

Health National Adaptation Plan (H-NAP)
Climate Change Health Adaptation Strategies and Action Plans of
Nepal (2016-2020)



Government of Nepal

Ministry of Health

2015

Executive summary

There are strong global evidences on the impacts of climate variability and change on human beings and that the poor regions of the world are most vulnerable to the negative impacts of climate change. The greatest health effects of climate change occur in the most vulnerable populations residing in the least developed countries currently suffering from the heaviest disease burdens which were historically the least responsible for greenhouse gases (GHGs) emissions indicating an “ethical crisis”. Despite Nepal's very low contribution to GHGs, Nepal ranks the fourth most vulnerable country in the world according to the Climate Change Atlas 2010. Climate change impacts are felt in many sectors and across all Nepalese population. Health is considered as one of the sectors being highly vulnerable to climate change. There are increasing evidences on the impacts of climate variability and change in health outcomes in Nepal. In order to avoid or prevent the adverse effects of climate change on people's health in the near and distant future, appropriate strategies are essential for early planning and for strengthening the health system of the country.

There are evidences on possible reductions of morbidity and mortality by improving the provisions of basic requirements for maintaining health such as clean air and water, sufficient food and shelter, strengthening and implementing early warning systems, strengthening preparedness and response of the health services as well as appropriate urban planning and housing. The infrastructure of the health system has to be able to adapt or to deal with extreme climatic events. There is an urgent need to improve capacities for climate change adaptation in all sectors and at all levels. The inclusion of health sector in adaptation planning can develop synergy in actions to protect population health, and can result in policies and programmes in other sectors contributing to health co-benefits.

The National Climate Change Health Adaptation Strategies and Action Plans of Nepal has been prepared as per the commitment of the Government in different national, regional and international meetings and conventions; and as guided by the Constitution of Nepal 2015, National Health Policy of Nepal 2014, Health Sector Adaptation Strategy (2015-2020), National Population Policy 2014 as well as National Climate Change Policy 2011. This document aims to develop the national strategies on climate change and health with an adequate focus on health sector and inter-sector collaboration for protecting health from adverse effects of climate change. Furthermore, it may be milestone in mainstreaming health in overall national adaptation plan (NAP). The general goal of the strategy is to reduce vulnerability and to

enhance adaptation measures to reduce adverse effects of climate change on human health in the Federal Democratic Republic of Nepal. The vision, mission and goal of this strategy are as follows.

Vision: Develop climate resilient health system to protect human health from climate change in Nepal

Mission: Creating a national framework for engaging the public, private sector, civil society organizations and development partners in a participatory process for responding to adverse health effects of climate change.

Goal: To reduce vulnerability and enhance adaptation measures to reduce adverse effects of climate change on human health

Following specific objectives are envisioned as a part of the implementation of this strategy and the action plan:

1. To raise public awareness about climate change and its effect on health;
2. To generate evidences on the health effects of climate change at national and sub-national level through research and studies;
3. To reduce morbidity and mortality of infectious diseases (vector, water, air and food-borne diseases) and malnutrition attributed to climate change;
4. To manage the risk of extreme climatic events;
5. To protect human health from adverse effects of climate change through multi-sectoral response ensuing health in all policies.

The National Climate Change Health Adaptation Strategy of the Federal Democratic Republic of Nepal envisages the objectives and the activities that will be carried out by the health sector in cooperation with other relevant sectors in the country. Its goal is to interlink this strategy with other strategies in the area developed by other sectors and to form a part of the chain of activities aimed at reducing the impact of climate change on people's health in Federal Republic of Nepal. The Federal Democratic Republic of Nepal determines its national structures and resources for public awareness by enhancing surveillance alert and response to climate-change-related diseases, and also develops and implements national action plans that meet the demands for key capacities.

The implementation of climate change health adaptation strategies and action plans (2016-2020) aims to meet following targets by 2020

1. To conduct public awareness programmes about climate change and its effect on health in all 75 districts of Nepal
2. Introduce and teach climate change and health related modules into school and university curriculum
3. Capacity building of at least 500 health professionals on climate change and health subject
4. Improving recording and regular reporting of climate sensitive health risks
5. Enhancing capacity of at least 250 researchers on climate change and health data analysis
6. Conduction of at least 10 national level studies on climate change and health and publication of research reports and articles
7. Development of online database of climate change and health data and study findings
8. Expand surveillance of vector, water and food-borne diseases throughout the country in all 75 districts and scale up programmes as per the need to control those diseases
9. Development of early warning system at least in each district level to protect health from climate induced diseases and risks
10. Formation and mobilization of rapid response team in all 75 districts for disaster management and epidemic control
11. Reduction of morbidity and mortality from climate change through multisectoral response ensuing health in all policies
12. Organization of National Workshop on Climate change and health each year
13. Mapping of distribution of medicinal plants above 3000m in Nepal
14. Develop models of environmental friendly health institutions and advocate with concerned agencies to construct at least 50 such environmental friendly buildings of health institutions.

The major implementation strategies can be as follows:

1. Establish an effective climate response unit in Ministry of Health capable of national and international negotiation on funds and technology transfer, within-country knowledge management, and programme planning and implementation;
2. Develop and implement an action plan based on national and international evidences;

3. Ensure the adequacy and appropriateness of human and financial resources;
4. Strengthen a surveillance system at appropriate levels to monitor risk factors/behaviours, water and air quality, food safety, vectors, malnutrition and other sensitive diseases and risks;
5. Prevent the transmission of vector, water, air and food borne diseases;
6. Strengthen national research capacity to assess vulnerability, to conduct the surveillance of climate sensitive risk factors and diseases, and to assess the impacts of climate change on human health.

Foreword

To be added by MoH

Acknowledgment

To be added by MoH

Acronyms

To be added

Table of Contents

Executive summary	i
Vision.....	ii
Mission.....	ii
Goal	ii
Foreword.....	v
Acknowledgment	vi
Acronyms	vii
Background	1
Climate change in Nepal	1
Current climate sensitive health risks in Nepal.....	3
Vulnerability and the adaptation assessment of health impacts of climate change in Nepal	4
National policies, plans and strategies to address climate sensitive health risks in Nepal	8
Need of National Climate Change Health Adaptation Strategy.....	12
Vision, Mission and Goal.....	14
Vision.....	14
Mission.....	14
Goal	15
National Strategic Objectives (SOs) of the Climate Change Health Adaptation Strategy.....	15
Implementation Strategies	15
Monitoring and Evaluation	17
Financial Implications.....	17
Action Plan for Climate Change Health Adaptation Strategy (2016-2020).....	18
References	28

Background

Climate change in Nepal

Climate change has become a topic of public interest because of its wider range of devastating effects. The Inter-governmental Panel on Climate Change (IPCC) defines climate change as “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer”[1]. Climate change is mainly contributed by the emission of greenhouse gases in atmosphere from anthropogenic activities. Nepal is one of the most vulnerable countries with respect to climate change because it is positioned in the southern rim of the so-called “Third Pole” of our planet, has a complex topography, and a low level of development [2]. Although analyses of observed temperature and precipitation data are still limited in Nepal, climate change is obvious. Available temperature data show a warming trend with higher warming rates in the hills and mountain regions compared to the lowlands (Siwalik and Terai) of Nepal [3-5], [6]. Precipitation does not show much distinct trends in Nepal. However, the impacts of climate change are observed through the changes in the extreme events. A decreasing trend of cool days and an increasing trend of warm days are observed in the higher altitudes of Nepal [6]. The combined effects of increased temperature and diminished snowfall followed by the rapid shrinking of the majority of glaciers have already resulted in a reduction of the amount of water available for drinking and farming in the hill and the mountain regions of Nepal [5, 7, 8]. The precipitation extremes show an increasing trend in total and heavy precipitation albeit no systematic difference is observed in extreme precipitation trends between the highlands and the lowlands [6]. The Hadley Centre's high-resolution regional climate model PRECIS (Providing Regional Climates for Impact Studies) projects significant warming towards the end of the 21st century and a decrease in monsoon precipitation over Nepal during the period 2011-2040 but an increase in seasonal rainfall during the period 2071-2098 compared to the baseline period (1961-1990) [9]. The rate of temperature increase in Nepal will be 1.4 °C by 2030, 2.8° C by 2060 and 4.7° C by 2090. The inter-model comparisons show that the global average earth temperature is likely to have

increased by 1.5°-4° C in different representative concentration pathways (RCPs) by the end of the 21st century compared to the baseline years 1850 to 1900 [1]. More importantly, the increase of the surface temperature has been recorded over the last three decades in the northern hemisphere [1, 10] with the highest increase in the Himalayas [11] indicating greater effects in mountainous countries. Climate change and climate-induced extreme events will continue to accelerate the loss of lives and property and increase the burden of diseases if corrective actions are not taken timely. The 21st UN Climate Change Conference of the Parties (COP21) held in Paris in December 2015 came up with the Paris Agreement which was framed by a bold ambition to keep warming “well below” the 2° C point regarded as untenably dangerous by the scientists, and “pursuing efforts to limit the temperature increase to 1.5° C.” The agreement includes a strong commitment to climate adaptation actions, recognizing the principle of loss and damage due to climate change and the protection of those most vulnerable.

As Nepal's GHGs emission is less than 0.027 percent of the total global emission, its contribution on GHGs emission reduction will not be very significant indicating that Nepal's effort should be on 'adaptation' as a 'development agenda' and a 'survival strategy'. There should be a direct access to the adaptation fund allocated by developed countries for adaptation activities. Nevertheless, the government of Nepal still recognizes the need to reduce GHGs emissions without affecting overall economic development. Nepal has committed to taking all possible measures to promote a low-carbon development path in order to maximize benefits from adaptation because of two reasons. First, it must reduce its dependency on unsustainable and expensive fossil fuel, which costs Nepal a significant share of its revenue, and seek self-reliance by promoting the renewable sources of energy that can sustain development even in distant future. Second, the mitigation strategy will contribute to the global efforts to reduce emissions by promoting the renewable sources of energy and reducing emissions caused by deforestation and degradation as well as have significant benefits in reducing burden of cardio-respiratory diseases. For example, replacing solid biomass fuel with solar and hydropower can be expected to reduce the burden of respiratory illness in rural areas;

promoting clean energy in transport sectors in urban areas can reduce ambient air pollution; and encouraging people for walking and cycling can reduce risk of non-communicable diseases.

Current climate sensitive health risks in Nepal

Climate change impacts are felt in many sectors and across all Nepalese population. The Nepal National Adaptation Programme of Action (NAPA) to climate change has identified public health as one of the most vulnerable sectors to the negative effects of climate change. There are increasing evidences on the impacts of climate variability and change on health outcomes in Nepal. The health impacts of climate change are water-borne diseases, vector-borne diseases, air-borne diseases, food-borne diseases and nutrition related diseases such as malnutrition, injuries and mental illnesses [12]. Though the effects of climate change on health are noticeable, there are limited etiological studies on the health impacts of climate change in Nepal. Several challenges for conducting climate change and health research in developing mountainous countries have been reported which include lack of trained human resources, financial resources, long-term data and information, and suitable methods that are applicable to the local context [13]. Entomological and epidemiological studies carried out in Nepal show early effects of climate change on vector-borne diseases with clear shifting of vector-borne diseases and their vectors in the highlands of Nepal [14-19]. The impacts of climate change could be seen or observed through the changes in average temperature, precipitation and extreme weather conditions over the past three decades. These changes bring about direct impacts on human health or indirectly on disease transmitting agents and thereby affecting human health.

Based on global evidences and scientific consensus, if climate change continues as projected across the RCPs scenarios, the major increase of ill-health will occur in Nepal compared to no climate change scenario through: (1) the greater risk of injury, disease, and death due to more intense heat waves, cold waves and fires; (2) the increased risk of under-nutrition resulting from diminished food production in resource poor regions; (3) consequences on health of lost work capacity and reduced labour productivity in vulnerable populations; (4) the increased risks

of food- and water-borne diseases and vector-borne diseases especially in previously considered non-endemic mountain areas; (5) modest reductions in cold-related mortality and morbidity in the highlands due to fewer cold extremes, (6) increased morbidity and mortality related to cold waves in southern Terai; and (7) the reduced capacity of disease-carrying vectors due to exceeding thermal thresholds especially in the lowland Terai regions. Management of these health effects of climate change will require inputs from all sectors of government and civil society, collaboration between many academic disciplines, and new ways of international cooperation. Involvement of local communities in discussing, advocating, assisting and monitoring of the process of adaptation will be crucial.

Vulnerability and the adaptation assessment of health impacts of climate change in Nepal

According to the Climate Change Atlas 2010, Nepal ranks the fourth most vulnerable country in the world. Hence there is a need to develop an adaptation strategy to minimize the risk of climate induced health vulnerabilities in Nepal. Most commonly, vulnerability deals with three components viz. exposure, sensitivity, and adaptive capacity. While the first two components together represent the potential impacts and the adaptive capacity is an extent to which these impacts can be averted. Thus, vulnerability is the potential impact (I) minus adaptive capacity (AC). The vulnerability and adaptation (V &A) assessment of health impacts of climate change in Nepal was recently carried out in Nepal by Ministry of Health and Population in 2015 with the technical and financial support of World Health Organization (WHO) [20]. For, V&A assessment, health impacts due to climate change were grouped into three categories: (a) Extreme weather related health impacts such as heat wave or heat stress and cold wave; (b) Vector borne diseases including Japanese Encephalitis (JE), malaria, Kala-azar (Visceral leishmaniasis) and Dengue; and (c) Diarrhoeal disease.

The major findings of the V &A assessment are summarized below.

- Nepal's mountains and hills, which make about three-fourths of the total area, are geologically fragile, where almost 50 percent of population live. There are 55 mountain and hill districts, of them 22 districts covering approximately 45 percent area have been defined as remote or marginal districts by the government of Nepal. The marginal regions are characterised by the ruggedness of terrain with slope above 30°, mostly inaccessible by roads, with dispersed settlements and poor socioeconomic infrastructure including education, health, employment, etc. The rest about one fourth lies in the Tarai plain but accommodates over 50 percent of the total population.
- The population of Nepal has grown rapidly over the past decades and likewise the urban population has also grown very rapidly. The density of population has increased in the country from 157 persons per km² in 2001 to 181 persons per km² in 2011. However, the population growth rate has a declining trend and the life expectancy at birth is increasing for both male and female.
- In sensitivity, the demographic indicators such as population density, under-5 children, elderly population and gender and the ecology indicators including forest coverage and protected area were considered. By cluster region, the Western Mountain had the highest mean sensitive score with high range of standard deviation indicating high variability among the districts of the cluster. This was followed by the Central Hill and the Eastern Tarai. Two cluster regions, viz. the Far-Western Mountain and the Far-Western Tarai had the lowest mean score.
- The exposure/risk indicators included temperature, precipitation, climate induced disasters, landslides, floods, GLOFs, drought occurrence, and drying-up of water sources related to the meteorology and diarrhoea, ARI, and malaria diseases. The index analysis depicts that the highest exposure index value was found in most districts of the Mid- and the Far-Western Hills and Mountain regions, signifying greater vulnerability to climate change health impacts with a mean score. Of these, the Far-Western Mountain region was the most vulnerable in terms of exposure. This was followed by the Western Mountain region. The Central Tarai region is the least vulnerable to exposure.

- In adaptive capacity, the socio-economic indicators included wealth quintile, gender empowerment, human poverty, literacy, nutrition, and food balance; the infrastructure indicators included road access, communication access, drinking water access, sanitation coverage, and education coverage; the technology indicators comprised TV/radio, telephone/mobile, and bicycle/motor cycle; and the health services indicators included health service access, and human resources for health while the indicators of the government responses included health service systems, awareness programs, and policy measures. Relatively higher adaptation index scores were found in most districts of the Mid- and the Far-Western Hills and Mountains, indicating low or poor adaptive capacity, i.e. more vulnerable. The Mid-Western Mountains had the largest mean adaptive index score, meaning the lowest adaptability or the highest vulnerability. Next to it was the Far-Western Mountains . The lowest adaptive index score was obtained by the Central Hill and the Eastern Tarai cluster regions, meaning low vulnerability.
- The average composite index value of all three components for the country as a whole was found to be 0.39. There were 38 districts above the mean value, signifying more vulnerable and the rest 37 districts less vulnerable. On the whole, the result did not show any distinct pattern of spatial distribution of potential health vulnerability. The districts with the lowest aggregate values were spotted across the western half of the hill and mountain regions and likewise the districts with higher to the highest aggregate values were scattered across the country except in the mountain region.
- When analyzed the districts in terms of the magnitude of vulnerability, seven Tarai districts, representing three from the Western and two each from the Eastern and the Mid-Western clusters; and two districts from the Far West Mountain cluster showed very high vulnerability. Again, three districts from the Central Tarai, three from the Mid-Western Hill and two each from the Mid-Western Mountain and the Western Hill clusters had high vulnerability. Five districts of the Western Hill and four districts of the Central Hill clusters showed low vulnerability.
- In terms of the vulnerability analysis of specific hazard like GLOFs, the Eastern Mountain cluster, some parts of the Central and the Western Mountain clusters were the most

vulnerable. In terms of landslides, all the hills and mountain regions were highly vulnerable but in different range values. In terms of floods, almost all the Tarai regions were highly vulnerable. In terms of drought, especially all districts of the Mid and the Far Western regions, all the hill and mountain regions and the patches of districts of the rest regions were most vulnerable. In terms of adaptive capacity such as socioeconomic condition, most of the Mid and the Far Western regions and the patches of the districts in the rest regions across the country were found vulnerable.

- In terms of diseases like Malaria, 52% of the total population was found to be vulnerable while Lymphatic filariasis 87%, Japanese encephalitis 54%, Kala-azar 29.7%, both water and food borne diseases and non-communicable diseases were at 100%. It is clear that Nepal as a whole is extremely vulnerable though the level of vulnerability has improved.

Vulnerability in terms of climate change varies with the population characteristics, geographical location, settlement types, occupational groups, and the social, political and cultural aspects. Different intervention measures such as preventive, curative, promotive and rehabilitative are being practiced by the public health sector to cope with the type of diseases, prevalence needs, and additional coping strategy to enhance the adaptive capacity of the people. The adaptation measures especially for climate sensitive diseases need to be addressed at different levels such as personal, community and policy levels.

Vulnerability in Nepal is linked to the availability of local resources, effectiveness of governance and public institutions, quality of public health infrastructure and the access to relevant local information on extreme weather threats. The spatial distribution of these factors is, usually not uniform, affecting the vulnerable population at varying degrees. The differences are based on the topography, demography, socioeconomic factors and so on. The communities with low capacity to adapt to climate variability and change are more vulnerable and susceptible to it than those with high adaptive capacity. Those regions or districts, which are high vulnerable, require immediate actions or measures to enhance the adaptive capacity to raise the quality of health and to reduce the vulnerability of the region. However, the districts with less degree of vulnerability also require actions for midterm and long term measures or strategies.

The health impacts experienced due to climate change are: (a) Extreme weather related health impacts such as heat wave or heat stress in the Tarai region of Nepal. The consequences are hyperthermia, heat stroke, heat exhaustion, heat syncope, heat cramps, and heat rash. During winter season, cold wave occurs in different parts of the country including Tarai region causing respiratory problems such as cough, throat infection, chronic obstructive pulmonary disease (COPD), bronchitis, asthma, pneumonia, chronic bronchitis, rotavirus diarrhoea, skin diseases etc; (b) Vector borne diseases including Japanese Encephalitis (JE), malaria, Kala-azar (Visceral leishmaniasis) and Dengue seem to have occurred in the warmer districts of Nepal; and (c) The diarrhoeal disease shows a definite monthly pattern or seasonal pattern in a year. There is an increasing trend of diarrhoea morbidity despite several government intervention programmes in places.

While climate change affects everybody, not everybody is equally vulnerable. A number of factors like geography, health-system preparedness, health status, age, social class and support systems, etc. determine to what extent people's health will be endangered. Climate change can significantly worsen health inequities and put additional stress on poorer groups or regions. When it comes to affecting the health of the most vulnerable, tackling climate change cannot be a choice, it is a must.

National policies, plans and strategies to address climate sensitive health risks in Nepal

Constitution of Nepal 2015: The article 30(1) ensures that each person shall have the right to live in a healthy and clean environment and article 30(2) has provisioned that the victim of environmental pollution and degradation shall have the right to be compensated by the pollutants as provided for by law. Hence, Constitution of Nepal has clearly spelled out matter of loss or damage caused by emissions of global GHGs and right to get compensation as per national/international laws, negotiations and treaties. Similarly, the article 35 has stated about right to health care. The major provision of article 35 are: (1) Every citizen shall have the right to seek basic health care services from the state and no citizen shall be deprived of emergency health care, (2) Each person shall have the right to be informed about his/her health condition

with regard to health care services, (3) Each person shall have equal access to health care, and (4) Each citizen shall have the right to access to clean water and hygiene.

Climate Change Policy 2011: The policy has been formulated mainly to inform parties of UNFCCC about the implementation of the convention, to promote climate adoption mitigation and restoration of the carbon level, and to make natural resource management climate-friendly for socio-economic development and climate-resilient infrastructure development. The Policy intends to integrate climate change aspects into plan and development programmes and their implementation, to establish climate change centre; to reduce GHG emissions, to promote renewable energy; to enhance adaptation in and climate resilient capacity and initiate community based local adaptation plan in line with NAPA; to enhance the capacity to estimate and forecast present and future impact of climate change; to promote climate friendly technologies and to manage solid waste as a resource. The policy is mainly for general strategy. The policy intends to form sector wide working group and integrate climate change policy in the sector policies. The policy has emphasized the implementation of preparedness programmes to fight against disaster and epidemics; regular implementation of public awareness and capacity building programmes; preparation of appropriate climate forecasting models for Nepal and regularly updating it based on regional climate models; introduction of agriculture and disaster insurance in climate change-affected areas; and allocation of at least 80 percent of total funds available for climate change-related programmes at the community level.

National Adaptation Programmes of Actions (NAPA) to Climate Change, 2010: The NAPA, through a consultative process, has been prepared as strategic tools to assess climate vulnerability and systemic responses by climate change adaptation measures. The NAPA document has been summarized into six thematic groups: Agriculture and food; Climate induced disasters; Urban settlement and infrastructures; Public health; Forest and diversity; and Water resources and energy. Vulnerability analysis and work of TWG came out with a long list of adaptation options under each theme. Prioritization exercise was done for inclusion in the NAPA. Among nine areas of project profile, one is adapting to climate challenges in public

health. The NAPA has analyzed public health as a separate theme and has prioritized following activities for adapting to climate challenges in public health:

1. Reducing public health impacts of climate change through evidence based research and piloting;
2. Empowering communities through education for responding to the adverse effects of climate change in public health;
3. Investing in disease outbreak and emergency response;
4. Scaling up programmes on vector-borne, water and food-borne diseases and disasters;
5. Strengthening forecasting/early warning and surveillance systems on climate change and health.

The adaptation strategies that have been identified in the NAPA, has largely focused on awareness raising and health care system strengthening at community level including urgency of research and studies to understand the scale and epidemiology of health problems induced by climate change and variability and formulation of evidence informed adaptation strategies. The adaptation options identified in other thematic groups such as water & energy, forest & biodiversity, agriculture, climate induced disasters etc. are also relevant for protecting health from climate change indicating the need of inter-sector collaboration.

National Framework on Local Adaptation Plans of Action (LAPA) 2011: The LAPA was formulated in line with the NAPA as a national framework to provide the effective delivery of adaptation services to the most climate vulnerable areas and people. The LAPA Framework ensures the process of integrating climate adaptation and resilience into the local and national planning. The LAPA actions include: identifying the most climate vulnerable communities; identifying and prioritize adaptation; preparing the LAPA and integrate it into the local and national plans in accordance with the LSGA; identifying and mobilising appropriate service delivery agents; adopting and/or implementing adaptation actions sequentially; and conducting monitoring and evaluation by ensuring effective implementation of the plan. The LAPA requires

that all sectors integrate the local adaptation plan of action for climate change adaptation into the sector development plan at the local level. The LAPA mainly provides the process.

National Health Policy 2014: The new Policy has been developed as an improvement to the National Health policy of 1991 for ensuring quality health services to the people of Nepal without any discrimination. This aims to ensure the rights of people to quality services. The main objective of the new policy is the universal coverage of health services to all. The policy has one objective to gradually mainstream health in all policies by further strengthening collaboration with multi-sector stakeholders in health. In order to achieve this objective of health in all policies, it has adopted following strategies:

- Health agenda will be included in all concerned policies;
- For the overall management of the negative effects of climate change on health, a multi-sector plan will be developed in collaboration with all stakeholders and by properly utilizing the national networks and mechanisms or opportunities;
- The multi-sector action plan will be prepared and implemented in such a way that there will be multi-sector coordination on various aspects such as safe drinking water, sanitation, energy, food security, climate, environment, education, accommodation, infrastructure development including roads which affect in availing the health service.

National Population Policy 2014

This policy has given emphasis on carrying out research studies on inter-relationship between climate change, environmental degradation and different aspects of population for managerial works which maintain intimate relationship between population and sustainable development.

Nepal Health Sector Programme -Implementation Plan (NHSP IP-II): This is a continuation of NHSP IP-I (2004-10) extending plan for 2011-15. The plan has been prepared with the vision to improve health and nutritional status of Nepali population, especially the poor and excluded people. It has the objective to improve the health system to achieve universal coverage of essential health services including communicable disease control. The NHSP IP-II has added

sanitation and hygiene for community as one of the health promotion activities and environmental health (water, air quality, sanitation, hygiene, waste disposal,) as one of the components of essential health services for piloting and scaling up with inter-sector partnership. The Action also includes establishing a knowledge network with academia and practitioners on climate change; and a public health response team for climate change. But environmental health or climate change activities have not been incorporated into the institutional framework explicitly.

Nepal Health Sector Strategy 2015-2020

The Nepal Health Sector Strategy 2015-2020 (NHSS) is recognized as the strategy that will guide the sector, taking into account multi-sector collaboration to address the social determinants of health over the next five-year period (2015-2020). It responds to the existing socio-political environment and the changes that have taken place both in the local and global health agenda. This strategy is developed following the overarching planning and monitoring frameworks of the National Planning Commission and is guided by the National Health Policy 2014. It articulates nation's commitment towards achieving Universal Health Coverage (UHC). This strategy has given emphasis to establishing multi-sectoral response to climate change.

Need of National Climate Change Health Adaptation Strategy

The United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and its Kyoto Protocol adopted in 1997 refer to the legal frameworks that maintain the international climate change process and agenda. Both legal instruments are serviced by the Climate Change Secretariat or the UNFCCC secretariat. The Secretariat is accountable to the Conference of the Parties (COP) to the Convention, which meets annually to negotiate and further discuss the international climate change agenda and related commitments from countries. Articles 72 and 93 of the UNFCCC set the framework for international organizations to cooperate and contribute technically in their respective areas of work to the COP and to its subsidiary body for

the scientific and technological advice. The article 1 of the UNFCCC 1992 refers to health which has one of the adverse effects of climate change and the article 4 refers to the commitments of countries to assess the health implications of adaptation and mitigation policies. Similarly, the Cancun decision on the UNFCCC in 2010 has also identified health as a priority in climate adaptation actions.

Parties to the UNFCCC have decided to provide financial support to the Least Developed Countries (LDCs) from the LDC Fund to formulate and implement the National Adaptation Plan (NAP). None of the LDCs has secured funding for NAP process from the LDCF as it is 'empty' now. The LDCs may wish to secure funding from the Green Climate Fund (GCF) through its readiness programme. As Nepal has negligible greenhouse gas emission, it has to build its adaptive capacity and resilience to cope with the adverse impacts of climate change. Established by the Cancun decision on the UNFCCC in 2010, the NAP has the objectives of: (i) reducing vulnerability to the impacts of climate change by building adaptive capacity and resilience; and (ii) facilitating the integration of climate change adaptation (CCA) into relevant new and existing policies, strategies, programmes and activities of relevant sectors, and at different levels. The NAP contributes to address medium and long-term adaptation needs of the least developed countries (LDCs) and other developing countries.

To achieve the goals of healthy people in healthy communities, it is critical that the health sector is properly represented in the NAP process. Excluding the health sector in adaptation planning can miss critical actions to protect population health, and can result in policies and programmes in other sectors inadvertently causing or contributing to adverse health impacts, thereby undermining efforts to protect the environment. The health national adaptation process (H-NAP) should be a health component of the NAP. The health adaptation plan (NAP) is designed to achieve the national health adaptation goals within a specific period of time and given available resources.

The H-NAP follows the principles stated in the LDC Expert Group (LEG) guidelines for the overall NAP process (WHO 2014). These include:

- The NAP is a country-driven process owned by the Government of Nepal.

- Ensuring that the health adaptation planning is based on the best available evidence.
- Building on existing national efforts towards health adaptation to climate change, including assessments, and development and implementation of policies and programmes at local to national levels.
- Integrating health adaptation to climate change into the national health planning strategies, processes, and monitoring systems.
- Providing a flexible and context-specific approach to health adaptation to climate change. National circumstances, available information and experiences on health and climate change will determine the scope, institutional arrangements, and resources required for proper implementation of the health component of the NAP.
- Maximizing synergies across sectors, mainly across those that determine health, such as food, water, energy and housing sectors. This calls for developing relevant health indicators within the adaptation monitoring systems in these sectors, ensuring that the health considerations are integrated into their adaptation planning to avoid mal-adaptation.
- Ensuring that the health adaptation plan feeds into and coordinates with the overall NAP process.
- Piloting approaches that promote an iterative process for health adaptation to climate change, producing time-bound plans.

Vision, Mission and Goal

Vision: Develop climate resilient health system to protect human health from climate change in Nepal

Mission: Creating a national framework for engaging the public, private sector, civil society organizations and development partners in a participatory process for responding to adverse health effects of climate change.

Goal: To reduce vulnerability and enhance adaptation measures to reduce adverse effects of climate change on human health

National Strategic Objectives (SOs) of the Climate Change Health Adaptation Strategy

- SO 1: To raise public awareness about climate change and its effects on health;
- SO 2: To generate evidences on health effects of climate change at national and sub-national levels through research and studies;
- SO 3: To reduce the morbidity and mortality of infectious diseases (vector, water, air and food-borne diseases) and malnutrition attributed to climate change;
- SO 4: To manage the risks of extreme climatic events; and
- SO 5: To protect human health from climate change through multi-sectoral response ensuing health in all policies.

Implementation Strategies

The National Climate Change Health Adaptation Strategy of the Federal Democratic Republic of Nepal envisages the objectives and the activities that will be carried out by the health sector in cooperation with other relevant sectors in the country. Its goal is to interlink this one with other strategies in this area developed by other sectors and to form a part of the chain of activities aimed at reducing the impact of climate change on people's health in the Federal Democratic Republic of Nepal. The Federal Democratic Republic of Nepal determines its national structures and resources for public awareness by enhancing surveillance alert and response to climate-change-related diseases and also develops and implements national action plans that meet the demands for key capacities. The strengthening of national preparedness, surveillance and response capacities are essential for mid- and long-term reduction of public health threats in the country as well as preventing their spread internationally. The implementation of the activities will not only strengthen national capacity, but also lead to improved capacity of the entire health system.

The coordination of the cooperation between the institutions involved will be provided by the Ministry of Health and Population, which is in charge of monitoring the level of implementation of the Strategy and the Action Plan. There will be a responsible and designated unit/section from the Ministry of Health (MoH) to monitor, manage and coordinate the process.

In close cooperation with the Department of Health Services, the responsible unit/section will identify the qualitative and quantitative indicators for monitoring the progress of the Strategy in the National Public Health System. Also, the responsible person will be in charge of identifying the relevant WHO global indicators for climate change and health connected with international public health safety and implementing them in the Federal Democratic Republic of Nepal. The responsible person will also be the in-charge of identifying the indicators relevant for the legal procedures and processes as well as data collection and analysis in accordance with the best standards connected with climate change.

Identifying and locating the population groups most vulnerable to climate change is the most important preparative measure for strengthening the activities for these groups in the adaptation of the health system. The MoH, the Federal Democratic Republic of Nepal will define the populations at risk in the country on the basis of national data and evidence-based scientific findings. Climate change risk and health communication, adaptation, education and providing behavioural advice depend on the actions and goals, the locality (different geographical locations in the country) and the specific risk group being targeted.

The major implementation strategies can be listed as follows:

1. Establish effective climate response units capable of national and international negotiation on funds and technology transfer, within-country knowledge management, and programme planning and implementation;
2. Develop and implement an action plan based on national and international evidence;
3. Ensure the adequacy and appropriateness of human and financial resources;

4. Strengthen a surveillance system at appropriate levels to monitor the risk factors/ behaviours, water and air quality, food safety, vectors, diseases and malnutrition;
5. Prevent the transmission of vector borne, water borne, air borne and food borne diseases;
6. Strengthen research capacity to assess vulnerability and conduct the surveillance of climate sensitive risk factors and diseases.

Monitoring and Evaluation

The MoH will primarily be responsible for monitoring and evaluating the implementation of this strategy. The MoH will prepare and implement monitoring and evaluation indicators. The concerned divisions of Ministry will be responsible for maintaining work progress and resolving implementation issues. The local institutions will implement, monitor and evaluate the local level programmes in a prescribed format and report to the MoH. The budget, annual programme and progress of the projects/programmes related to climate change will be submitted to the MoH and to the Climate Change Council and related agencies, and made public.

Financial Implications

- Managing the finances in the Climate Change Fund, which are provided by the Government of Nepal, bilateral and multilateral agencies, national and foreign individuals and organizations, and the funds established under the UNFCCC and programmes to support climate change activities; and
- Allocating at least 80 percent of the total budget from the Climate Change Fund directly to programme implementation at the community level as provisioned in the National Climate Change Policy 2011.

Action Plan for Climate Change Health Adaptation Strategy (2016-2020)

SO 1: Raise public awareness about climate change and its effect on health

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
1.1 Education on and provision of regular information to the public on climate change health effects	Preparation, printing and distribution of information, education and communication (IEC) leaflets and brochures about impact of climate change on health and protection measures	2016-continuously	National Health Education , Information and Communication Center (NHEICC)	Annual production and distribution of IEC materials
	Regular media briefing	2016-continuously	NHEICC	Number of media briefings
	Participation in audio/visual (appropriate methods and media) shows about the effects of climate change on health (Advocacy, social mobilization and BCC) based on target	2016-continuously	NHEICC	Number of TV shows

	population needs and demand.			
1.2 Introduce/update climate change and health related modules into school and university curriculum	Update/revision of curriculum	2016-2020	NEHICC in collaboration with Curriculum Development Center (CDC) of schools and universities	Course contents of climate change and health in the School and University curriculum
1.3 Capacity development of health professional and other related stakeholder at all level.	Regular training programmes to health professionals	Since 2016-regularly	National Health Training Centre (NHTC)	Number of trained participants
1.4 Integrating content of health impacts of climate change in informal sector	Development of audiovisual materials and dissemination in non-formal education sector	2016-2020	NHEICC in collaboration with non-formal education center	Production of audio-visual materials on climate change and health

SO 2: Generate evidences on health effects of climate change at national and sub-national level

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
2.1 Improving the recording and reporting of climate sensitive health risks	Training to health professionals on diagnosis, data recording format and reporting	2016 – regularly	Management Division/HMIS and D (P)HOs	Data base of climate sensitive diseases/risks
	Development of training manual on climate change and health research	2016	NHTC	Training Manuals
	Institutional based research activities in all level (give targets for hospital and district office)	2016-2020	NHRC	Research reports
2.2 Enhancing the capacity on data analysis in particular to climate and health data	Training on data management and analysis	2016-2020	Nepal Health Research Council (NHRC) / Universities	Number of trained participants on data analysis and management
2.3 Mapping of research institutes/Experts working on climate change	Institutional mapping and developing roster of experts	2016-2017	NHRC	Research report/Roster/Da tabase

and health				
2.4 Develop and maintain a database of past and current research projects related to climate change and health	Development of online data base of health research bibliography in Nepal	2016-regularly	NHRC	Health Research Data base
2.5 Institutional linkage and co-ordination about generated evidences	Regular interaction through meetings/ publications/ dissemination	2016-regularly	NHRC/ Universities	Database of institutions/ research reports/published articles
2.6 Strengthen translation of evidences generated in climate change and health to appropriate policy and program actions	Regular interaction between researchers and policymakers	2016-regularly	NHRC/ Ministry of Health	Number of evidence based policies and programs
2.7 Enhance institutional and individual capacity on developing policy briefs and doing systematic reviews on climate change	Training workshops	2016-regularly	NHRC/ Universities	Number of policy briefs and published systematic reviews on climate change

on health				and health
2.8 Mapping of distribution of medicinal plants above 3000 m	Conduction of regular survey to spatio-temporal distribution of medicinal plants above 3000m in Nepal	2016-2020	Department of Aurveda/Aurv eda Research and Training Center	Survey reports and distribution maps
2.9 Conduct multi-sectors surveys on health impacts of climate change on health	Research studies and surveys	2016-2018	NHRC	Research and Survey Reports
2.10 Conduct and promote Research on health risks related to extreme climatic events and advocate for implementation of evidence based recommendation	Conduction of scientific research and research communication via appropriate channel	2016	NHRC/NAST/ Universities/ Research Institutions	Research reports and policy briefs
2.11 Improving Recording and reporting of epidemic and extreme events risks	Revising/developing electronic data base for compiling disaggregated data	2016 and regularly	MoH/MoHA and related institutes	Reports

SO 3: To reduce morbidity and mortality of infectious diseases (vector, water, air and food-borne diseases) and malnutrition attributed to climate change

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
3.1 Strengthen and establish surveillance system of climate related/sensitive infectious diseases	Training to health professionals on diagnosis, data recording format and reporting	2016 – regularly	Epidemiology and Disease Control Division (EDCD)	Data base of climate sensitive diseases/risks
3.2 Implement climate resilient water safety plan	Supply of sufficient safe drinking water	2016 – regularly	Ministry of Drinking Water and Sanitation d/Department of Water Supply and Sewerage (DWSS)	Percentage of population covered of safe drinking water and sanitation
3.3 Strengthen water quality surveillance	Training to technicians of local bodies/District Public Health Office on water quality surveillance	2016 – regularly	EDCD/MoH	Data generated from water quality assessment
3.4 Protect water source and promote open	Raising awareness	2016 – regularly	DWSS	Number of ODF declared districts/VDCs

defecation free (ODF)				
3.5 Improve air quality and monitor air quality and air borne diseases	Raise awareness on air pollution and air borne diseases	2016 – regularly	Ministry of urban development/ Ministry of federal affairs and local development, MoHP	Hospital data on air borne diseases/ survey reports
3.8 Advocate to ensure food safety	Awareness and monitoring on food safety	2016 – regularly	Ministry of Agriculture	Reports
3.9 Promote appropriate feeding practices	Awareness raising and behaviour change programmes	2016- regularly	Child Health Division/MoH	Reports
3.10 Environmental sanitation and Hygiene promotion	Awareness raising and behaviour change programmes	2016- regularly	NHEICC/ DWSS	Percentage of households practicing environmental sanitation and hygiene promotion
3.11 Strengthen surveillance on vector,	Review and scale up of programmes	2016- 2017	EDCD	Changes in or scale up of diseases control programmes

water and food borne diseases and scale up of diseases control programs as per the need				
---	--	--	--	--

SO 4: To manage the risks of extreme climatic events

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
4.1 Strengthen Institutional arrangement for addressing environmental health and climate change issue	Strengthening institutional capacity in the relevant ministries and institutions by assigning working groups for implementation of activities in the area of environmental health and climate change	2016	MoH/MoPE/MoLD/MoUD and other government bodies	Signed decisions for responsible people appointed to the working groups
4.2 Establish early warning system	Develop early warning alert system regarding the quality of the ambient air and epidemic of	2016-regularly	MoHP/MoSTE/MoHA/MoLD and other government bodies	Functional alert system for early warning regarding the quality

	communicable diseases to protect health			of the ambient air, water, extreme events such as cold wave, heat wave, landslides, floods etc, epidemic preparedness to protect health
4.3 Set up Rapid Response Team Awareness	Formation of rapid response team at central, federal state, district and local level	2016	MoHP/MoHA/MoSTE	Meeting minutes and formation of functional working groups
Development of environmental friendly health institutions	Construction of environmental friendly health institutions	2016-2020	MoH in collaboration with DUDBC	Number of environmental friendly health institutions
4.5 Preposition of logistics	Preparation of contingency plan	2016 and regularly	MoH/MoF/MoHA/MoD	Contingency plan
4.6 Strengthen legal framework	Review and update of legislation to suit present context	Regularly		Legislations in actions

SO 5: To protect human health from climate change through multispectral response ensuring health in all policies

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
5.1 Formation of Multi-sectoral co-ordination committee	High level committee, steering and working committee	Sep 2015	NPC/MOHP	No. of meetings of the committee
5.2 Advocacy and awareness for stakeholders	Orientation to stakeholders, IEC/BCC	By Dec 2015	NPC/NHEICC/MOH	No. of stakeholders oriented, No. of IEC/BCC material produced
5.3 Incorporate Health in all Policies	Incorporate Health issues in all sectoral policies of	2016 onwards	NPC/MOH/ all sector	No. of sector/Policies incorporated the health issues in relation to climate change
5.4 Multi-stakeholders Surveillance of health risks related to climate change	Surveillance body/site/process	2016 onwards	EDCD/MOH	No. of Health risks Identified

References

1. IPCC, *Climate Change 2013. The Physical Science Basis. Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change-Abstract for decision-makers*, T.F. Stocker, et al., Editors. 2013: Cambridge, United Kingdom and New York, NY, USA.
2. MoE, *National Adaptation Program of Action to Climate Change (NAPA)*. 2010, Government of Nepal, Ministry of Environment: Kathmandu.
3. Shrestha, A.B., et al., *Maximum temperature trends in the Himalaya and its vicinity: An analysis based on temperature records from Nepal for the period 1971-94*. *J Climate*, 1999. **12**(9): p. 2775-2786.
4. Qi, W., et al., *Climate change on the southern slope of Mt. Qomolangma (Everest) Region in Nepal since 1971*. *Journal of Geographical Sciences*, 2013. **23**(4): p. 595-611.
5. Shrestha, A.B. and R. Aryal, *Climate change in Nepal and its impact on Himalayan glaciers*. *Reg Environ Change*, 2011. **11**(Suppl. 1): p. S65-S77.
6. Baidya, S.K., M.L. Shrestha, and M.M. Sheikh, *Trends in daily climatic extremes of temperature and precipitation in Nepal* *J Hydrol and Meteorology*, 2008. **5**(1 March 2008): p. 38-51.
7. Aryal, A., D. Brunton, and D. Raubenheimer, *Impact of climate change on human-wildlife-ecosystem interactions in the Trans-Himalaya region of Nepal*. *Theor Appl Climatol* 2014. **115**(3-4): p. 517-529.
8. Chaudhary, P. and K.S. Bawa, *Local perceptions of climate change validated by scientific evidence in the Himalayas*. *Biol Lett*, 2011. **7**(5): p. 767-70.
9. Kulkarni, A., et al., *Projected climate change in the Hindu Kush-Himalayan region by using the high-resolution regional climate model PRECIS*. *Mt Res Dev*, 2013. **33**(2): p. 142-151.
10. IPCC, *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. S. [Solomon, et al. 2007, United Kingdom and New York, NY, USA: Cambridge University Press. 996.
11. Shrestha, U.B., S. Gautam, and K.S. Bawa, *Widespread climate change in the Himalayas and associated changes in local ecosystems*. *PLoS One*, 2012. **7**(5): p. e36741.
12. Dhimal, M. and C.L. Bhusal, *Impacts of climate change on human health and adaptation strategies for Nepal*. *J Nepal Health Res Council*, 2009. **Oct**;7(15): p. 140-141.
13. Dhimal, M., *Climate Change and health: research challenges in vulnerable mountainous countries like Nepal* in *Global Forum for Health Research, Young Voices in Research for Health*. 2008, The Global Forum for Health Research and the Lancet Switzerland p. 66-69.
14. Dhakal, S., D.D. Joshi, and P. Chand, *Geographical expansion of Japanese Encephalitis and research need in Nepal* *Zoonoses and Food Hygiene News* 2011. **17**(4 (October-December)): p. 2-4.
15. Dhimal, M., B. Ahrens, and U. Kuch, *Altitudinal shift of malaria vectors and malaria elimination in Nepal*. *Malar J*, 2014. **13**(Suppl 1): p. P26.
16. Dhimal, M., B. Ahrens, and U. Kuch, *Species composition, seasonal occurrence, habitat preference and altitudinal distribution of malaria and other disease vectors in eastern Nepal*. *Parasit Vectors*, 2014. **7**(1): p. 540.
17. Dhimal, M., B. Ahrens, and U. Kuch, *Climate Change and Spatiotemporal Distributions of Vector-Borne Diseases in Nepal--A Systematic Synthesis of Literature*. *PLoS One*, 2015. **10**(6): p. e0129869.
18. Dhimal, M., et al., *Risk factors for the presence of chikungunya and dengue vectors (Aedes aegypti and Aedes albopictus), their altitudinal distribution and climatic determinants of their abundance in central Nepal*. *PLoS Negl Trop Dis*, 2015. **9**(3): p. e0003545.

19. Ostyn, B., et al., *Transmission of Leishmania donovani in the Hills of Eastern Nepal, an Outbreak Investigation in Okhaldhunga and Bhojpur Districts*. PLoS Negl Trop Dis, 2015. **9**(8): p. e0003966.
20. MOH and WHO, *Protecting Health from Climate Change: Vulnerability and Adaptation Assessment of Health Impacts of Climate Change in Nepal 2015*: Kathmandu