Unoffical Translation

Health National Adaptation Plan (H-NAP)

Climate Change Health Adaptation Strategies and Action Plans of Nepal (2017-2021)

Government of Nepal
Ministry of Health and Population
Ramshahpath, Kathmandu

मा. पद्मा कुमारी अर्याल
राज्यमन्त्री
स्वास्थ्य तथा जनसंख्या मन्त्रालय
Hon. Padma Kumari Aryal
State Minister
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नेपाल सरकार
Government of Nepal

रामशाहपथ, काठमाडौं, नेपाल
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Subject: -

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Message

It gives an immense pleasure to present the long-awaited Health National Adaptation Plan (H-NAP) 2017-2021. Climate Change has visible impacts on different sectors including health although country's contribution towards global warming is very negligible. This plan has been prepared to address health impacts of climate change in a systematic way. This plan sets strategic objectives and defines roles and responsibilities to meet these objectives. In this way, this plan will play a vital role in guiding for the next five years to address the impacts of climate change on human health.

Ministry of Health and Population (MoHP), together with many partners from the public and private sectors is committed to further improve public health through adaptation in order to reach the targets of Health National Adaptation Plan. The Ministry would like to work in close collaboration with Ministry of Population and Environment (MoPE) and other related government agencies, academic and research institutions, development partners, I/NGOs involved in improving the health through climate change adaptation.

I hope this plan will help to raise awareness among all the stakeholders about the importance of climate change adaptation. This plan will be very useful to understand the different strategies adopted to protect human health from the possible effects induced due to climate change.

I would like to thank Nepal health research council (NHRC) and WHO for continuous support in making this plan. I like to extend my sincere appreciations and thank all partners for their invaluable contribution in preparing this plan.

Lastly, I would like to acknowledge and congratulate Dr. Pushpa Chaudhary, Secretary, Ministry of Health and Population for her dynamic leadership during the preparation of this plan. I would also like to extend my sincere thanks to Dr. Dipendra Raman Singh, Chief, Curative Service Division and the entire team of the Ministry and all the experts for their efforts in preparing the plan.

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Message

Nepal is one of the most vulnerable countries with respect to climate change.It cannot be ignored the growing trend of the temperature in coming years due to increases in the human population, increased use of fossil fuels, vehicles, development activities and change in agriculture patterns. Due to increase in temperature the impacts of climate change also tend to increase which results in direct impact on health.

The Health National Adaptation Plan (2016-21) will provide a range of information much demanded by health analyst and policy makers and is critical in responding to existing and future policy challenges and needs. The aim of H-NAP is to minimize the adverse effects of climate change on human health. Moreover, this plan will be a useful document for any policy makers, decision makers, planners, managers, academics, researchers and other concerned stakeholders to apprehend the health adaptation mechanism in the country.

Finally, I would like to thank WHO Country office for Nepal and members of technical working group for their contribution in developing this important document H-NAP.My sincere gratitude goes to the entire team, who worked tirelessly under difficult circumstances to make it a success.

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Acknowledgement

I am pleased to inform you that Ministry of Health and Population prepared Health National Adaptation Plan (H-NAP) for the period of 2017-2021. If climate change continues in same rate, the burden of disease will increase differently and in new form. Climate change impacts have been identified in many sectors and transversely in Nepalese population as well. Hence, this plan has been prepared to protect human health from the potential effects persuaded due to climate change in Nepal through different measures. They are related with public awareness programmes, researches/studies, capacity building of health professionals and early warning systems through integration of climate risks in health programmes.

The UNFCCC conference held in Cancun in 2010 has made mandatory to set health sector in higher priority of adaptation activity. Similarly, the National Adaptation Programme of Action (NAPA) has identified public health as one of the most vulnerable sectors to the negative effects of climate change. Meanwhile the Ministry of Forests and Environment (MoFE) has been preparing overall National Adaptation Plan (NAP) and we have been leading the thematic group on public health and WASH. This H-NAP document will largely supplement to prepare health component of NAP.

I would like to appreciate World Health Organization (WHO) Country Office Nepal for providing the financial and technical support, without which H-NAP would not have been possible. It was prepared under the DFID funded project "Building adaptation to climate change in health in LDCs through resilient WASH".

The publication of this report has been successful by the tireless effort from Dr. Madhab Prasad Lamsal, Deputy Health Administrator and Chief of Disease Control, Climate Change and Environment Section of Ministry of Health and Population. I am also grateful to then Chief of Curative Service Division Dr. Bhola Ram Shrestha and Section Chief Ms. Yeshoda Aryal for overall involvement in preparing this document. Also, I would like to thank especially to Mr. Raja Ram Pote Shrestha, National Professional Officer from WHO Nepal Country Office for his continuous technical and all sorts of support in preparing and publishing this H-NAP. Along with this, I would also like to extend my sincere thanks to Dr. Meghnath Dhimal of Nepal Health Research Council (NHRC) and entire team of NHRC for their contribution in preparing this plan. Lastly I would like to acknowledge efforts of Mr. Upendra K.C., Environmental Health Officer from Ministry of Health and Population in consolidating this plan for publication. To sum up, I would like to thank as well congratulate to the members of Technical Working Group (TWG) and all officials involved directly and indirectly for their tireless efforts in bringing out this H-NAP in final shape.

My special word of appreciation goes to Dr. Pushpa Chaudhary, Secretary, Ministry of Health and Population for her valuable guidance and supervision during the process of developing and preparation of this plan. Finally, I hope this H-NAP will be helpful in addressing the health issues of the people induced from the impact of climate change.

DR Singh

Dr. Dipendra Raman Singh
Chief, Curative Service Division

Preface

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 any change in climate for a long term which is caused by human activities or natural imbalance. Health is one of the important sectors affected by climate change. So in order to mitigate the negative effects of climate change, the development of Climate Resilient Health System is today's inevitability by preparing appropriate strategies in health sector.

Nepal's green house gas emission is 0.027 percent of the total global emission which is very low but the study and analysis of temperature as well as precipitation in Nepal shows that the climate change is happening in an alarming rate in Nepal. The increased in temperature trend is higher in hill and mountain region then in low land. The climate change induced temperature rise can cause adverse effects such as heavy rainfall in short period, drought, flood, glacier lake outburst, drying of water sources, longer foggy days, cold waves, forest fire, increase occurrence of new diseases as well as spread of diseases in new places.

Climate change adaptation and mitigation measures need to be integrated into the overall development approaches and agenda. This document provides background information on the interrelationship between climate change and health and ways to deal with the health threat of climate change. It also shows the opportunities for the health sector to adapt, as well as describing how it can contribute to adapting the climate change challenge. Climate change and its associated impacts require immediate action in order to safeguard economic development and environment of Nepal.

The main aim of preparing Health National Adaptation Plan (H-NAP) is to reduce the negative effects of climate change on human health by reducing vulnerability and enhancing adaptation related capacity of the people. The objectives envisioned by H-NAP are as: (i) to raise public awareness about climate change and its effect on health; (ii) conduct continuous research and studies for scour and to implement climate change and its effects on human health policy and programme on the basis of evidence; (iii) to mitigate morbidity and mortality induced by climate change infectious diseases (vector, water, air and food-borne disease) and malnutrition; (iv) to manage the risk induced by the extreme climatic events and ; (v) to protect human health from adverse effects of climate change by incorporating health in all policies through multi-sectoral cooperation.

The H-NAP had set a target to mitigate impact of climate change on health by incorporating all relevant sectors through collaboration with other strategies. The focus of this plan is to protect human health from the climate change impacts through mitigation, adaptation and resilience strategies. This plan is designed to achieve the objectives of national health adaptation within a specific period of time through utilization of available resources.

This document has been approved by Government of Nepal, Ministry of Health with ministerial level decision on 2073 Poush 8.

Executive summary

The impact of climate variability and climate change on human beings is quite evident today. Moreover, these impacts seem to have more profound effect in least developed countries. The least developed countries emit nominal amount of greenhouse gases but the people from these countries are facing serious impact of climate change on their health. Despite Nepal's very low contribution to GHG, it ranks fourth most vulnerable country in the World according to the Climate Change Atlas 2010.

Health is one of the important sectors affected by climate change . So in order to mitigate the adverse impacts of climate change on people's health, appropriate strategies are essential for the development of Climate Resilient Health System. The provision of clean air, water, and sufficient nutritious food as well as improvement in infrastructures like environment friendly buildings, settlement and pollution free planned cities are essential for this. 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 overall adaptation planning can develop synergy in actions to protect population health, and the coordination provides equitable profit to the health sector as well.

The different commitments made by the Government of Nepal at national and international level, Constitution of Nepal 2015, National Health Policy of Nepal 2014, Health Sector Strategy (2015-2020), National Population Policy 2014 as well as National Climate Change Policy 2011 have guided to prepare and implement the national climate change health adaptation strategies and action plan.

The main goal of national climate change health adaptation strategy is to protect human health from the adverse effects of climate change by enhancing the partnership on health sector. Similarly, the strategy helps to prepare National Adaptation Plan (NAP) and its effective implementation. The vision, mission and goal of this strategy are as follows.

Vision: To protect human health from the potential impacts of climate change in Nepal through climate resilient health system.

Mission: Creating a national framework for engaging the public, private, civil society organisations 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 to reduce the impacts of climate change on human health, minimise risks and to enhance adaptation measures:

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 continuous 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 induced by the extreme climatic events; and
5. To protect human health from adverse effects of climate change by incorporating health in all policies through multi-sectoral cooperation.

The implementation of climate change health adaptation strategies and action plans aims to meet following targets by 2021

1. Conduct public awareness programmes about climate change and its effect on health in all 75 districts of Nepal.
2. Introduce and deliver courses on climate change and its effects on health in school and university curriculum.
3. Develop capacity of at least 500 health professionals on climate change and health related subject.
4. Improve documentation and reporting of climate sensitive disease and risks on regular basis.
5. Enhance capacity of at least 250 researchers on climate change and health data analysis.
6. Conduct at least 10 national level researches on climate change and health related subject; publication and advertisement of research reports and articles.
7. Develop online database of climate change and health related data and findings of the research.
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 these diseases.
9. Development of early warning system at least in each district level to protect human health from climate induced diseases and risks.
10. Actively mobilise rescue teams in all 75 districts by providing supplementary training for disaster management and epidemic control.
11. Reduce morbidity and mortality by incorporating climate change in all health related policies.
12. Organize National level Workshop on Climate change and health each year.

13. Map distribution pattern of medicinal plants found in higher region above 3000m (10000 feet) in Nepal.
14. Develop models of environment friendly health institutions and advocate with concerned agencies to construct at least 50 such environment friendly buildings of health institutions.

The major implementation strategies are defined as follows:

1. Establish an effective climate change unit under Ministry of Health for knowledge management within country and transfer of necessary fund and technology for planning and implementation of programme which should be capable of fulfilment of coordinating role in national and international level;
2. Develop and implement an action plan based on national and international research evidences;
3. Develop an effective system with necessary skilled manpower with appropriate action plan for managing appropriate human and financial resources;
4. Strengthen surveillance system at appropriate levels for monitoring of air, water pollution, food-borne, vector borne disease and malnutrition related risk factors;
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;
7. Incorporate climate change in all health related policies.

Acronyms

%	Percentage
°C	Degree Celsius
A	Adaptation
AC	Adaptive Capacity
BCC	Behaviour Change Communication
CBS	Central Bureau of Statistics
CCA	Climate Change Adaptation
CDC	Curriculum Development Centre
CHD	Child Health Division
COP	Conference of Parties
DHO	District Health Office
DoA	Department of Ayurveda
DPHO	District Public Health Office
DUDBC	Department of Urban Development and Building Construction
DWSS	Department of Water Supply and Sewerage
EDCD	Epidemiology and Disease Control Division
FM	Frequency Modulation
GCF	Green Climate Fund
GHGs	Green House Gases
HMIS	Health Management Information System
H-NAP	Health National Adaptation Plan
IEC	Information Education and Communication
IPCC	Inter-governmental Panel on Climate Change
LAPA	Local Adaptation Plans of Action
LDCs	Least Developed Countries
LEG	Least Developed Country Expert Group
LSGA	Local Self Governance Act
MoA	Ministry of Agriculture
MoD	Ministry of Defence
MoWS	Ministry of Water Supply and Sanitation
MoF	Ministry of Finance
MoFALD	Ministry of Federal Affairs and Local Development
MoH	Ministry of Health
MoHA	Ministry of Home Affairs
MoPE	Ministry of Population and Environment
MoUD	Ministry of Urban Development
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action

NARTC	National Ayurveda Research and Training Centre
NAST	Nepal Academy of Science and Technology
NHEICC	National Health Education Information and Communication Centre
NHRC	National Health Research Council
NHSS	Nepal Health Sector Strategy
NHTC	National Health Training Centre
NPC	National Planning Commission
ODF	Open Defecation Free
UNFCCC	United Nations Framework Convention on Climate Change
V	Vulnerability
VDCs	Village Development Committee
WHO	World Health Organization

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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 any change in climate for a long term which is caused by human activities or natural imbalance [1]. Climate change is mainly contributed by the emission of greenhouse gases in atmosphere from anthropogenic activities. The complex topography and low economic status of Nepal makes the nation vulnerable to climate change [2]. The study and analysis of temperature as well as precipitation in Nepal shows that the climate change is happening at an alarming rate in Nepal. Similarly, based on the available temperature data the overall temperature of Nepal has increased in such a way that the increase in temperature is found to be higher in hills and mountains regions compared to low lands. [3-5], [6]. The precipitation data has not clearly supported climate change in Nepal; however the extreme and minimal precipitation days are found to be increased. Even though, the impacts of climate change can be experienced through the extreme events in Nepal. For example day and night are getting hotter or cold days and nights are decreasing [6]. Along with this, the increasing temperature, scattered snowfall and rapid melting of glacier lakes have caused scarcity of drinking as well as irrigation water in mountain [5, 7, 8]. The precipitation extremes show an increasing trend in total but much difference has not 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) signifies that towards the end of the 21st century there will be maximum increase in temperature and decrease in seasonal rainfall in 2011-2040 in comparison to 1968-1990 over Nepal but an increase in seasonal rainfall during the period of 2071-2098 compared to the baseline period (1968-1990) [9]. The temperature in Nepal as compared to the year gap 1968-1990 is expected to increase at the rate of 1.4 °C in 2030, 2.8° C in 2060 and 4.7° C in 2090 by scientists. The climate change induced temperature rise can cause adverse effects such as heavy rainfall in short period, drought, flood, glacier lake outburst, drying of water sources, longer foggy days, cold waves, forest fire, increase occurrence of new diseases as well as spread of diseases in new places. The climate change projection models have predicted that the global average earth temperature is likely to increase by 1.5°-4° C at the end of the 21st century in comparison to the period of 1850 to 1900 [1]. More importantly, the increase of the surface temperature has been recorded over the last three decades [1, 10] with the highest increase in the Himalayan region [11] indicating greater effects in mountainous countries. If corrective actions are not duly taken, climate change and climate-induced extreme events will continue to increase the burden of disease and accelerate the loss of lives as well as property. The UN Climate Change Conference of the Parties (COP 21) held in Paris in December 2015 came up with ambition proposal to keep temperature rise "well below" the 2°C. by 21st century. Beside this, the parties have committed to take efforts not to increase temperature rise beyond 1.5° C. The agreement includes a strong commitment to climate adaptation actions; resource mobilization on the basis of loss and damage ratio principle and also provide security measures to the most vulnerable population.

As Nepal's GHGs emission is 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'. Nevertheless, the government of Nepal still recognizes the need to reduce GHGs emissions without affecting overall economic development. The Government of Nepal has committed to adopt all possible measures to promote low-carbon emission and maximize benefits from adaptation because of two reasons. First of all, it must reduce its dependency on unsustainable and expensive fossil fuel to get self-reliance by promoting the renewable sources of energy and to reduce the cost incurred used while importing petroleum products. 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 instance, replacing solid biomass fuel with solar and hydropower can reduce the number of patients suffering from respiratory illness in rural areas; Similarly, promoting clean energy in transport sectors can reduce ambient air pollution; walking and cycling can reduce risk of non-communicable diseases.

Need of National Climate Change Health Adaptation Strategy

Nearly two decades ago i.e. before 1992 United Nations Framework Convention on Climate Change (UNFCCC) was institutionalised to address the climate change issues of which Nepal is also a member country. The article 1 of the convention has considered health sector as one of the adversely affected sectors by climate change whereas the article 4 demands the commitment of member countries for the effective implementation of adaptation measures and GHGs mitigation policies. UNFCCC and Kyoto Protocol adopted in 1997 have provided legal provisions to climate change related international process and agenda. In response to this, every year the UNFCCC organises Conference of Parties (COP), which discusses on climate change related international agenda and commitments made by the member countries.

Parties to the UNFCCC have committed to provide financial support to the least developed countries to develop and implement the National Adaptation Plan (NAP). Such fund provided by the developed countries to the least developed ones should be accessible to everyone. The least developed countries can receive grant through Green Climate Fund for the implementation of adaptation and resilient programmes. Despite negligible contribution on GHG emission, Nepal has to build its strength and capacity to cope with the adverse impacts of climate change. The UNFCCC conference held in 2010 in Cancun has decided to prepare National Adaptation Plan and effectively implement such plan. The objectives of NAP are: (1) reduce climate change induced vulnerability/risks by the help of adaptive capacity and resilient development, (2) facilitate new plans, strategies, programme and activities of relevant sectors and different levels with adaptation and resilient issues and (3) address medium and long-term adaptation programme as per the needs of least developed countries through NAP. The Cancun decision has set health sector in higher priority of adaptation activity.

National Adaptation Plan should represent health sector as an important part to achieve the goals related to health sector. Exclusion of the health sector in adaptation plan can overlook its significant opportunity in protecting human health. So to effectively address the health sector, National Health Adaptation Plan (H-NAP) should be provisioned under National Adaptation Plan. The health adaptation plan is designed to achieve the objectives of national health adaptation within a specific period of time and through utilization of available resources. The planning of National Health Adaptation Plan has followed principles which are prepared by Least Developed Country Expert Group (LEG) and the principles are as follows:

- The NAP is planned and owned by the Government of Nepal.
- Health Adaptation Plan should be planned on the basis of best appropriate and available evidence.
- The preparation and implementation of climate change health adaptation programs should be incorporated in existing local and national initiatives.
- The climate change health adaptation should be integrated in national health plan strategy, process and monitoring system.
- Climate change health adaptation should be flexible and subject oriented. The National Health Adaptation Policy should be implemented effectively considering national condition, available information and experience on climate change as well as institutional arrangement and availability of resources.
- The health adaptation plan should be ensure its coordination with the overall national adaptation system.

Current climate sensitive health risks in Nepal

Climate change impacts are felt in many sectors and across all Nepalese population. The 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. The climate change and climate variability in health sector have caused rise in water and food, air pollution, nutrition deficiency related disease, injuries and mental illness [12]. However researches on specified disease are very few. Also, research regarding climate change and health in least developed and mountainous nation like Nepal face various challenges. For instance, there is lack of trained human resources, poor financial condition, lack of data base and suitable study techniques [13]. Entomological and epidemiological research carried out in Nepal shows 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]. The impacts of climate change could be foreseen as the rise in average temperature and precipitation as well as change in extreme weather conditions for past three decades along with such impacts predicted to be observed at the end of the decade as well. Such changes can bring direct impacts on human health or indirectly on disease transmitting agents and thereby bringing alteration on overall human health.

Based on global evidence acquired from research and consensus among scientists, if climate change continues in the same rate as it is happening now, the pressure of following illness and diseases seem to increase in different parts of Nepal as compared to scenario without climate:

(1) The increased risk of injury, disease, and death due to heat waves, cold waves and altitude sickness, fires, flood and landslide.

(2) The increased risk of under-nutrition resulting from diminished food production in resource and equipments.

(3) Reduced work capacity of workers from the health risk.

(4) The increased risks of food and water-borne diseases and vector-borne diseases especially in previously considered non-epidemic mountain areas.

(5) The reduced morbidity and mortality due to extreme cold climate in high mountains to some extent.

(6) The Increased morbidity and mortality due to increase cold waves in southern Terai and

(7) The Reduced capacity of vectors in spreading disease due to increase in temperature especially in the Terai regions.

Management of these health effects of climate change will require inputs from all sectors at government and civil society, collaboration between many academic disciplines and new ways of international cooperation. The involvement of local communities in discussing, advocating, assisting and monitoring of the process will be crucial for impact mitigation.

Assessment of climate change impact, risk and adaptation on health

Climate change and its risk study conducted in 2010 have ranked Nepal in the fourth position in the world. Hence there is a need to develop an adaptation strategy to minimize climate change induced health risks. Generally, vulnerability deals with three components viz. risk, sensitivity and adaptation. The first two components in overall represent the potential impacts where as the adaptation can reduce the impacts. Thus, risk is the potential impact (I) minus adaptive capacity (AC).

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. It grouped health impacts due to climate change into three categories (1) Extreme weather related health impacts such as heat wave and cold wave; (2) Vector borne diseases including malaria, and Dengue; and (3) Diarrhoeal disease.

The major findings of the above mentioned study are summarized below.

- Nepal's mountains and hill regions, which make about three-fourths of the total area and where almost 50 percent of the population live, are geologically fragile. There are

altogether 55 districts in mountain and hilly region, out of which 22 districts covering nearly 45 percent area have been defined as remote/marginal districts by the Nepal Government. The marginal regions are characterised by the rugged terrain with slope exceeding 30°, mostly inaccessible by roads, dispersed settlements and poor economic infrastructure such as education, health, employment, etc. The rest of the area is occupied by Terai region which accommodates over 50 percent of the total population.

- The population of Nepal has grown rapidly over the past decades and likewise the urban population is also growing very rapidly. The density of population has increased 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 years old 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 means sensitive score with high range of standard deviation indication high variability among the districts of the cluster. This was followed by the centre hill and the eastern Terai. Two cluster regions, viz. the far-western Mountain and the Far-western Terai had the lowest mean score.
- The hydrology and meteorology related indicators such as temperature, precipitation, along with climate induced disasters, landslides, floods, glacier lake outburst, desertification and drying-up of water sources etc are related to diarrhoea, respiratory disease and malaria. The mid and far western districts are found to be more risk on analysis of these indicators. These are followed by Western Mountain region and the Central Terai region.
- In adaptive capacity, the socio-economic indicators include wealth quintile, gender empowerment, poverty, literacy, nutrition and food balance; the infrastructure indicators includes road, communication and drinking water facility, sanitation and education; the technology indicators comprises TV/radio, telephone/mobile and bicycle/motor cycle; and the health service indicators includes access to health services and human health resources. Similarly, accountability indicators for Nepal government comprises of health service systems, awareness programs and outcome of policy development. In comparison mountain districts of mid and far-western development regions have lowest adaptive capacity.
- On the basis of composite vulnerability analysis, 38 districts are found to be more vulnerable while the remaining districts to be less. When analyzing the districts based on outcomes of vulnerability, seven districts, including three from the western and two; each from the eastern and the mid-western clusters and two from the far-west mountain cluster are found to be vulnerable. Similarly, five districts from western hill and four district from the central hill clusters show low vulnerability.
- Regarding the vulnerability analysis of sensitive hazard like GLOFs, some parts of Eastern Himalayan region, as well as Central and the Western higher Mountain clusters are found to be most vulnerable. In terms of landslides, all the hilly and mountain regions are found to be highly vulnerable in different range values. Similarly, concerning flood, almost the entire Terai region is found to be highly vulnerable. In terms of drought,

especially all the hill and mountain region of the Mid and the Far-western regions, are most vulnerable. Also in terms of adaptive capacity such as socio-economic condition, the Mid and Far-Western regions and the scattered areas throughout the country are found to be vulnerable.

- Regarding the diseases like Malaria, Lymphatic filariasis, Japanese encephalitis, Kalaazer etc, out of the total population 52% is found to be most sensitive to Malaria, 87% to Lymphatic filariasis, 54% to Japanese encephalitis, 30 % to Kalaazar. However, all the population are found to be sensitive to water, food borne disease and non-communicable diseases. From such evidence, it has been clear that Nepal 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 political and cultural aspects. Different intervention measures such as preventive, curative, encouraging and rehabilitative methods are being practiced by the public health sector. Such measures and strategy are adopted eventually to protect from various diseases and enhance the adaptive capacity of the people. The adaptation measures adopted especially for climate sensitive diseases need to be addressed at, community and policy levels.
- Vulnerability in Nepal is linked to the availability of local resources, institutional good governance, quality of public health infrastructure and the access to relevant local information regarding extreme weather threats. The spatial distribution of these factor is not uniform, hence affects the vulnerable population at varying degrees. The differences are governed by the topography, demography, social and economic factors. 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. Therefore those regions which are highly vulnerable require immediate actions to enhance the adaptive capacity so as to raise the quality of health and to reduce the vulnerability. Along with this, the less vulnerable districts also need to adopt mid term and long term measures and strategies.
- Climate change is affecting every individual and their community. Even though, everybody is not equally affected but is affected by a number of factors like geographical condition, health-system preparedness, health status, age, social class and its support systems, etc. Climate change can significantly worsen health conditions of people and their community who are living under poverty and below poverty line. Thus climate change having an integral relation with people's health needs to be appropriately addressed at present scenario.

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

Constitution of Nepal 2015:

The article 30(1) of constitution of Nepal has ensured that each person shall have the right to live in a healthy and clean environment while the article 30(2) has provisioned that the victim of environmental pollution and degradation shall have the right to be legally compensated by the polluters. Hence, Constitution of Nepal 2015 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(1) has stated that Every citizen shall have the right to free basic health care services from the state, article 35(2) has stated that each person shall have the right to be informed about his/her health care services, article 35(3) has mentioned that each person shall have equal access to health care and finally article 35(4) has stated that 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 adoptation 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 different aspects and plans of climate change, as well as development programmes and their implementation. The objectives of the policy are establishment of climate change centre, reduction in GHG emissions, promotion of renewable energy, enhancement of adaptive capacity to protect from climate change induced impacts, initiation of community based local adaptation plan as per NAPA provision, enhancement of the capacity to estimate and forecast the present and future impacts of climate change, promotion of environment to promote environment friendly technologies and to manage solid waste and this policy can play an important role in strategic plan. The policy has set additional objective regarding the formation of sector wise subject related working group and integrating this policy with policies of various other sector. Besides, the policy has emphasized on the implementation of preparedness programmes to combat natural disasters and epidemics; regular implementation of public awareness and capacity building programmes; development of appropriate climate forecasting models in context of Nepal; implementation of agriculture and disaster insurance in regional 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

biodiversity, and Water resources and energy. Vulnerability analysis identified a long list of adaptation options under each theme. During this process, prioritization exercise was done for nine areas of project profile, one is addressing challenges induced from climate change in public health. The NAPA has analyzed public health as a separate theme and has prioritized following activities:

1. Reduce the impact of climate change on public health through evidence based research and piloting.
2. Aware communities about the negative impact of climate change on human health through education and public awareness.
3. Increase the investment for disease outbreak and emergency response.
4. Scale up programmes on vector, water and food-borne diseases and disaster management programme.
5. Strengthen 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 National health policy 2014 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 policy aims to ensure the rights of people to quality health services. The policy has an overall objective of mainstreaming health in all the policies of the nation by

further strengthening the collaboration with various stakeholders in health sector. In order to achieve this objective of health in all policies, it has adopted following strategies:

- Inclusion of health agenda in all concerned policies;
- Development of multi-sector plan for the overall management of the impacts of climate change on health through collaboration with all the stakeholders and proper utilization of the national networks and mechanisms or opportunities;
- Preparation and implementation of multi-sector action plan through coordination among various sectors like clean/safe drinking water, sanitation, energy, food security, climate, environment, education, accommodation, infrastructure development including roads which help to benefit the health sector of the nation.

National Population Policy 2014:

This policy has given emphasis on carrying out effective implementation of necessary programme in coordination and cooperation with stakeholders by conducting studies on the risk level of communities occurred due to the environmental degradation, climate change and natural disaster.

Nepal Health Sector Strategy 2015-2020:

Nepal Health Sector Strategy is focused on multi-sector collaboration to address the social related indicators till 2020. This strategy is prepared following the most important planning and monitoring frameworks of the National Planning Commission and is guided by the National Health Policy 2014. In this strategy Nation's commitment is linked with "Health for all" and given emphasis on multi-sectoral collaboration to climate change.

Vision, Mission and Goal

Vision: To protect human health from the potential impacts of climate change in Nepal through climate resilient health system.

Mission: Creating a national framework for engaging the public, private, civil society organisations 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 of the Climate Change Health Adaptation Strategy

Following specific objectives are envisioned to reduce the impacts of climate change on human health, minimise risks and to enhance adaptation measures:

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 continuous 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 induced by the extreme climatic events; and
5. To protect human health from adverse effects of climate change by incorporating health in all policies through multi-sectoral cooperation.

Targets

The implementation of climate change health adaptation strategies and action plans (2017-2021) aims to meet following targets by 2021

1. Conduct public awareness programmes about climate change and its effect on health in all 75 districts of Nepal.
2. Introduce and deliver courses on climate change and its effects on health in school and university curriculum.
3. Develop capacity of at least 500 health professionals on climate change and health related subject.
4. Improve documentation and reporting of climate sensitive disease and risks on regular basis.
5. Enhance capacity of at least 250 researchers on climate change and health data analysis.
6. Conduct at least 10 national level researches on climate change and health related subject; publication and advertisement of research reports and articles.
7. Develop online database of climate change and health related data and findings of the research.
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 these diseases.
9. Development of early warning system at least in each district level to protect human health from climate induced diseases and risks.
10. Actively mobilise rescue teams in all 75 districts by providing supplementary training for disaster management and epidemic control.

11. Reduce morbidity and mortality by incorporating climate change in all health related policies.
12. Organize National level Workshop on Climate change and health each year.
13. Map distribution pattern of medicinal plants found in higher region above 3000m (10000 feet) in Nepal.
14. Develop models of environment friendly health institutions and advocate with concerned agencies to construct at least 50 such environment friendly buildings of health institutions.

Implementation Strategy

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 mitigate impact of climate change on health by incorporating all relevant sectors through collaboration with other strategies. Implementation of national action plan requires raising awareness, enhancing surveillance, alert on climate change induced disasters, reducing impact of diseases through identification of national resources, instruments and institutions as well as enhancing capacity development to fulfil requirements.

The major implementation strategies are described as below:

1. Establish an effective climate change unit under Ministry of Health for knowledge management within country and transfer of necessary fund and technology for planning and implementation of programme which should be capable of fulfilment of coordinating role in national and international level;
2. Develop and implement an action plan based on national and international research evidences;
3. Develop an effective system with necessary skilled manpower with appropriate action plan for managing appropriate human and financial resources;
4. Strengthen surveillance system at appropriate levels for monitoring of air, water pollution, food-borne, vector borne disease and malnutrition related risk factors;
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;
7. Incorporate climate change in all health related policies.

Monitoring and Evaluation

The MoH will be primarily 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 health institutions will implement, monitor and evaluate the programmes and report to the MoH. The budget, annual programme and progress of the projects/programmes will be submitted to the MoH and to the Climate Change Council and related agencies, and made public.

Financial Implications

- Managing the financial support, 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 programme to support climate change activities.
- Allocating at least 80 percent of the total budget from the Climate Change Fund directly to the community level (grassroots level) for the implementation of programme as provisioned in the National Climate Change Policy 2011.

Action Plan for Climate Change Health Adaptation Strategy (2017-2021)

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

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
1.1 Raise awareness and disseminate information continuously to the general public on climate change and its effects on human health	Preparation and distribution of Information Education and Communication (IEC) materials on impacts of climate change on health and its protective measures	Continuously from 2017	National Health Education, Information and Communication Centre (NHEICC)	Production and distribution of IEC materials in number/year
	Regular dissemination of information to the media and to the community through media	Continuously from 2017	NHEICC	Dissemination of information to the media and to the community through media (times)/ year
	Use of audio/visual (appropriate methods and media) show effects of climate change on health. Conduct social mobilization and behavioural change activities for the affected community based on need and demand	Continuously from 2017	NHEICC in collaboration with various curriculum development centres	Number of TV shows, radio programme, street dramas and exhibitions (times)/year

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
1.2 Introduce and update climate change and health related subjects into school and university curriculum	Update/revision of curriculum	2017-2021	NHEICC in collaboration with Curriculum Development Centre (CDC) of schools and universities	Course contents on climate change and health related issues in the School and University curriculum
1.3 Enhance capacity of climate change and health related entities such as health ministry, line agencies/ stakeholders and individuals	Organize regular training programmes on capacity development	2017-2021	National Health Training Centre (NHTC)	Number of trainings conducted and participants involved
1.4 Integrate issue of climate change and its health impacts to informal education sector	Preparation and distribution of audio visual materials in informal education sector	2017-2021	NHEICC in collaboration with non-formal education center	Number of audio-visual materials produced and distributed

2: Generate evidences on the health effects of climate change at national and sub-national level through continuous research and studies

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
2.1 Document and improve reporting of climate sensitive health risks	Training to health professionals on diagnosis, data recording format and reporting	Continuously from 2017 –	Management Division/ HMIS and D (P)HOs	Data base of climate sensitive diseases/risks
	Development of training manuals	2017	NHTC	Training Manuals
	Enhance institutional based research activities in all level	2017-2021	NHRC, EDCD	Research reports
2.2 Enhance capacity on climate change and health related data analysis	Trainings on data management and analysis	2017-2021	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 and health sector	Preparation of List / mapping of Institutions and roster of experts	2017-2021	NHRC, NAST, Universities	Research report/Roster/ Database/Mapping
2.4 Develop and maintain a database of past and current research projects related to climate change	Development of online data base of climate change and health related research in Nepal	Continuously from 2017-	NHRC, Universities	Data base of reports on Climate change and Health issues

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
2.5 Conduct research/ studies on disaster management and epidemic control along with their effective implementation, inspection, monitoring and evaluation	Conduct scientific research and disseminate it through appropriate media	Continuously from 2017	NHRC/ NAST/Universities/ Research Institution	Database of institutions/ research reports/ published articles
2.6 Document and prepare report on disaster management and epidemic control	Revision and update of online data base for aggregation of dispersed data	Continuously from 2017	Ministry of Health, MoHA and concerned institutions	Report
2.7 Institutional coordination, cooperation and communication on disaster management and epidemic control related evidence	Organize interaction programme/ workshop/ seminar regularly through meeting, publication and advertisement, Broadcast result through FM radio and national television	Continuously from 2017	NHRC/ Universities	Data base list of institution, research, report and research paper. Record and list of broadcasting materials
2.8 Conduct continuous survey and research on impact of climate change in the geographic distribution of medicinal plants found in Himali region above 3000m	Conduction of regular survey and research	2017-2021	Department of Ayurveda/ National Ayurveda Research and Training Center/NHRC	Research and Survey reports

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
2.9 Conduct multi-sectoral study and research on risk of climate change on health	Conduction of studies, Research and surveys	2017-2019	CBS/NHRC	Identification of health related risks Approval of studies, research and reports

3: Reduce morbidity and mortality of infectious diseases (vector, water, air and food-borne disease) and malnutrition attributed to climate change.

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
3.1.1 Strengthen and establish surveillance system of climate sensitive infectious diseases	Training to health professionals and researchers on data base format and report	2017 – 2018	Epidemiology and Disease Control Division (EDCD), MoH	Data base of climate change induced diseases/ risks
3.1.2 Increase research and surveillance on vector borne disease	Conduct surveys	Continuously from 2017	MOH, Vector-Borne Disease Research and training Center (VBDRTC)	Data base
3.1.3 Revision, review and scale up of programmes related to spreading of vector/ water borne disease and mapping of places having chances of epidemic due to climate change	Review and scale up of programmes	2017-2018	EDCD, MoH	Changes in and scale up of diseases control programmes

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
3.1.4 Survey on zoonosis and new diseases	Conduct surveys	Continuously from 2017	MOH, MOA	Database
3.2 Implement climate resilient water safety plan	Maintain supply of sufficient, clean and safe drinking water	Continuously from 2017	Ministry of Water Supply and Sanitation / Department of Water Supply and Sewerage (DWSS)	Percentage of population using clean and safe drinking water
3.3 Surveillance on the implementation of national drinking water quality standard	Test on the supplied drinking water quality	Continuously from 2017	EDCD/MoH	Data base generated from clean/safe drinking water
3.4 Protect water source and promote open defecation free (ODF) zone	Raise public awareness	Continuously from 2017	Ministry of Water supply and Sanitation/ DWSS, NHEICC, Media	ODF declared zone at districts/VDC level
3.5 Improve and monitor air quality and mitigation of air borne diseases	Raise awareness on air pollution and air borne diseases	Continuously from 2017	Ministry of Population and Environment/ Department of Environment, NHRC	Hospital and survey data on air borne diseases
3.6 Advocate to ensure food security	Awareness and monitoring on food security	Continuously from 2017	Ministry of Agriculture	Reports
3.7 Promote appropriate use of food	Organize awareness raising and behavioural change programmes	Continuously from 2017	Child Health Division/MoH	Reports
3.8 Promote environmental sanitation, and healthy lifestyle	Organize awareness raising and behavioural change programmes	Continuously from 2017	NHEICC/ DWSS/ MoFALD	Percentage of households practicing environmental sanitation and hygiene

4: Manage the risks induced by the 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	Formation of working group to implement environmental health and climate change related issues and Strengthen at institutional level from the relevant ministries and institutions	2017 to 2018	MoH/MoPE	Appointment of responsible person in the working group
4.2 Establish early warning system	Develop early warning system on air quality and epidemic of communicable diseases to protect public health	Continuously from 2017	MoH/EDCD	Functional early warning alert system for air and water quality extreme events such as cold and heat wave, floods etc. Preparedness on epidemic diseases Commute climate related information at important public areas
4.3 Capacity development of Rapid Response Team for disaster management and epidemic control through trainings and exposure visits	Formation of rapid response team at central, provincial, district and local level	Regularly from 2017	MoH/MoHA/MoD/ MoFALD	Meeting minutes and formation of functional working groups

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
4.4 Develop environment friendly health facilities	Revise current policy and implement it to make health institutions environment friendly	Continuously from 2017	MoH/DUDBC/MoUD	Number of environment friendly health facilities
4.5 Prepare plan for necessary logistics	Preparation of contingency plan for necessary logistics	2017	MoH/MoF/ MoHA/MoUD/ MoFALD	Availability of the necessary equipments
4.6 Strengthen legal framework	Review of related documents and maintain their record	Regularly	Ministry of Law	Legislations in actions

5: Protect human health from adverse effects of climate change by incorporating health in all policies through multi-sectoral cooperation

Actions	Measures	Time frame	Responsible institutions	Monitoring and evaluation (Indicators)
5.1 Formation of Multi-sectoral co-ordination committee	Formation of high level committee, steering and working committee and conduct their meetings	Till 2017	NPC/MOH	No. of meetings and decisions taken by committee; conducted at least 3 meeting (Thrice a year)
5.2 Orientation and advocacy for concerned stakeholders	Development of a package to inform the concerned stakeholders to conduct workshop/ seminar and orientation information, education communication (IEC)/ behaviour change communication (BCC)	By end of 2017	NPC/NHEICC/ MOH	No. of stakeholders oriented, No. of IEC/BCC material produced
5.3 Incorporate health issues in all related policies	Incorporate Health issues in all sectoral policies of the nation	Till 2021	MOH/NPC/Ministry of Law Justice and Parliamentary Affairs /Council of Ministers	No. of sector/policies Incorporated health issues in relation to climate change

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