Climatic information has been used in public health strategies and plans, including strategies and information plans. 2. Adaptation measure from climate change is carried out in the vulnerable communities to eliminate or reduce diseases susceptibility to climate change. 	<ol style="list-style-type: none"> 1. Finding and responding to susceptible diseases to climatic conditions can prevent the epidemic of serious diseases.

a. Component 9: Emergencies preparedness and management

The outbreak of disease and emergencies affecting health is the main problem caused by climate change. Preparedness plans for climate change and emergencies and disaster management and community emergencies are essential for the resilience of climate change. Thus, the public health and community system must manage health risk management and focus on more preparedness than regular response.

Objective:

1. To ensure that public health systems and community are able to deal with health risks and focus on preparedness rather than focusing on regular response.
2. To increase the capacity at the public health and community-level in dealing with health risks related to emergencies and natural disasters caused by the variability of climatic conditions.
3. To ensure that the current and predicted climate conditions have been included in the policies, strategies and risk management programs for natural disasters and emergencies

Main activities	Outputs	Outcomes
<ol style="list-style-type: none"> 1. Develop a standard procedure for disaster risk management and emergencies with relevant departments within and outside of the Ministry of Health. 2. Use information from Component 3 and 4 to meet the requirement for real adaptation of the vulnerable community and the health sector's capacity to prepare readiness for emergencies. <ol style="list-style-type: none"> 2.1. Working with disaster management units to develop emergency plans and procedures for employing staff at the time of severe disaster 	<ol style="list-style-type: none"> 1. Disaster risk management plans are effectively implemented in times of emergencies and disasters to prevent the epidemic and to help the lives of the people. 2. Emergency plans and procedures for the use of staff at the time of severe disasters are endorsed by the above 	<ol style="list-style-type: none"> 1. The community and the public health sector are effective in preventing and responding to the severe weather events that contribute to health risks. 2. Health risks that sensitive to climatic conditions included sufficiently in the policies, strategies and risk management programs of natural disasters and emergencies.

Main activities	Outputs	Outcomes
2.2. Develop short- and long-term plans for public health infrastructure to cope with vector borne diseases and water borne. 2.3. Operate after a severe weather event / assess the damage caused by disasters and disseminate peasants for affected populations by considering the diseases that are sensitive to climate and mental illness.		

b. Component 10: Climate and health financing

The effective health protection from climate change is required to use the implementation budget which may use the government, international and community budgets based on the 2017-2025 Strategic Direction and the four-year Implementation Plan (2017-2020) that have been agreed by all relevant agencies.

Objective:

1. To raise funds for adaptation of health risks from climate change by incorporating the climate change and health change into the budgets of relevant sectors.
2. To facilitate the funding of international organizations for the implementation of climate change and health.

Main activities	Outputs	Outcomes
1. Prepare and submit proposals for health sector adaptation projects from climate change to international organization. 2. Draft a standard operation plan and prioritize the project to raise the funds	1. Have a list of funding resources and projects related to the climate change and health appropriately. 2. Collaboration with the donors.	1. Projects related to climate change and health are funded and implemented

Implementation plan from 2017-2020 is attached in the appendix 1.

Part 5: Implementation, Monitoring and evaluation, and funding source allocation

5.1 Implementation

5.1.1 Management structure

The National Health Sector Adaptation Strategy to the Climate Change is the direction for the implementation of the health sector adaptation to climate change, from central to local level. Establish a National Health Sector Adaptation Committee to climate change with the representatives from the departments, centers, concerned departments within and outside the Ministry of Health to be members of the committee and to jointly manage, implement and monitor of identified strategies and plans which the chairman of the committee is the Vice Minister of Health who is in charge of hygiene and health promotion.

The Department of hygiene and health promotion is the secretariat, which is the Chairman is the Deputy Director General of Department of Hygiene and Health Promotion who is in charge of environmental and occupational health management, the Vice Chairman is the Director of Environmental and occupational health management Division, the members are representatives of departments, centers, relevant divisions within and outside the Ministry of Health. The key functions of the Secretariat are to coordinate and summary the reports from the localities, including the development of annual plan and monitoring/evaluation of the implementation related of health sector adaptation strategy to the climate change.

5.1.2 National coordination mechanism

Coordination mechanisms with all relevant stakeholders at each level should be developed. The Secretariat room of this National Health Sector Adaptation Committee to climate change is located at the Environmental and Occupational Health Management Division, Department of Hygiene and Health Promotion, to be a center point of the coordination to jointly implement the strategy and plans.

5.1.3 The coordination in provincial and district levels

The Provincial Health Sector Adaptation Committee to Climate Change should be established. The Director of the Provincial Health Department will be the chairman. Its structure, membership, role and responsibilities, including the Secretariat would be similar like at the central Level.

5.1.4 Implementation methodologies

The Implementation of the strategy focuses on objectives, outputs and outcomes as indicated in the strategy by jointly working with many departments, divisions, centers and relevant sectors to sustain and promote the cooperation and capacities of concerned agencies and stakeholders including their effective support.

5.2 Monitoring and evaluation

The National Committee and the secretariat would be monitored / Evaluated the key indicators as defined in each objective, output and outcome, including development of appropriate and uniform M&E tools. The key indicators for measuring achievement of strategic implementation and implementation plan are indicated in Table 1 of Appendix 2. The annual review and plan development with all concerned organizations will be held

in November of each year to review, share knowledge and experience in the implementation and develop annual plan. After the annual review and plan development meeting and before budget disbursement next year, the secretariat should coordinate and compile the information from all relevant agencies as follows:

- Annual report
- Detail expenditures of budget report
- The detail of next year implementation plan

The evaluation by the end of 2020 should be undertaken to evaluate the progress of the implementation as planned before developing the next 05-year implementation plan.

5.3. Funding source allocation

To achieve the goals, objectives and outcomes, the dissemination meeting on National Health Sector Adaptation Strategy to the Climate Change, 2017-2025 and Action Plan 2017-2020 will be held at each level after the adoption of strategy and 4 years plan in order to understand the strategy and activities presented in the 04-year plan, and to ensure that all relevant stakeholders, including donors support and cooperate to mobilize funding support for implementation. The secretariat will coordinate and collaborate with relevant organizations to develop detailed plans and budgets for the implementation of each stakeholder as agreed in the operational plan. All funds received from agencies including Government and the International organizations will follow the financial accounting system. The financial audit system must be conduct once a year by an external auditor who has been approved by the donor and the secretariat. The audit should be carried out before the next disbursement of budget.

Minister of Health

References:

1. Climate Change Implementation Plan of Lao PDR from 2013-2020
2. The studies of Climate Change and Health in Lao PDR in 2012
3. WHO. Climate and Health Country Profile, 2015, Lao People's Democratic Republic
4. Carolyn Reimann et Al. Review of climate-sensitive conditions and recommendations for adaptation measures. Lao PDR, 2016
5. WHO. Operational framework for building climate resilient health systems. 2015

Appendix 1:

Public Health Sector Adaptation Implementation Plan on Climate Changing from 2017-2020

- Overall target: To promote the capacity of the public health sectors and community to protect and prevent the people health and ourselves from unstable and changing climatic conditions.
- Objective, the output and outcome are defined in the Component 10 of the Strategy. For the indicator defined in topic 5.2 of Part 5 of the Strategies.

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
Component 1: Leadership and Governance	1.1 Establish committees, units and national coordinators for the adaptation of health sector to the climate change, from the central to local levels, include defining clear roles and responsibilities of each party.	Q4				Secretariat	
	1.2 Establish a team with staff and office equipment adequately.	Q4				Department of Hygiene and Health Promotion	
	1.3 Identify the coordination and report mechanism with the related departments and sectors.	Q4				Department of Hygiene and Health Promotion	
	1.4 Hold the meetings with relevant departments and sectors to sign a Memorandum of Understanding between the Ministry of Health and core partners.		Q1			Department of Hygiene and Health Promotion and relevant departments	
	1.5 Review the development project that still not making the health impact assessment reports and implement health impact assessments for the new relevant policies, programs and projects of the relevant sectors.		Q1			Department of Hygiene and Health Promotion	
	1.6 Attend seminars, seminars and trainings on the global, regional and national levels of climate change and health.	Every time and every where whenever giving the chance				Department of Hygiene and Health Promotion and relevant departments	
	Require budget for Component 1:						50.000

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
Component 2: Organizational and staff capacity strengthening	2.1 Training for target staff (within and outside the Ministry of Health) about climate change and health.	Q4	Q2Q3	Q2Q3	Q2Q3	Department of Hygiene and Health Promotion and relevant departments	
	2.2 Develop curriculum on climate change and health at the National University and the University of Health Science.		Q1			National University of Lao and University of Health Science	
	2.3 Develop / update technical recommendations on diagnosis, investigation, control, prevention and treatment (dengue, diarrhea, typhoid fever, leptospirosis), injuries and food borne.		Q1	Q1	Q1	Division and relevant center	
	2.4 Develop a communication strategy related to climate change and health (such as preparing, printing and distributing IEC materials, TV and radio broadcasting programs that reflect the effects of climate change and appropriate responses, preventive measures at high / low temperatures, in the event of floods and droughts and other measures to prevent diseases that are susceptible to climate change, attention should be given to disadvantaged groups (elderly, children, women, and areas with high vulnerability to epidemics).	Q4	Every time, Every where			Department of Hygiene and Health Promotion, Medical and Health Information Center and relevant departments	
	2.5 Develop a gender plan that related to the climate change and health	Q4	Every time every where				
	Require budget for Component 2:						200.000
	Component 3: Health information systems	3.1 Identify the most vulnerable communities of fluctuations and changes in climatic conditions, climate and related health risks by existing data.	Q4				Secretariat
3.2 Assess the capacity of the health system to cope with health risks from climate change and make			Q1			Department of Hygiene and Health Promotion,	

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
	plans to undertake appropriate activities (such as diagnosis and treatment capabilities, clinics, etc.)					Division of Health Care, Hospital, University of Health Science	
	3.3 Hold a meeting with the Environmental and Social Impact Assessment Department and other relevant departments regarding the integration of health impact assessments into all development projects.		Q1			Department of Hygiene and Health Promotion, Department of Environment and Social Impact assessment and other relevant departments	
	3.4 Assess the health structure at all levels (especially disasters area) to respond to diseases that are susceptible to climatic conditions (dengue, diarrhea, typhoid fever, leptospirosis)		Q2Q3	Q2Q3	Q2Q3	Department of Hygiene and Health Promotion, Division of Health Care, Hospital, University of Health Science	
	3.5 Carry out after a severe weather event / assess damage caused by disasters and disseminate peasants for affected people, considering their susceptibility to climate conditions and mental illness.		Q1	Q1	Q1	Department of Hygiene and Health Promotion	
	3.6 Develop project proposals and recommendations and strategies for adapting to identified defects.	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Hygiene and Health Promotion, Epidemiology and Laboratory Center, Department of Meteorology, Department of Climate	

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
						change and relevant centers	
	3.7 Analyze climatic conditions, diseases and other relevant information / parameters (eg, exposure, adaptation capacity).	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	secretariat	
	3.8 Develop community capacity by creating activities with adaptive measures in vulnerable communities.	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	secretariat	
	Require budget for Component 3:						500.000
Component 4: The integration of risk monitoring and early warning system.	4.1 Collect and analyze data of some key variables (such as extreme temperatures, rainfall, humidity, illness and death from diseases that are sensitive to climate change) that are related to communicable diseases, insects, and other hazards.	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Hygiene and Health Promotion, Epidemiology and Laboratory Center, Department of Meteorology, Department of Climate change and relevant centers	
	4.2 Create and test website reporting system for the symptoms, laboratory and environmental-health aspects of diseases that are sensitive to the climatic conditions.	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	secretariat	
	4.3 Provide strong support for disease surveillance, reporting, monitoring and control activity and mitigation of vector and rodent borne diseases.	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Disease Control and Epidemiology analysis center	
	4.4 Follow the early warning systems by using mosquitos and weather forecast data	Q1 to Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Hygiene and Health Promotion, Epidemiology and Laboratory Center, Department of	

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
						Meteorology, Department of Climate change and relevant centers	
	Require budget for Component 4:						500.000
Component 5: Health and climate research	5.1 Hold a meeting with all relevant parties to create a national research.		Q1			Department of hygiene and Health Promotion, Departments and relevant centers	
	5.2 Conduct research with a wide range of stakeholders to study the sensitivity of factors that affecting to health, such as water, sanitation and hygiene, food, vector borne diseases, non-communicable diseases, nutrition as well as social-mental illnesses caused by climate change.		Q2	Q2	Q2	Department of Hygiene and Health Promotion, Departments and relevant Centers	
	5.3 Explore co-operation in research on the involvement of multiple sectors in order to create existing financial resources and create opportunities for training.		Q1			Department of Hygiene and Health Promotion and University of Health Science	
	Require budget for Component 5:						50.000
Component 6: The resilience to climate change and the sustainability of technology	6.1 Regularly maintain public health facilities, install or upgrade to ensure clean water, electricity, communications, equipment, and medicine.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Health Care and Hospitals	
	6.2 Use new technologies such as eHealth or satellite imagery to improve the efficiency of the public health system.						
	6.3 New public health facilities will be located in areas with no risk of climate change and access.						

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
and infrastructure s.	6.4 Explore opportunities to develop green health facilities, hospitals, safe and modern.						
	6.2 Use new technologies such as eHealth or satellite imagery to improve the efficiency of the public health system.		Q1 to Q4	Q1 to Q4	Q1 to Q4	The provincial health departments and hospitals	
	6.3 New public health facilities will be located in areas with no risk of climate change and access.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Health Care and provincial health departments and hospitals	
	6.4 Explore opportunities to develop green health facilities, hospitals, safe and modern.		Q1			Department of Health Care and provincial health departments and hospitals	
	Require budget for Component 6:						200.000
Component 7: Management of Environmental determinants of health.	7.1 Cooperate with multiple agencies to strengthen joint monitoring with multiple sectors, including mechanisms. 7.2 Organize meetings with relevant ministries and departments regarding the review and improvement of legislation related to air quality, water quality, food quality, housing security, waste management, urban development. 7.3 Organize meetings with relevant ministries, departments and agencies on the promotion and use of health impact assessment policy and guideline in critical development projects such as dam projects, mining projects, road and rail construction projects, industry and trade projects, agriculture and forestry projects, hospital construction projects.		Q1	Q1	Q1	Secretariat	

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
	7.2 Organize meetings with relevant ministries and departments regarding the review and improvement of legislation related to air quality, water quality, food quality, housing security, waste management, urban development.		Q2	Q2	Q2	Department of Hygiene and Health Promotion, Departments and relevant centers	
	7.3 Organize meetings with relevant ministries, departments and agencies on the promotion and use of health impact assessment policy and guideline in critical development projects such as dam projects, mining projects, road and rail construction projects, industry and trade projects, agriculture and forestry projects, hospital construction projects.		Q3	Q3	Q3	Department of Hygiene and Health Promotion, Departments and relevant centers	
	Require budget for Component 7:						50.000
Component 8: Climate informed health programs.	8.1 Using the information from monitoring, epidemiological surveillance and environmental monitoring surveillance of health impacts, pre-events, during and after events occurrence of severe weather conditions in the identified risk areas for monitoring with many sectors that concerned to the environmental risk which is sustainable to climate conditions.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Secretariat	
	8.2 Use the information from Component 4 to develop a plan and an adaptation measure.		Q1 to Q4	Q1 to Q4	Q1 to Q4		
	8.2.1 Develop a water, sanitation and hygiene plans for vulnerable communities and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Environmental Health and Water Supply Center	
	8.2.2 Develop a dengue control plan in vulnerable community and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Malaria control and Epidemiology and Laboratory Center	

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
	8.2.3 Develop a non-communicable disease plan in vulnerable community and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Health Care	
	8.2.4 Develop a nutritional plan in vulnerable community and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Nutrition Center	
	8.2.5 Develop women's health, reproductive health and child health plans in a vulnerable community and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Mother and Children Center	
	8.2.6 Develop neglected tropical diseases in vulnerable community and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Communicable Disease Control	
	8.2.7 Developing mental health plans in community and implement.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Department of Mental illness at the hospital	
	8.3 Introduce climate information into health strategies and public health plans, including strategies and information plans, especially clean water, sanitation and hygiene, nutrition, emergencies and communicable diseases.	Q4	Q1 to Q4	Q1 to Q4	Q1 to Q4	Secretariat and medical information	
	Require budget for Component 8:						3.000.000
Component 9: Emergencies preparedness and management	9.1 Develop a standard procedure for disaster risk management and emergencies with relevant departments within and outside of the Ministry of Health.		Q1			Secretariat	
	9.2 Use information from Component 3 and 4 to meet the requirement for real adaptation of the vulnerable community and the health sector's capacity to prepare readiness for emergencies.						

Component	Main activities	Timeline				Organization/Responsible person	Require budget(US\$)
		2017	2018	2019	2020		
	9.2.1 Working with disaster management units to develop emergency plans and procedures for employing staff at the time of severe disaster		Q1 to Q4	Q1 to Q4	Q1 to Q4	Secretariat and disaster management unit, Ministry of Health	
	9.2.2 Develop short- and long-term plans for public health infrastructure to cope with vector borne diseases and water borne.		Q1 to Q4	Q1 to Q4	Q1 to Q4	Hospital at each level	
	9.2.3 Operate after a severe weather event / assess the damage caused by disasters and disseminate peasants for affected populations by considering the diseases that are sensitive to climate and mental illness.	Operate every time after a severe weather event				Disaster management unit, Ministry of Health	
	Require budget for Component 9:						1.000.000
Component 10: Climate and health financing	10.1 Prepare and submit proposals for health sector adaptation projects from climate change to international organization.		Q3	Q3	Q3	Secretariat	
	10.2 Draft a standard operation plan and prioritize the project to raise the funds		Q1			Secretariat	
	Require budget for Component 10:						30.000
Total required budget							5.580.000

Summary of required budget for each component

No.	Component	Require budget (US\$)
1	Component 1: Leadership and governance	50.000
2	Component 2: Organizational and staff capacity strengthening	200.000
3	Component 3: Health information systems	500.000
4	Component 4: The integration of risk monitoring and early warning system	500.000
5	Component 5: Health and climate research	50.000
6	Component 6: The resilience to climate change and the sustainability of technology and infrastructures	200.000
7	Component 7: Management of Environmental determinants of health	50.000
8	Component 8: Climate informed health programs	3.000.000
9	Component 9: Emergencies preparedness and management	1.000.000
10	Component 10: Climate and health financing	30.000
	Total required budget	5.580.000

Appendix 2:

Table 1: Key indicators to measure the success of the implementation of the strategy and implementation plan

Component	Key indicators	Verification resources
Component 1: Leadership and governance	<ul style="list-style-type: none"> • The Committee, Unit, Coordinator and the Adaptation Team of the Public Health Sector from the Climate Change will be established by the Ministry of Health by the end of 2017 • Completion of the coordinated co-operation mechanism by the end of 2017 • At least 03 workshops / seminars have been conducted with the department and related sectors • At least 02 projects/year have developed Health Impact Assessment Reports • At least 03 Memorandum of Understanding has been signed with the relevant stakeholders (Department of Energy and Mines, Department of Industry, Department of Civil Engineering) • 20 people attended the meeting, seminars and workshop on the global, regional and national stages. 	<ul style="list-style-type: none"> • Resolution • Report • Minute of meeting • Memorandum of Understanding
Component 2: Organizational and staff capacity strengthening	<ul style="list-style-type: none"> • 100 people / year had attended the workshop (50% of women are attended) • Teaching at least 8 hours on climate change and health has taken into the National University and the University of Medical Science. • At least 5 technical recommendations regarding the diagnosis, investigation, control, prevention and treatment (dengue, diarrhea, typhoid fever, urinary disease), injuries and foodborne diseases that has been improved and new creation. • At least 03 times/year conducting the workshop • At least 10,000 posters / brochures produced and distributed to the target communities 	<ul style="list-style-type: none"> • Training report • Minute of meeting • Media production reports and mass media reports

Component	Key indicators	Verification resources
	<ul style="list-style-type: none"> • At least 2 times of TV / radio advertisement per month • There is a communication strategy related to climate change and health • There are implementation plans on gender roles related to the climate change and health. 	
Component 3: Health information systems	<ul style="list-style-type: none"> • The 100 most disadvantaged communities to the weather fluctuation condition and climate change have been identified. • At least 3 meetings/year have been conducted with the Environment and Social Impact Assessment Department and other relevant departments on integrating health impact assessments into all development projects. • At least 04 projects and adaptation plan have been established • There is a list of health sensitive areas • At least 100 sensitive communities have built the adaptive measures activity • There is a disadvantageous community map that adapts to the climate change 	<ul style="list-style-type: none"> • Reports • Minute of meeting • The list of sensitive areas
Component 4: The integration of risk monitoring and early warning system	<ul style="list-style-type: none"> • 1 time / month has analyzed the information on climate change and diseases • 1 time / month has been reported the disease to be sensitive to the climate change • 1 time/week, has a monitoring reports and control activities / insecticide report. • 1 time / quarterly has been reported in early warning system 	<ul style="list-style-type: none"> • Analysis report • Disease report • Early warning report • Minute of meeting • Research report
Component 5: Health and climate research	<ul style="list-style-type: none"> • At least 3 meeting sessions were held with all parties involved in the National Research Agenda • At least 2 topics/year that have conducted the research • At least 2 recommendations/year of the research that have been carried out 	

Component	Key indicators	Verification resources
Component 6: The resilience to climate change and the sustainability of technology and infrastructures	<ul style="list-style-type: none"> • 10 district hospital and 50 healthcare center had been installed or renovate to ensure there are clean water, electricity, communication, equipment and medicines. • 10 district hospital and 50 healthcare center that use new technology such as eHealth or satellite image on the effectiveness improvement of public health systems. • 10 new healthcare center located in the areas that not risk from climate change and accessible • 3 proposals for green hospital development, safety hospital in central and provincial levels. 	<ul style="list-style-type: none"> • Report on installation and renovation • Report on new technology utilization • Report on the establishment of healthcare center in safe area. • Project proposal
Component 7: Management of Environmental determinants of health	<ul style="list-style-type: none"> • There are at least 5 meetings with ministries, departments related to the review and revise regulations on air quality, water quality, food quality, safety shelter, waste disposal and urban development. • There are Health Impact Assessment Report 2 projects/year 	<ul style="list-style-type: none"> • Minute of meeting • Project proposal
Component 8: Climate informed health programs	<ul style="list-style-type: none"> • Monitoring at least 04 times/year • 20 sensitive communities that implemented on water, sanitation and hygiene • 20 sensitive communities that implemented on dengue control • 10 sensitive communities that implemented on noncommunicable disease • 20 sensitive communities that implemented on nutrition • 20 sensitive communities that implemented on women health, reproductive and children health • 10 sensitive communities that implement the mental illness 	<ul style="list-style-type: none"> • Monitoring reports • Implementation Report on Water, Sanitation and Hygiene, Dengue Control, Noncommunicable Diseases, Nutrition, Health for Women, Reproductive and Child Health, Mental Illness
Component 9: Emergencies preparedness and management	<ul style="list-style-type: none"> • There are plans and steps to be prepare for response the emergencies • At least 50 officers participate during the severe disaster occur • 10 times of disaster management team implement after severe weather event/assess the lost from disaster and dissemination 	<ul style="list-style-type: none"> • Plan • Report on the participation during disaster
Component 10: Climate and health financing	<ul style="list-style-type: none"> • Number of proposal on public health adaptation from climate change that submit to the international organization 	<ul style="list-style-type: none"> • Project proposal