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Review Article

Public Health Impacts of Climate Change in Nepal

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ABSTRACT

Climate change is a global issue in this century which has challenged the survival of living creatures affecting the life supporting systems of the earth: atmosphere, hydrosphere and lithosphere. Scientists have reached in a consensus that climate change is happening. The anthropogenic emission of greenhouse gases is responsible for global warming and therefore climate change. Climate change may directly or indirectly affect human health through a range of pathways related to temperature and precipitation. The aim of this article is to share knowledge on how climate change can affect public health in Nepal based on scientific evidence from global studies and experience gained locally. In this review attempt has been made to critically analyze the scientific studies as well as policy documents of Nepalese Government and shed light on public health impact of climate change in the context of Nepal. Detailed scientific study is recommended to discern impact of climate change on public health problems in Nepal.

Keywords: cardio-respiratory, climate change, injuries, malnutrition, psychological stress, public health, vector-borne diseases.

INTRODUCTION

Climate change is currently a global issue which has raised debate the concerns among scientists and policymakers all over the world. It is well known fact that climate change affects human health.[1] The major cause is anthropogenic activities that has raised atmospheric concentration of greenhouse gases, that warms the Earth's surface.[2] The Intergovernmental Panel on Climate Change (IPCC), predicts an increase in world average temperature by 1.4-5.8 ºC in 2100. During last 32 years, 1.8 ºC temperature has increased in Nepal from 1975-2005.[3-4] Mean annual temperature is projected to be increased by 0.5-2.0 °C, with a multi-model mean of 1.4 °C, in our country by the 2030s.[4-5] The average annual rainfall has shown uneven and erratic weather. The projected mean annual precipitation does not show a clear trend with both increase and decrease by -34 to +22%, with multi-model mean of +0% by the 2030s but -36 to +67%, with in a multi-model mean of +4%, by the 2060s.[4-6] There are several mechanisms by which climate can affect health. The IPCC has grouped the implication of climate change into six broad categories: cardio-respiratory, injuries, malnutrition, vector-borne diseases and psychological stress.[6-8]

Cardio-Respiratory

Climatic condition is directly associated with cardio-respiratory diseases, though health impact is related to exposed environment and duration of exposure.[17] Global studies show that there is association between variation in metrological conditions and cardiovascular mortality. These relationships are supported by strong evidence for direct links between high and low temperature and increased blood pressure, viscosity and heart rate for Cardiovascular diseases (CVD) and broncho-construction for pulmonary diseases, that has also supported by IPCC third assessment report on human health.[15,19-21] The climatic variation, socioeconomic and cultural environment are considered as major contributing factor

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for happening the CVD occurrence.[20] In addition smoggy climate is chief conductive environment for diseases infection. Earth surface has suffered from active human participant by creating the cloudy atmosphere. The outdoor air pollutants have been exceeding the national ambient air quality in most of the cities of Nepal and similar situation of indoor air quality is observed in rural part. However individual exposing behavior to climate play significant role for inducing the problem.[8-13] According to a study about 47% rural and 39% urban women and 31% rural and 45% urban men are suffering from respiratory disorders. The main cause for it was rural women and urban men are more exposed to polluted environment whereas urban women are less exposed to such pollution.[14-21]

Injuries

Climate change can have devastating effects on human physiology and mental disorder.[7] Heavy rain often triggers devastating landslides and floods that cause the death and disability.[20-22] It is very likely that climate change is associated with increases in the frequency of heat waves. Every year, many people loss their lives and more than thousand became homeless and suffer from various diseases and injuries in different parts of country due to adverse environmental catastrophes. In addition, more than hundred people in every year die due to sudden occurrence of disaster.[22-24] As per the 2001 to 2007 report of disaster management section about 1318 people injured due to various disasters.[23] The information showed that there is somewhat increase in trend of loss in magnitude of life and properties. Various types of health impacts have reflected through out the world ranging from immediate effects of physical injury, morbidity and mortality by different type of natural disaster.[2]

Psychological Stress and Malnutrition

As global temperatures increase, heat waves will become more common, last longer and be more severe. In addition, maladaptive coping mechanisms and poor quality housing are likely to confer further vulnerability on people with mental health problems.[24,34] Indirect consequences of climate change, such as migration and economic collapse, are potential drivers of adverse health outcomes. About 21% patients have suffered from schizophrenia and 56% from neurotic disorders in Nepal.[24-25] If one member of a family loss life in calamity, the family loss their support which could lead to mental stress. The mental depression has become one key health hazard and responsible cause for it may attributed to nutrition deficiency.[25-27] About 48% of children are under weight, 50% are stunted while remaining 10% are wasted, and drought and many other climatic variations induced agricultural production imbalance are considered as contributing factor for the mentioned child growth defects.[28] The average annual agriculture production has reduced in subsequent years. Crop production has reduced by 12.5% in 2005-06 on national basis; though crop production is fluctuating around the country depending upon climatic variations induced natural disaster, which is highly affecting the nutritional need of people, mainly those people living under the clouds of poverty. Fruits-like peach, pear and apple has found off-season flowering in higher altitude regions of Nepal.[29- 32]

Vector-Borne Diseases

Natural calamities eventually destroy the infrastructures, natural habitat, take lives of the people and damage all aspects of environment.[32-35] Apart from this, that calamity further helps to emerge most of the vector borne diseases like malaria, kala-azar, dengue, plague etc. There are some examples that suggest climate change has already resulted in the introduction of infectious diseases into previously unaffected geographic areas.[37-39] One such example is the spread of mosquito vector into highland regions such as Himalayan, mountain district etc, where the vector and its infection did not exist previously. Malaria is now prevalent in 65 districts of the country with highly endemic in 13 districts among 52 endemic districts. In Nepal, the first case of dengue was reported in 2004 from Chitwan district and first outbreak of dengue had occurred at Banke in 2006.[38-40] Later on 140 cases of dengue fever in five major urban areas of terai bordering with India was found, yet there is limited information on dengue viral infection at grass root level.[40-44]

Water-Borne Diseases

In addition, waterborne diseases emerge after the too much or too little water. During drought, water scarcity results in poor sanitation and much of the population can be exposed to contaminated water. For example, in a recent 2009 epidemic of diarrhea and cholera in mid western Nepal more than 200 people lost their life. Like drought, excess rainfall and flooding can also contribute to epidemics of waterborne infectious diseases.[44-48] Cases of typhoid, cholera and diarrhea are seemed to be in maximum during the drought and rainy season in urban cities of many developing countries including Nepal. Kathmandu valley is one of the city where there is high demand of water (320 million liters/day) but the supply is only one third (90 million liters/day) of the demand.[49-50] Dhungedhara are important source for fulfilling remaining water supply, though more than 68 out of 389 stone spots have dry out. These stone spouts are supplying about 2,946,542 liters water per day in dry season from March to May and about 7,696,091 liters per day in wet season.[49-51] This scarcity and drying out of

stone spot are suggesting that the climate change is at a peak and it could even engrave the situation.[51- 55]

Ways Forward

The issues of climate change should be addressed by the national level policy that can be applied at different public and private sectors in carrying out the mitigation practices. Co-ordination among concerned stakeholders and promoting research on climate change and human health are the key components to mitigate the possible harms of climate change and to deal with the impending crisis of climate change. With the known health hazards of climate change it is now high time to address climate change impacts and its possible health consequences. Government should create a friendly environment and inter-sectoral co-ordination within different sectors including international and national non governmental organization and stakeholders including individual to tackle the climate change induced health problems.

Due to the shifting pattern of various disease transmitting vectors at higher altitude in hills and mountain, there is an eminent need to conduct more extensive research on vectors found in different altitudinal variations in the country. Vector borne disease control program should be strengthened in hilly and mountain regions to prevent the increasing burden of vector borne disease. In addition government and private sector should emphasize research activities with systematic recording, reporting and monitoring the health implications like respiratory, water and food borne disease, malnutrition etc. Health workers should be trained for the emergency rapid response in the time of extreme climatic catastrophic events.

Concept of community forest has to be empowered more to reduce the rate of deforestation which is the best adaptation practice to protect forest in Nepal. Protecting watershed forest can be a good strategy to preserve and protect the water resources that could be accompanied with scientific water harvesting strategy at both rural and urban settings.

Water supply system should be more systematic and mechanism should be developed to ensure the supply of clean and safe drinking water by installing the advance water treatment plant. The ever speeding urbanization rate should be managed with organized and scientific urbanization plan. Buildings and huge construction works are to be scientifically sound and approved by concerned national level authority to ensure the standard and natural integrity. Profound seasonal variations in climate and erratic rainfall with extreme climatic events have affected the food productivity since many years. Effective communication with farmers should be therefore made to transfer the technology to best adapt with climate change and its impacts on agriculture. Drought hazards reduction mechanism should be developed with strengthening the national policy on climate change for effective implementation of the measures developed and recommended to combat the burning problems of climate change.

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