

CLIMATE CHANGE AND HEALTH IN BANGLADESH

INFORMATION BRIEF



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KEY POINTS

- The main direct effect will be an increase in primary vulnerabilities: water and vector born diseases, food insecurities, heat and cold related illnesses, under nutrition.
- Strengthening health care systems, implementing water and sanitation programmes and widening coverage of

proven and accessible public health interventions to control climate sensitive diseases, would accelerate progress towards the health-related Millennium Development Goals and save millions of lives and sufferings of others. In the long term, the same actions would also reduce vulnerability to climate change.

INTRODUCTION

Observations of increase in global temperature and rising global sea level in the recent decades, show that warming of the Earth's climate is undeniable. Bangladesh is one of the countries expected to be worst affected by climate change. The combination of frequent natural disasters, high population density and low resilience to economic shocks, make Bangladesh very vulnerable to climatic risks.

Human health in tropical developing countries will be affected by climate change. Drainage congestion and standing water will increase the potential for outbreaks of cholera and other waterborne and diarrheal diseases. The pressure on the availability and access to safe water, in particular during the dry period is an additional threat. Additionally, natural disasters threaten people and their belongings and cause stress. Finally the pressure on agricultural production may result in under nutrition which affects the overall health.

According to the National Adaptation Programme of Action (2005)¹, "High summer temperatures could result in enhanced deaths due to heat stress, but the extent of such impacts has not been quantitatively assessed yet. However, the combination of higher temperatures and potential increases in summer precipitation could create favorable conditions for greater intensity or spread of many infectious diseases."

The impact of climate change on human health depends critically on the success to adapt to climate change in the other sectors. Improved health infrastructure including health care system, reliable drinking water supply and improved sanitation will greatly reduce the vulnerability of the health sector.

This paper will look briefly at how the health sector is affected by various aspects of climate change in Bangladesh. It will also attempt to highlight key policies necessary to both adapt now to these impacts and be prepared to adapt to these impacts in the future.

IMPACTS OF CLIMATE CHANGE ON HUMAN HEALTH

Impact of Drought on Health

It has been reported that drought will increase in some areas of Bangladesh due to change in rainfall pattern as results of climate change. The effects of drought on health include deaths, malnutrition (under nutrition, protein-energy malnutrition and/or micronutrient deficiencies), infectious diseases and respiratory diseases.² Drought diminishes dietary diversity and reduces overall food consumption, and may therefore lead to under nutrition.

A study in Bangladesh found that drought and lack of food were associated with an increased risk of mortality from diarrhoeal illness.³ Population displacement can lead to increases in communicable diseases and poor nutritional status resulting from overcrowding, and a lack of safe water, food and shelter.

The transmission of some mosquito-borne diseases may be affected by drought events. During droughts, mosquito activity is reduced and, as a consequence, the population of non immune persons increases.

When the drought breaks, there is a much larger proportion of susceptible hosts to become infected, thus potentially increasing transmission.⁴ In other areas, droughts may favor increases in mosquito populations due to reductions in mosquito predators.

Impact of Increasing Heat Waves on Health

No formal study on increase of heat waves in Bangladesh has been undertaken but the increasing trend of temperature has been found in Bangladesh in several studies. Increased temperature may results different types of complicacy for human health. Rahman (2008)⁵ reported that the health impacts associated with heat waves are heat stroke, dehydration and aggravation of cardiovascular diseases in elderly

¹ MoEF. (2005). *National Adaptation Programme of Action (NAPA)*. Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh. xvi + 63 pp.

² Menne, B. and R. Bertollini. (2000). 'The health impacts of desertification and drought'. *Down to Earth*, 14, 4-6.

³ Aziz, K.M.A., B.A. Hoque, S. Huttly, K.M. Minnatullah, Z. Hasan, M.K. Patwary, M.M. Rahaman and S. Cairncross. (1990). *Water supply, sanitation and hygiene Sanitation Report Series, No. 1*. World Bank, Washington, District of Columbia, 99 pp.

⁴ Bouma, M. and C. Dye. (1997). 'Cycles of malaria associated with El Nino in Venezuela'. *J. Am. Med. Assoc.*, 278, 1772-1774.

people. It is also to be noted that Bangladesh does not have records on illnesses and deaths related to heat waves.

However, it was generally observed that prevalence of diarrhoeal diseases increased during extreme temperatures and heat waves, particularly in children.

Impact on Vector Borne Diseases

Wide scale change in ecology may occur due to warm climate that may affect the disease pattern. Climate change may have an effect on health in three major ways; by creating conditions conducive to outbreaks of infectious diseases; increasing the potential for transmission of vector borne disease and hindering the future control of disease. Vector-borne diseases (VBD) are infections transmitted by the bite of infected arthropod species, such as mosquitoes, ticks, bugs, sand-flies and black-flies.

Climate directly influences the development of vector of malaria-dengue. Climate also has an indirect effect on malaria-dengue through its influence on suitable vegetation and vector breeding sites. Precipitation is important because mosquitoes require water to lay their eggs, as well as for the subsequent development of larvae. Projections indicate that, in the future, malaria is most likely to extend its range into the fringes of established endemic areas. It is also reported that the intensity and extent of malaria's potential transmission would change significantly.

Impact on Water and Food Contamination

Temperature and precipitation, both of whose extremes will increase with climate change, affect the spread of water and food-borne diseases. In general, increased temperature results in higher pathogen replication, persistence, survival, and transmission for bacterial pathogens, and has mixed effects on viral pathogens but often reduces the overall transmission rate.

Higher temperatures seem to produce a greater

number of water and food-borne parasitic infections, as well. Overall, increased precipitation is associated with increased burdens of disease for bacteria, viruses, and parasites, though the causes of these increases differ by pathogen and ecologic setting. Rahman (2008)⁵ reported that changes in precipitation patterns are likely to compromise the supply of safe water, thus increasing the risk of waterborne diseases. They are also associated with floods and water logging that increase the incidence of diarrhoea, cholera and skin and eye diseases.

Agricultural production and food security are also linked directly to precipitation patterns – this impacts the nutritional status of the population. Under nutrition will further increase the vulnerability of those affected to infectious and water and vector-borne diseases .

Impact on Air Quality

Climate change is expected to contribute to some air quality problems.⁶ Respiratory disorders may be exacerbated by warming-induced increases in the frequency of smog (ground-level ozone) events and particulate air pollution.

Ground-level ozone can damage lung tissue, and is especially harmful for those with asthma and other chronic lung diseases. Climate change may increase the concentration of ground-level ozone, but the magnitude of the effect is uncertain. For other pollutants, the effects of climate change and/or weather are less well studied and results vary by region.

Another pollutant of concern is "particulate matter," also known as particle pollution or PM. Particulate matter is a complex mixture of extremely small particles and liquid droplets. When breathed in, these particles can reach the deepest regions of the lungs. Climate change may indirectly affect the concentration of PM pollution in the air by affecting natural or "biogenic" sources of PM such as wildfires and dust from dry soils.

Impact of Sea Level Rise on Health

Sea level rise may increase the risk of health hazards like

⁵ Rahman, A. (2008). *Climate change and its impact on health in Bangladesh*. Regional Health Forum. Volume 12, Number 1. Pp. 16-26.

⁶ IPCC. (2007). *Climate Change 2007: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000 pp.

diarrhoea, cholera, etc. *Vibrio cholerae* is the causing microbe of cholera that survive longer with salinity level ranging from 2.5 ppt to 30 ppt and need Sodium ion (Na+) for growth.⁷

Water salinity and its distribution in the coastal area are increasing with the increase of sea level rise.⁸ With the increased density and distribution of salinity, cholera germs are getting favourable habitat and spreading in the coastal area. This hypothesis is also supported by Colwell and Huq (2001) that states, most major epidemics [of Cholera] that have occurred during the last 50 years originated in coastal region.

So, coastal water and its saline environment have close association with cholera disease. Outbreaks of cholera often occur after flooding, because the water supply becomes contaminated (Eco-health Glossary, 2005). Thus, sea level rise, by increasing flood risk, increase the risk of cholera outbreak too.

Increasing salinity levels also lead to increased incidences of hypertension in the coastal areas. This is a major problem for expecting women can even cause involuntary foetus abortion (MoEF, 2009).⁹

RESULTANT IMPACTS AND ECONOMIC LOSSES

Illness and poor health means people are less able to carry on productive lives, and this undermines social and economic development. Unfortunately the poorest of society with no or limited access to proper healthcare, water and sanitation are the most vulnerable to the impacts of climate change. It is estimated that BDT 500 crore annually spent on physician fee, medicine and travel costs which means illness and ill health are also financial burdens.

The cyclones in Bangladesh in 1970 and 1991 were estimated to have caused 300,000 and 139,000 deaths respectively. In Global Climate Risk Ranking 2007 it is reported that Bangladesh had highest number of deaths (4729) due to extreme weather events (mostly

by storms, followed by floods and heat waves) in 2007. It also ranked Bangladesh as highest (2.98) for deaths/100,000 inhabitants.

MANAGING CLIMATIC HAZARDS

The first steps are clear. In the short term, strengthening health systems, and widening coverage of proven and cheap public health interventions to control climate sensitive diseases, would accelerate progress towards the health-related Millennium Development Goals and save millions of lives. In the long term, the same actions would also reduce vulnerability to climate change. Responding to climate change is not a distraction from the business of protecting health: it is part of the same agenda.

As governments convene in Copenhagen in the COP15 conference to reach an agreement on how to respond to climate change, there are three clear messages from the health community. First, climate change is a fundamental threat to health. Second, strengthening control of diseases of poverty is essential to protect the most vulnerable populations, and is a safe investment for adaptation resources for climate change. Third, cutting greenhouse gas emissions can represent a mutually reinforcing opportunity to reduce climate change and to improve public health. Health protection should therefore be one of the criteria by which mitigation measures are judged.

World Health Assembly 2008 addressed the importance of climate change and health.¹⁰ The Assembly's resolution lays out a five-point agenda of research and action. First is full documentation of the risks to health and of differences in vulnerability between and within populations; Second, development of health protection strategies; Third, identification of the health co-benefits of actions taken to reduce greenhouse gas emissions or, in other sectors, to adapt to climate change; Fourth, development of decision support tools and systems to predict the impact of climate change for member states; and fifth, estimation of the financial costs of actions and inactions in relation to health.

⁷ Borroto, R.J. (1998). Global warming, rising sea level, and growing risk of cholera incidence: a review of the literature and evidence, *Geo Journal* 44 (2), pp.111-120.

⁸ Faisal, I.M., Parveen, S. (2004). Food Security in the Face of Climate Change, Population Growth and Resource Constraints: Implications for Bangladesh, *Environmental Management* 34(4), pp.487-498.

⁹ MoEF. (2009). *National Adaptation Programme of Action (NAPA)*. Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh. Pp. 39.

¹⁰ WHO. (2008). 'The impact of climate change on human health'. April 7, 2008. Retrieved from: <http://www.who.int/mediacentre/news/statements/2008/s05/en/index.html>.

The different stakeholders in the health sector, doctors, nurses and other practitioners, administrators, public health personnel are to appreciate the importance of the issue and they have to¹¹:

- Promote recognition of the main health threats from climate change;
- Find the win-win actions that promote health as they reduce climate change – e.g., more active transport in automobile-dependent cultures will improve air quality, decrease greenhouse gas emissions and combat obesity;
- Stress the health sector's direct responsibility to respond to the threats to health that climate change is posing to the population;
- Provide an example of how the health sector can demonstrate carbon neutral practice;
- Point out that many of the most effective interventions in protecting health from climate change are basic public health interventions;
- Include issues of climate-related health threats in general health training and continuing education modules.

It is now more and more appreciated that like many public health interventions prevention of health impact of climate change is possible.¹²

FINANCING ADAPTATION IN THE HEALTH SECTOR

In order to build new health facilities of different types requirement of 13,775.29 million USD for Bangladesh has been estimated. Also estimated annual recurrent costs for these new health facilities will be 51.41 million USD. For elimination and control of diseases caused by climate change for years 2010-2021 an estimated 2,801.47 million USD is required. Substantial further investment in water supply and sanitation infrastructure, and greater sector efficiency, are needed to achieve the Millennium Development Goals (MDG) for water supply

and sanitation and other closely related MDGs for child and maternal mortality.

The government of Bangladesh has recently established a National Climate Change Fund, with an initial capitalization of 45 million USD later raised to 100 USD, which will focus on adaptation. Health being included in the first pillar of the Bangladesh Climate change Strategy and Action Plan a part of this fund should go into adaptation against impacts of climate change on health.

However, these types of funds need to be administered properly with sound disbursement modalities, an appropriate governance structure and careful resource management.

POLICY AND INSTITUTIONAL ARRANGEMENT

The Bangladesh Climate Change Strategy and Action Plan (2009) recognises the importance of adaptation in health sector by including in the first pillar of the plan. The health chapter of the ten years' perspective plan for 2010-2021 of the government with respect to climate change¹³, marked out that human health will be affected and health security will be at risk. In the plan, as part of the climate change management strategy, emphasis has been given to improving sanitation issues in rural, towns and cities.

The Sixth Five Year (FY 2011-2015) Plan¹⁴ (Part - 1) of the government recognises possible health impacts of degraded environment including due to climate change, and wants to "build capacity in the area of environmental health through both public and private sectors". Environmental health relates to those aspects of human health and disease that are determined by factors in the environment. The Sixth Five Year Plan (Part - 1) acknowledges limited experience with respect to adaptation in the health sector and therefore sets a target to initiate preliminary studies for possible adaptation options.

In the Part – 2 (Sectoral Strategies, Programs and Policies) of the Sixth Five Year (FY 2011-2015) Plan¹⁵, direction has been given with respect to climate change and health as follows:

¹¹ WHO. (2008). 'Protecting Health from Climate Change A toolkit for event organizers'. World Health Day 2008.

¹² St. Louis, M. E., and Hess, J. J. (2008). 'Climate Change: Impacts on and Implications for Global Health'. *Am J Prev Medicine*; 35: 527 – 538.

¹³ GED. (2011). *Outline Perspective Plan of Bangladesh 2010-2021: Making Vision 2021 A Reality*. General Economic Division (GED), Planning Commission, Government of the People's Republic of Bangladesh.

- Devising a national program to reduce the burden of diseases due to climate change;
- Mainstreaming adaptation to climate change as central part of public health services;
- Short, medium, and long research on the adverse effect of climate change on health;
- Public awareness programme on climate change impacts on health;
- Development of an advanced preparedness plan;
- Partnership across the society and with global community in order to safeguard and enhance national as well as global public health security issues.

The National Health Policy¹⁶ (MOH&FW 2011) in Context and Trend section mentions that Bangladesh has demonstrated remarkable achievement in natural disaster/emergency response through better preparedness and proper management. However climate change, salinity intrusion, drought have been slowed down the progress made. The health policy identifies respiratory diseases, heat strokes, cold wave related illness, vector borne diseases like malaria, dengue, water borne diseases like cholera, and increased malnutrition due to reduced food production due to climate change and natural disasters.

Therefore, the policy aims to monitor disease and health disaster and find out ways to reduce adverse effects due to climate change. Further the policy principally agreed to adopt a health safety net comprising of health services, emergency relief, medicine, and instruments for people affected by natural disasters and climate change.

In order to achieve the aim and towards the fulfilment of its principal related to climate change, the policy took the following strategy:

“A concerted effort will have to be made to protect health from adverse effects of climate change. To this end, a national program outline will be

developed in order to reduce the burden of diseases due to climate change. Strengthening of public health services needs to be a central component of adaptation to climate change. The existing health research agenda will include the adverse effect of climate change on health, and field surveys and studies will be conducted to identify the short, medium, and long term effects of climate change on health.”

The Health Population and Nutrition Sector Strategic Plan¹⁷ (HPNSSP) identifies the key interventions required to accelerate the pace of the Health, Population and Nutrition sector in Bangladesh. The HPNSSP sets out what the sector’s strategic priorities are and explains to a certain extent how these will be addressed. The Strategic Plan 2011-2016 is more elaborate to meet the challenges of climate change.

The strategic plan acknowledges increasing incidence of common and non-conventional diseases some of which due to climate change and natural disasters. It proposes establishment of an autonomous institute namely ‘Environmental and Occupational Safety and Health’ manned by relevant multidisciplinary personnel for protecting not only the safety, health and welfare of people engaged in work or employment, but also with the environment and the community. The strategic plan feels that the issues of environmental degradation, climate change and environmental pollutions are resultant effect of anthropogenic activities being domestic or occupational. The goal of all environmental / occupational health and safety programs is to foster a safe environment everywhere.

The strategic plan is in agreement with the National Health Policy on health concerns due to climate change and has further identified that – “the initial health risks will be on the groups bearing most of the resulting disease burden, i.e., poor children, women and elderly people”. In this context, creating a well coordinated approach for protecting health from climate change remains a great challenge for the government that can only be achieved by effective surveillance system and increased institutional capacity to manage these problems including of health professionals.

¹⁴ Planning Commission. (2011a). *Sixth Five Year Plan (FY 2011-2015), Accelerating Growth and Reducing Poverty, Part – 1: Strategic Direction and Policy Framework*. Planning Commission, Ministry of Planning, Government of the People’s Republic of Bangladesh.

¹⁵ Planning Commission. (2011b). *Sixth Five Year Plan (FY 2011-2015), Accelerating Growth and Reducing Poverty, Part – 2: Sectoral Strategies, Programs and Policies*. Planning Commission, Ministry of Planning, Government of the People’s Republic of Bangladesh.

¹⁶ MoH&FW. (2011). *National Health Policy 2011*. Ministry of Health and Family Welfare (MoHFW), Government of the People’s Republic of Bangladesh.

¹⁷ MoH&FW. (2011). *Health Population and Nutrition Sector Development Program (HPNSDP) 2011-2016*. Planning Wing, Ministry of Health and Family Welfare (MoH&FW), Government of the People’s Republic of Bangladesh.

The water supply and sanitation coverage, inequalities, arsenic problem have been given due importance which will support adaptation against climate change. Also concern is showed for The Government of Bangladesh has initiated a multi-year program on total sanitation starting in October 2003. Water quality surveillance in some 120 towns re-started. Together with continued laboratory strengthening, an overall surveillance system, covering bacteriological and chemical parameters needs to be developed. With frequent natural disasters, collaboration between water supply, health and disaster preparedness sectors should lead to a greater response capacity.

Institutional Arrangements

Response of the health sector will need to be undertaken in wide collaboration with many other sectors of

government and social action. The health sector, in general, has been slow to perceive the enormous significance of global climate change, as a threat to Earth's life-support systems, including the provision of water, food, clean air, and stable ecosystems-and, therefore, to human wellbeing, health, and survival. Medium to long term adaptation plans are expected to be carried out by the Ministry of Health and Family Welfare (MoHFW), in association with research centers (ICDDR,B) and others. To build capacity and strengthen health systems to combat the health impact of climate change and to protect human health from current and projected risks due to climate change, MOHFW has formed a Climate Change and Health Promotion Unit (CCHPU).



CONCLUSION AND RECOMENDATIONS

Climate change is inevitable. In order to face the effects and impacts, particularly on health, relevant stakeholders including policy makers, program designers, program implementers, civil servants, civil society members need to have better understanding about both climate change and its possible effects/impacts on health. Relevant policy framework is available from the under preparation sixth five year and next health sector strategic document. However, these policy intention need to be translated into concrete

strategies and activities. Each of those needs proper follow-up for due implementation. Bangladesh has many success stories, in health sector, to share with rest of the world. Through proper understanding of climate change issue and its impending effects on health, timely initiation of preparedness activities with thorough participation of community, Bangladesh has the potential to be successful once again in combating health effects of climate change. For that policy makers and program designers must act with proper implementation of the planned activities with full cooperation of community and health work-forces at all levels.



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