NATIONAL WORKSHOP ON CLIMATE CHANGE AND HEALTH

November 19-20, 2007

Dhaka, Bangladesh

Organized by

Directorate General of Health Services/ Ministry of Health and Family Welfare

Bangladesh Centre for Advanced Studies

World Health Organization

At Hotel Sheraton, Dhaka, Bangladesh

Report prepared by:



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Proceedings of the National Workshop on Climate Change and Health Organized by WHO and DGHS in association with BCAS

Introduction

Taking into account the importance of the linkage between climate change and health issues, the World Health Organisation (WHO) in association with the Bangladesh Centre for Advanced Studies (BCAS) organized a workshop on Climate Change and Health in Dhaka on November 19-20, 2007. The workshop was attended by representatives from various organizations working on climate change and public health issues and academicians.

The objectives of the workshop were as follows:

- Review and share knowledge about climate change impacts on health and on actions taken/ planned to mitigate them
- Present methodologies and tools for assessing the vulnerability of the health sector and for determining possible options for mitigation and adaptation.
- Develop a framework for national action to promote mitigation and adaptation mechanisms to address key health and environmental issues resulting from climate variability and change.

The workshop included presentations on climate change, health impacts and future health problems associated with climate change. Discussion sessions and breakout groups were arranged to highlight the priority issues in health, identify gaps in health services and responses needed to bring the issue of climate change and health impacts to the forefront.

Inaugural Session: Sharing the evidence about climate change

The inaugural session was chaired by **Dr. Shahjahan Biswas**, Director General, Directorate General of Health Services (DGHS). **Dr. Khandaker Rashedul Haque**, Director General of the Department of Environment (DOE), Ministry of Environment and Forest was present as the Special Guest while the Chief Guest was **Mr AKM Zafar Ulla Khan**, Honourable Secretary, Ministry of Health. During the inaugural session **Dr Atiq Rahman**, Executive Director, Bangladesh Centre for Advanced Studies (BCAS) made a presentation on the scientific basis of climate change and introduced the Background Paper on Climate Change and Health. The Special Guest and Chief Guest also addressed the session. On behalf of the WHO Country Representative, **Dr Andrew Trevett**, Environmental Health Advisor WHO Bangladesh welcomed everyone to the workshop. He mentioned the importance of understanding the linkages between climate change and health and the scepticism that still exists within the health community regarding this linkage. He insisted on the need to focus on local communities and recommended implementing the recommendations of the 2nd International workshop on community – based adaptation to climate change that was held in Dhaka, 24-28 February 2007 organised by BCAS.¹,

Climate change science and overview of the Background Paper on Climate Change and Health was presented by **Dr Atiq Rahman**, BCAS (*full presentation in Annexure*). He said that climate change affects health in mainly two ways: *Directly*- through changing weather patterns; and *Indirectly*- through changes in water, air, food quality and ecosystems. According to IPCC (2007) climate change has altered:

¹ "Scaling up, i.e. replicating good practices being undertaken by communities in other villages and countries through developing methodologies, sharing information and working together; capacity building to make communities less vulnerable and overcoming bottlenecks in institutional capacity through informing institutions and incorporating climate change into their work so they can help communities; partnerships and mainstreaming, including partnerships at all levels, and ensuring funding goes to the most vulnerable, and that different constituencies include the risk factor of climate change in their work; and looking at the most effective ways to support community-based adaptation and finding out what communities need and assisting them according to their needs." More at: <u>Community Based Adaptation to Climate Change</u>, <u>Published by the International Institute for Sustainable Development (IISD) in</u> <u>collaboration with IIED</u>, Vol. 135 No. 1, March 2007; 3w.iisd.ca/ymb/sdban/html/ymbvol135num1e.html

- the distribution of some infectious disease vectors
- the seasonal distribution of some allergenic pollen species
- increased heat wave-related deaths

Moreover, a WHO study estimated that in 2000, climate change caused the loss of over 150,000 lives and 5,500,000 DALYs (0.3% of deaths and 0.4% of DALYs, respectively)¹. Dr Atiq summarized the linkage between climate change and health through the following diagram:

Figure: Relationship between Climate Change and Human Health²:



Dr Atiq listed some of the climate change and health related studies that have been conducted so far in Bangladesh:

- Study on Malaria and Climate Change carried out by BCAS.
- Climate Change and Health Impacts carried out by BCAS and National Institute of Preventive and Social Medicine (NIPSOM)
- Study on Dengue and Climate Change by NIPSOM

Institute for Cholera and Diarrhoeal Disease Research, Bangladesh (ICDDRB) has also carried out studies on the incidence of cholera and its relationship to climate change. This study was presented later on in the workshop.



According to **Dr. Khandaker Rashedul Haque**, DG of DOE, the recent cyclone Sidr has shown first hand how climate change is affecting our lives. Hence the impacts of climate change on health of the population are self explanatory. Unfortunately the predictions made against the timeframe have been realized much earlier. Climate change impacts are taking place much faster than the scientists anticipated. The actions taken

² 1. Taken from the IPCC AR4. Cited as : Confalonieri, U., B. Menne, R. Akhtar, K.L. Ebi, M. Hauengue, R.S. Kovats, B. Revich and A. Woodward, 2007: Human health. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, Eds., Cambridge University Press, Cambridge, UK, 391-431.

must be pro-active and the policies should reflect preparedness to cope with issues like extreme events and disasters. Furthermore, climate change issues are not a monopoly of the Ministry of Environment and Forest (MOEF). Other relevant ministries such as health, agriculture, livestock, water resources, planning etc should work together to mitigate and combat the impacts of climate change in Bangladesh. Health is a very important component of development and the impact of climate change on health cannot be ignored any longer. Creating awareness among the health professionals and workers on climate change linkages should be a priority issue.

Mr AKM Zafar Ulla Khan, Secretary, represented the Ministry of Health in this workshop. In his address Mr Khan made reference to the clear linkages between the environment and health problems. He pointed out that climate change would likely have an increasingly severe impact on health particularly with regard to vector and water borne diseases. Mr Khan stressed that with change in climate and other stress factors, people's perception and behaviour must also change in order to effectively cope with the situation.

Mr Khan thanked WHO for arranging the workshop and agreed that instead of trying to eradicate diseases like malaria, it would be more efficient to manage the disease to reduce its transmission. Moreover, the Secretary called for multi-sectoral approaches, with accelerated expansion in literacy, improvement of sanitation and poverty situation is required to tackle modern health problems brought on by climate change.

There is difference in distribution and pattern of diseases in the rural and urban areas. Understanding of this difference is crucial in formulating policies and designing strategies. Usually health professionals are reluctant to identify environmental situations that have an impact of health. This practice can no longer be sustainable and the health professionals along with the policy makers must now look at the broader picture and understand the delicate balance and linkage that exists within all sectors.

The Chair of the session, **Dr. Shahjahan Biswas**, Director General, Directorate General of Health Services (DGHS) discussed the need to immediately address the limitations of the public health system. The mitigation of present and future health problems of climate change should also be addressed. Dr Biswas expressed his gratitude to WHO and BCAS for arranging the workshop and for addressing the important issues of climate change and its associated health impacts.

Technical Session I: Health impacts from climate change

The Technical Session I was chaired by **Dr Faiz**, Principal, Dhaka Medical College. There were two presentations in this session and an open discussion on the issues.

The first presentation by **Mr Alexander von Hildebrand**, Regional Advisor, Climate Change & Health, SEARO WHO, dealt mainly with Climate Change and IPCC position with regard to climate change impacts on health issues. He explained the reason why human health should be at the heart of climate change. Mr Hildebrand presented examples of climate change related health impacts in different parts of the world and more specifically in the SEA Region. He mentioned results of a recent research study on malaria and climate change, carried out in 2005 by Malaria Research Centre in India³, indicating the dominant role of temperature and relative humidity in malaria transmission. He concluded insisting on the need for more intersectoral collaboration towards developing policies that promote, not harm, human health.

Mr Golam Rabbani, Senior Research Officer, BCAS then presented the Background Paper in detail⁴. The paper gives an overview of the health situation around the world in regard to climate change and presents the findings of the Intergovernmental Panel on Climate Change (IPCC) as

³ Current Science, Vol.90, No. 3, 02.2006)

⁴ 3. Background paper on *'Climate Change and Health Impacts'* prepared by BCAS given as Annex.

presented in its Fourth Assessment Report (AR4). The important aspect of this paper is Bangladesh's position on climate change and health issues along with status of health services, policies and strategies.

According to the IPCC report the emerging evidence of climate change effects on human health shows that climate change has (IPCC 2007):

- altered the distribution of some infectious disease vectors (medium confidence)
- altered the seasonal distribution of some allergenic pollen species (high confidence)
- increased heat wave-related deaths (medium confidence)

Systematic reviews of empirical studies provide the best evidence for the relationship between health and weather or climate factors, but such formal reviews are rare. Published evidence so far indicates that:

- climate change is affecting the seasonality of some allergenic species as well as the seasonal activity and distribution of some disease vectors;
- climate plays an important role in the seasonal pattern or temporal distribution of malaria, dengue, tick-borne diseases, cholera and some other diarrhoeal diseases;
- heat waves and flooding can have severe and long-lasting effects.

Some of the health effects faced by the population of Bangladesh due to climate change include:

- Increasing frequencies of heat waves: Increasing heat waves have implications for Bangladesh since the elderly and children are those that suffer most from increased temperatures. Even though there has been no formal study on increase of heat waves in Bangladesh, we are already observing yearly trends in temperature rise. Heat wave associated impacts are heat stroke, dehydration, aggravation of cardiovascular diseases in elderly people.
- <u>Disturbed precipitation patterns</u>: Changes in precipitation patterns are likely to compromise the supply of freshwater, thus increasing risks of water-borne diseases. This is also associated with floods and water-logging that increases the incidence of diarrhoea, cholera, along with skin and eye diseases.
- <u>Malnutrition</u>: Rising temperatures and variable precipitation are likely to decrease the production of agriculture, increasing risks of malnutrition. Malnutrition further increases the vulnerability to infectious, water and vector borne diseases.
- <u>Vector-borne Diseases</u>: Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases, and to alter their geographic range, potentially bringing them to regions which lack either population immunity or a strong public health infrastructure. Already dengue is a regular disease in the major cities of Dhaka and Chittagong, but the role of temperature and humidity need to be confirmed.
- Rising sea levels: This threat is very significant for Bangladesh. Most of the human population lives close to the sea, with about 17 million people live less than one metre above sea level. Coastal regions are important for ports, fisheries, agriculture and tourism. Flood defences prevent natural variations in the coastline and protect these economically important activities. However, they can also lead to increases in water levels in coastal areas by isolating the sea from its natural coastal flood plain. This can

lead to catastrophic flooding if the sea defences fail. According to projections done by UNEP, a 1.5 meter increase in sea level would affect 16% of the country.



Water borne diseases are a major health problem and climate change will increase its incidence. A recent study carried out jointly by Bangladesh Centre for Advanced Studies (BCAS) and the National Institute of Preventive and Social Medicine (NIPSOM) in 2007 indicated that the annual incidence of diarrhoea was 2841273 during 1988-2005 and that of skin diseases were 2623092 during 1998-1996. Recommendations were made in areas of policy reforms, changes in behaviour, awareness raising and capacity building. Policy decisions, scientific tasks and broad research should be undertaken to confirm earlier research findings, institutional capacity building to handle consequences may need to be considered to address the problem.

Open Discussion: During the open discussion the level of scepticism of the health professions regarding the linkage of climate change to health impacts became clearer. Public health professionals and medical doctors still seemed reluctant to accept the relationship of climate change and to the increased potential transmission of vector and water borne diseases. Discussants asked for more concrete and detailed studies and sound international literature. Other topics of discussion included level of adaptive capacity, psychosocial aspects of post-disaster situation, response and management of diseases. It was agreed that community management, awareness, response and preparedness can effectively reduce disease burden. WHO is working to develop strategies to cope with the mental health of disaster victim but there are not enough resources or studies carried out on psychosocial stress.

Participants shared the opinion that the reluctance to accept the significance of climate change can be attributed to the fact that many industry/ corporate communities, by admitting their responsibility, would fear incurring higher cost for their businesses. Furthermore, researchers and doctors are very conservative and do not want to accept facts unless there is concrete and recognised evidence. Unfortunately climate change impacts are happening now and intensifying. There is not enough time to gather verified scientific facts to convince the sceptics. Health programmes need to be geared up to address the challenges...

In his statement, the Chair of the session mentioned that climate change linkage to health issues is a new discipline and that is multi-sectoral in nature. Involvement of stakeholders from all relevant sectors is important to develop an appropriate and efficient country strategy to deal

with health issues. There should be more involvement of the DG Health Services in programmes such as this.

Technical Session II: Climate change and health impacts in Bangladesh

The Second Technical Session was chaired by **Mr Alexander von Hildebrand**, Regional Advisor, Climate Change & Health, SEARO WHO. The session included a presentation on the National Adaptation Programme of Action (NAPA) process, objectives and projects. The participants of the workshop were also divided into two groups for the breakout session.

The Bangladesh National Programme of Action (NAPA) was presented by **Dr Aminul Islam** of UNDP. The objective of the NAPA for Bangladesh⁵ is to:

- Development of a countrywide program that encompasses "the immediate and urgent adaptation activities" that address the current and anticipated adverse effects of climate change, including extreme events; and
- Create provision of a framework for coordination and implementation of adaptation initiatives through a participatory approach.
- Building synergies with other relevant environmental and related programs.
- Develop a specific priority program of action for adaptation to climate change
- Address the need to develop a realistically achievable country-driven program of action made up of priority activities

Dr Islam listed the most priority projects that were identified in the NAPA and highlighted those that are linked with health issues.

Open Discussion: The issues discussed included reduced production of crops, change in cropping patterns and its relevance to nutrition. Concern was raised about the possible effects of climate change on reproductive health but so far there has not been any study on this issue. According to a participant, it was observed that disruption of reproductive cycles of women in coastal areas occur in dry seasons when saline concentration in water is higher, though there is no scientific data to support this observation. With regard to NAPA, participants felt that health issues were not represented adequately. Also NAPA is limited to addressing immediate, not mid and long term actions.

The participants were divided into two groups. The breakout groups were given a set of three questions that they needed to answer. The questions were:

- 1. Which are the most direct and indirect health impacts that climate change will have on human health in Bangladesh? Prioritize.
- 2. How is the country responding to the health outcomes identified in Question 1 at present?
- 3. What are the additional challenges ahead for the health sector if we take climate change into account?

It is important to mention that participants did not fully comprehend the difference between direct and indirect impacts of climate change to health. The exercise brought to light the knowledge gaps that still exist among health professionals regarding impacts of climate change. This shows the need for more awareness raising and capacity building among health

More information is available at: http://unfccc.int/resource/docs/napa/ban01.pdf

⁵ The NAPA of Bangladesh draws upon the understanding gathered through discussion with relevant stakeholders in four sub-national workshops and one national workshop, prior research, background papers prepared by Six Sectoral Working Groups (SWG) i.e. a) Agriculture, Fisheries and Livestock coordinated by Bangladesh Agricultural Research Council (BARC), b) Forestry, Biodiversity and Land-use coordinated by IUCN, Bangladesh, c) Water, Coastal Zone, Natural Disaster and Health coordinated by Water Resources Planning organization (WARPO), d) Livelihood, Gender, Local Governance and Food Security coordinated by Bangladesh Institute for Development Studies (BIDS), e) Industry and Infrastructure coordinated by Department of Environment (DoE), and f) Policies and Institutes coordinated by Bangladesh Centre for Advanced Studies (BCAS), and expert judgments.

professionals on climate change and the climate change experts need to provide more and clearer information regarding this issue.

Findings of Group I:

- Direct Impacts of climate change on health was identified as diarrhoeal diseases, vector borne diseases (malaria and dengue) and heat stress. The indirect impacts were increased vulnerability due to malnutrition and mental stress created by disasters and extreme events...
- Health responses to each of these issues were discussed and are summarized in the Annexure.
- The additional challenges were identified as:
 - There is a knowledge gap in the health sector with regard to climate change and its impacts on health. Awareness raising and capacity building is required to integrate climate change into the health sector.
 - So far the policies and programmes of the health institutions and other relevant sectors do not consider climate change as a major challenge.
 - According to the IPCC AR4, climate change will give rise to new diseases and diseases that have evolved. The health sector must be prepared to deal with this new challenge by keeping up-to-date regarding vector borne, water borne and infectious diseases.

Findings of Group II:

- Group II identified skin diseases, respiratory diseases and allergies, diarrhoeal diseases, dengue and physical injuries as the most direct impacts of climate change on health. As indirect impacts there is malnutrition and psychological distress.
- Health responses to each of these issues were discussed and are given in the Annexure.
- The additional challenges presented by Group II are:
 - Malnutrition and psycho- social problems will evolve as the major challenge for the health sector because there are no national programmes to address these problems.
 - Rural-urban migration and overcrowding in cities makes it difficult for the health professionals to deal with epidemic and outbreak of diseases.
 - Huge cost to integrate climate change into health and other sectors. This includes cost of awareness raising, training and capacity building programmes. It also includes inclusion of climate change component into institutional policy and programmes.
 - Proper monitoring and implementation of health programmes. The existing monitoring system is not adequate or effective.
 - So far the health sector is working alone regarding all public health related decisions and activities. There should be integration with other sectors like water resources, DPHE, media etc.

Dr Ainun Nishat, Country Representative of IUCN summed up the session in a few words. He stated that the link between climate change and health should be established more strongly and the health sector needs to wake up and become educated. He introduced three new issues that are relevant to the discussion:

- 1. Water supply and sanitation
- 2. Disaster related trauma
- 3. Better prepared health teams for disaster areas.

Dr Nishat mentioned that these factors will gain more prominence as climate change impacts continue to rise.

Technical Session III: Evidence base: research results

Dr Zafor Ullah Chowdhury, Director of NIPSOM chaired this session. The session included three presentations on the studies on Climate Change and Health impacts carried out in Bangladesh and discussions to clarify the issues.

'Role of Climate in Transmission Dynamics of Cholera in Bangladesh⁶ was presented by **Dr Md Sirajul Islam** of ICDDRB. He explained the role of temperature; sunlight and salinity play a key role in the proliferation of cholera bacteria living in blue-green algae who act as reservoirs. Based on the study carried out by Dr Islam concluded that climate change due to global warming might influence the transmission dynamics of cholera. Moreover, he mentioned that more in-depth studies are needed in this field.

The second case study presented was on '*Relationship between Climate Change and Incidence of Malaria in Chittagong Hill Tracts*'⁷ carried out jointly by BCAS and **Dr Shajedul Hasan** of DG Health Services. This study was carried out in the Chittagong Hill Tracts area where malaria is a major health problem. In Bangladesh, out of 64 districts, 13 bordering districts in the east and north-east region belong to the high-risk malaria zone. 14.7 million people are at high-risk of malaria in the country and 1.0 million clinical cases are treated every year. The factors affecting malaria are: Climate (rainfall, temperature and relative humidity); Availability of Health Care; Population Density; Use of DDT; Urbanization; Irrigation; Life Style.

The risk and rate of malaria are affected by many factors. But climatic factors show the most persuasive correlation to the change in the rate and risk of malaria. So, we should plan and organize the malaria control strategy in that perspective and also and extend our research in these areas.

'*Climate Change and Health Impacts in Bangladesh'* was presented by **Dr. M.H. Salimullah Sayed**, Associate Professor, NIPSOM. The objectives of this study, carried out by BCAS and NIPSOM, were to:

- Analyze climate and health related data for exploring correlation between them
- Assess current knowledge base and understanding on public health due to climate change, and create a database for further research in the area.

The study was based on data collected from three districts in Bangladesh over 6 months, through focus group discussions (FGDs), in-depth interviews data. The conclusions drawn from this study are indicated below:

- Climatic factors are associated with prevalence of diarrhoea, skin diseases, malnutrition and kala-azar etc in the study areas.
- The correlation coefficients between climate factors and health disorders varied among the study locations. Prevalence of diarrhoea was found to have positive correlation with total annual rainfall in Rajshahi (+0.27) and Satkhira (+0.05). For Rajshahi the correlation between annual rainfall and incidence of diarrhoea is more statistically significant than for Satkhira.
- Monsoon total rainfall was also found to have positively correlated with diarrhoea in Rajshahi (+0.21) and Satkhira (+0.27). Statistically the correlation with monsoon rainfall and diarrhoea in Rajshahi and Satkhira is slightly significant. In contrast, dry seasonal rainfall was found to have positive correlation with Manikganj study area.

Open Discussion: The discussion focused on the problem of malaria and its impacts for the rest of Bangladesh. The present status of controlling malaria epidemic is not enough. Furthermore, correct diagnosis and treatment is needed to stop the disease from spreading.

⁷ See website: http://www.bcas.net/2nd-CBA/Documents/tc-2b/Shafiqur.ppt

⁶ Based on Islam, M.S., Drasar, B.S. and Sack, R.B. 1994. Probable role of blue-green algae in maintaining endemicity and seasonality of cholera in Bangladesh: A hypothesis. *Journal of Diarrhoeal Disease Research.* 12(2): 87-96.

More information on this issue also see: http://www.nature.com/nature/journal/v436/n7051/full/nature03820.html

Some initiatives have been taken by NGOs in conjunction with the government to raise awareness among the community on malaria. So far insecticide soaked mosquito netting have been distributed in the malaria prone areas but this is very costly. According to the discussants, malaria epidemic and spread can be best controlled through implementing more holistic approaches in vector control such as Integrated Vector Management or IVM⁸, including

- Empowerment of local communities through education for behavioural change
- Using local knowledge on controlling micro-environment where the vectors breed.
- Wearing protective clothing and keeping surrounding area clean and hygienic.

The participants felt that more studies are needed to properly co-relate climate change and health impacts. Without understanding the proper co-relation, adequate and effective policies and strategies cannot be designed. Along with data collection and studies, appropriate vector control actions/ programmes must also be carried. The studies on health should be issue specific instead of area specific.

Technical Session IV: Ways forward

Three breakout groups were formed to answer the following questions. Each group was asked to work on one question. The questions were:

- 1. How to increase knowledge and awareness on the health consequences from climate change within the health sector?
- 2. How to assess and address the vulnerability of the national health systems with regard to the challenges posed by climate change?
- 3. How to integrate climate change related health issues into the other sectors?

The findings of the technical session were presented by representatives of the groups:

Group I: Knowledge and awareness within the health sector can be raised by activities and actions for:

- Policy makers: Participants proposed setting up a National Committee consisting of senior health professionals, DG Health Services, academic institutions and media. The function of this National Committee would be to raise awareness regarding climate change related health issues and disseminate knowledge to relevant stakeholders. Advocacy was made for holding an Inter-ministerial meeting on Climate Change. WHO should organise a regional meeting on Climate Change and Health at Joint Secretarial Level. The decisions taken by the SEAR Health Ministers at the 60th Committee Meeting held in Bhutan, August 2007 and the 2008 theme of World Health Day: "Protecting health from Climate Change .should be used for advocacy purposes.
- Health Professionals: Identification of professionals that work with climate change related health aspects, for instance, at Public Health Commission levels, civil surgeons and tertiary level (medical colleges and post graduate studies). Training of health professionals should be in a holistic manner through formal education and short courses. Furthermore increasing data base on climate change related health impacts.
- <u>Community</u>: Dissemination of knowledge, training, awareness raising and development of special community based groups to deal with the issues.

⁸ **Integrated Vector Management** is a decision-making process for the management of vector populations, so as to reduce or interrupt transmission of vector-borne diseases. Its characteristic features include:Selection of methods based on knowledge of local vector biology, disease transmission and morbidity; utilization of a range of interventions, often in combination and synergistically; collaboration within the health sector and with other public and private sectors that impact on vector breeding; engagement with local communities and other stakeholders; a public health regulatory and legislative framework; rational use of insecticides; good management practices. An IVM approach takes into account the available health infrastructure and resources and integrates all available and effective measures, whether chemical, biological, or environmental. IVM also encourages an integrated approach to disease control. More at: http://www.who.int/malaria/integrated/ectormanagement.html

Group II: Assessing and addressing vulnerability of the national health system can be carried out in the following way:

- The health system needs to be analysed and level of knowledge among the health professionals identified. Based on level of knowledge and gaps, training and awareness raising programmes should be initiated.
- Logistic capabilities of the health system must be increased. The range of facilities
 provided should also include dissemination of climate change related knowledge and
 community awareness.
- Both GO and NGOs should work towards addressing climate change factors affecting health as well as the already known factors.

Group III: On integration of climate change related health issues into other sectors. The group proposed:

- Carry out a situational analysis on key actors and institutions involved along with their activities in various sectors and geographical areas
- Meet and negotiate on strategy and develop a joint work plan on "Human health and climate change"
- Carry out action plans: both individually and combined
- Agree on who will monitor which activities.
- Ensure sufficient funding

Concluding Session

The concluding session was chaired by Dr Atiq Rahman of BCAS. The following outcomes were presented:

Outcomes of the Workshop:

The participants agreed that they now had:

- A better understanding of the linkages of climate change to health issues in Bangladesh.
- Identified the direct and serious diseases and health problems most affected by climate change (findings of the break out groups)
- Identified additional challenges, both short-term and long-term
- More knowledge on the various actions being taken at the government level on various health issues.
- Identified the major sectors that need to be involved to cope with the stress of climate change related health problems.

Identification of Additional Challenges:

Creating awareness on the linkages regarding health impacts of climate change within the health sector.

- Creating linkage at the institutional level, in policy and also with other relevant sectors.
- Challenges to manage diseases that will increase in severity or expand geographically, and new diseases that may arise due to climate change.
- Dealing with the psycho-social problems brought on by extreme events and sea level rise.
- Malnutrition will be a major challenge since climate change impacts will affect food production. Malnutrition will also hamper efforts to reduce the burden of other climate induced health impacts.

Recommendations

- 1. There is an urgent need to reduce the disease burden from current and projected risks due to climate change, through pro-active action/ strategies
- 2. Action is needed to increase the knowledge and awareness on the health consequences from climate change aimed at the general public, policy makers and the private sector
- Specific training needs to be given to health professionals/ health workers on how to prepare mitigation and adaptation plans for national health systems, based on a vulnerability assessment;
- 4. Build-on the existing health system by incorporating the dimension of climate change and its health impacts. There will be no need to create new programmes,
- 5. Climate Change Adaptation Policies need to focus on Health Impacts to ensure coordination and advocate for decisions on climate change in other key sectors that enhance public health.
- 6. Promote an integrated approach for vector control to prevent vector borne diseases and ensure tat local communities are participating in them
- 7. Preparedness measures to reduce the impact of extreme events on the health of the population
- 8. Plan to organize a Regional Conference on research findings on the relationship between Climate Change and Health, if possible before World Health Day 2008.
- 9. A national follow-up meeting on Climate Change and Health issues before having the Regional Conference on Climate Change & Health is called for.

Annexure 1: Programme of the National Workshop on Climate Change and Health, organized by DGHS, BCAS and WHO, Monday, 19- 21 November 2007 Sheraton Hotel, Dhaka

DAY-1	Monday, 19 November 2007		
Inaugural	Big Picture		
Session			
Chair	Dr. Shahjahan Biswas, Director General, DGHS		
09:00-09:25	Participants take their seats		
09:25-09:30	Reciting from Holly Quran		
09:30:09:35	Address of welcome, objectives and format of the workshop		
	Dr Khaled Hassan, Ag. WHO Representative, World Health		
	Organization (WHO) Bangladesh Special Guest		
09:35-10:00	Presentation on Summary of the Background Paper on Bangladesh		
	by Dr Atiq Rahman Executive Director, Bangladesh Centre for		
	Advanced Studies (BCAS)		
10:00-10:10	Address by the Dr. Khandaker Rashedul Haque, Director General,		
	Department of Environment, Ministry of Environment and Forest		
	Special Guest		
10:10-10:20	Address by the Mr AKM Zafar Ulla Khan Hon'ble Secretary,		
	Ministry of Health as Chief Guest		
10:20-10:30	Address by Chair Dr Shahjahan Biswas, Director General, DGHS		
10:30-11:00	Tea Break		
Technical	Setting the Scene		
Session : I			
Session Chair	Dr Faiz, Principal, Dhaka Medical College		
11:00 – 11:20	Presentation by Alexander von Hildebrand , Regional Advisor, Climate Change & Health SEARO WHO		
11:20 – 11:50	Detail Presentation on Background Paper by Bangladesh Centre for		
	Advanced Studies (BCAS)		
11:50 - 12:30	Open Discussion (question and answer, clarity of the issue)		
13:00-14:00	Lunch Break		
	Breakout Groups		
Session : II	Mr Alexander van Hildebrand Degional Advisor Climate Change 8		
Session Chair	Health, SEARO WHO		
14:00 – 15:45	2 Breakout Groups will discuss on specific questions and will bring		
	concrete suggestions		
15:45 - 16:00	Working Tea will be served		
16:00 - 16:45	Presentation by Group Leader of the 2 Breakout Group		
16.45 17.00	I Summarias Kay Point by Session Chair and concluding Day One		

DAY-2	Tuesday, 20 November 2007		
Technical	Climate Change and Health – Case Studies		
Session : III			
Chair	Dr Zafor Ullah Chowdhury, Director NIPSOM		
09:00-09:15	Participants take their seats		
09:15:09:30	Case Study Presentation on Cholera and Climate in Bangladesh by		
	ICDDR,B		
09:30-09:45	Case Study Presentation on Malaria and Climate Change by		
	Bangladesh Centre for Advanced Studies (BCAS)		
09:45-10:00	Case Study Presentation on Climate Change Related Health		
	Impacts in Bangladesh jointly by BCAS and NIPSOM		
10:00-10:45	Open Discussion		
10:45-11:00	Closing Remarks by Chair and Introduction of Next Session		
10:45-11:00	Tea Break		
Technical	Breakout Groups		
Session : IV			
Session Chair	Dr Mahfuzul Haque Add. Secretary,		
11:15 – 13:00	3 Breakout Groups will discuss on specific questions and will bring		
	concrete suggestions		
13:00 – 14:00	Lunch		
14:00 – 15:00	Presentation by Group Leader of the 3 Breakout Group		
15:00-15:30	Tea Break		
Concluding	Way Forward		
Session			
Session Chair	Dr. Atiq Rahman , Executive Director, Bangladesh Centre for Advanced Studies (BCAS)		
15:30 - 15:50	Presentation of Summary of the Workshop highlighting needs for		
	Bangladesh to address Health and Climate Change		
15:50 - 16:00	Concluding remarks from all Session Chairs: Dr Mahfuzul Haque,		
16:00 – 16:15	Director NIPSOM, Dr Ainun Nishat Country Representative IUCN, Dr		
	Faiz Principal Dhaka Medical College		
16:15 – 16:30	Future Possible Programme/Activities by WHO based on workshop		
	Discussion and closing comment.		

Annexure 2: List of participants

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Annexure 3: Main direct and indirect health impacts from global warming / climate change and challenges posed to current related health programmes

Health Existing health		Challenges posed and actions needed		
outcomes programmes				
Direct		Most health programmes are treatment oriented		
Respiratory	ARI (antibiotics), TB and	only.; Partial coverage		
diseases	pneumonia	Quality issues sometimes; Many depend on		
	Treatment is free of cost	external funding		
	(TFO)			
Allergies	Treatment is free of cost	There is a need to increase the awareness for		
Physical		urgent action to prepare fro climate change,		
injuries	-	notably within the health sector		
Drowning		Health professionals urgently need awareness		
Dengue	Control of fluid level, IFO	and capacity building on the consequences of		
	Prevention campaigns to	global warming and climate change and related		
	reduction of breeding	aspects		
	sites			
Malaria	Chloroquine treatment	Health sector will need to adapt its policies and		
Malana	prevalent TEO	develop strategies to urgently strengthen		
	Prevention campaigns to	prevention actions to lower burden of climate		
	engage community in	sensitive diseases and to reduce potential out of		
	reduction of breeding	pocket and public costs. Health sector will incur		
	sites	in huge costs if it wants to offer its treatment		
Diarrhoea and	TFO, Preventive water	services free of costs		
Food borne	and sanitation programme	Current programmes addressing alimete		
diseases		sensitive diseases that depend on foreign		
Cholera	TFO Increased	funding will need to be prioritized and		
	temperature and salinity	considered for integration into national budget		
	will layour development of	allocations to ensure more sustainability		
	bide green aigae that			
	pathogens in symbiotic	Closer collaboration with other sectors will allow		
	relationship	health sector to be more efficient in preventing		
Malnutrition	No national programme	diseases and other sectors to better understand		
	Donor funded projects	and to integrate health dimensions into their		
	Food production will lower	action plans		
	Fish catches may	Examples for collaboration:		
	decrease due to changes	municipality engagement in dengue control:		
	in sea water temperatures	better irrigation water management to reduce		
Post disaster	No programme	potential mosquito breeding sites: reduction of		
psychological		indoor air pollution through promotion of biogas		
trauma		as alternative energy; community based		
		integrated vector management using the farmer		
		field school experience gained in the agricultural		
		sector in IPM;		
		Health sector would need to strengthen its		
		capacities to address treatment of malnutrition		
		develop a specific programme to address post		
		uisasiei psychosociai sitess		

Annexure 4: Background Paper on Climate Change and Health Impacts in Bangladesh

1. Introduction

This background paper is prepared for a workshop to be held during 19-20 November in Dhaka on Climate Change and Health in Bangladesh. The workshop is being jointly organized by World Health Organization (WHO) Dhaka and Bangladesh Centre for Advanced Studies (BCAS). The primary objective of this background paper is to facilitate discussion during workshop through providing latest scientific assessment on climate change and health, burden and distribution of health in Bangladesh related to climate change and extreme weather events, existing response mechanisms and way forward.

2. International Science and Global Picture

The recently published Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) clearly stated that climate change is contributing to the global burden of disease and premature deaths. Since health is primary goal of sustainable development and includes physical, social and psychological well-being, it is crucial that the health impacts of climate change be understood and properly addressed.

Climate change affects human health both directly and indirectly. People are directly exposed to changing weather patterns (temperature, precipitation, sea-level rise and more frequent extreme events) and indirectly through changes in water, air and food quality and changes in ecosystems, agriculture, industry, settlements and the economy. These direct and indirect exposures can cause death, disability and suffering. Problems in health increases vulnerability and reduce the capacity of individuals and groups to adapt to climate change. At present the effects of climate change are small but the IPCC has projected progressive increase in all countries and regions.

Relationship between climate change and human health is multi-path and their relationship is schematically presented in the following diagram.



Source: Climate change and Health

Emerging evidence of climate change effects on human health shows that climate change has (IPCC 2007):

- altered the distribution of some infectious disease vectors (medium confidence)
- altered the seasonal distribution of some allergenic pollen species (high confidence)
- increased heat wave-related deaths (medium confidence)

Systematic reviews of empirical studies provide the best evidence for the relationship between health and weather or climate factors, but such formal reviews are rare. Published evidence so far indicates that:

- climate change is affecting the seasonality of some allergenic species as well as the seasonal activity and distribution of some disease vectors
- climate plays an important role in the seasonal pattern or temporal distribution of malaria, dengue, tick-borne diseases, cholera and some other diarrhoeal diseases
- heat waves and flooding can have severe and long-lasting effects.

A regional and global comparative risk assessment was carried out by the World Health Organization (WHO) to quantify the amount of premature morbidity and mortality due to a range of risk factors, including climate change, and to estimate the benefit of interventions to remove or reduce these risk factors. The study found that in 2000, climate change was estimated to have caused the loss of over 150,000 lives and 5,500,000 DALYs (0.3% of deaths and 0.4% of DALYs, respectively) (Campbell-Lendrum et al., 2003; Ezzati et al., 2004; McMichael, 2004). The assessment also addressed the level of future burden of climate change that could be avoided by stabilising greenhouse gas emissions (Campbell-Lendrum et al., 2003). The health outcomes included were chosen based on known sensitivity to climate variation, predicted future importance, and availability of quantitative global models (or the feasibility of constructing them):

- episodes of diarrhoeal disease,
- cases of Plasmodium falciparum malaria,
- fatal accidental injuries in coastal floods and inland floods/landslides,
- non-availability of recommended daily calorie intake (as an indicator for the prevalence of malnutrition).

Adverse health impacts will be greatest in low-income countries. Those at greater risk include, in all countries, the urban poor, the elderly and children, traditional societies, subsistence farmers, and coastal populations.

Climate change is projected to increase the burden of diarrhoeal diseases in low-income regions by approximately 2 to 5% in 2020. Countries with an annual GDP per capita of US\$6,000 or more are assumed to have no additional risk of diarrhoea. Endemic morbidity and mortality due to diarrhoeal disease primarily associated with floods and droughts are expected to rise in East, South and South-East Asia due to projected changes in the hydrological cycle associated with global warming. Furthermore increases in coastal water temperature would exacerbate the abundance and/or toxicity of cholera in South Asia.

Dengue is the world's most important vector-borne viral disease. Several studies have reported associations between spatial, temporal or spatiotemporal patterns of dengue and climate (Hales et al., 1999; Corwin et al., 2001; Gagnon et al., 2001; Cazelles et al., 2005). The IPCC report states that approximately one-third of the world's population lives in regions where the climate is suitable for dengue transmission.

Malaria is a complex disease to model and all published models have limited parameters for some of the key factors that influence the geographical range and intensity of malaria transmission. Given this limitation, models project that, particularly in Africa, climate change will be associated with geographical expansions of the areas suitable for stable malaria (*Plasmodium falciparum*) in some regions and with contractions in other regions (Tanser et al., 2003; Thomas et al., 2004; van Lieshout et al., 2004; Ebi et al., 2005). Some projections also suggest that some regions will experience a longer season of transmission. Although an increase in months per year of transmission does not directly translate into an increase in malaria burden (Reiter et al., 2004), it would have important implications for vector control.

According to the IPCC in order to reduce health impacts from climate change adaptive capacity needs to be improved everywhere in the world. Recent impacts of hurricanes and heat waves have show that even high-income countries are not well prepared to cope with extreme weather events. IPCC also suggested the following as measures to address health and climate change.

- The planning horizon of public-health decision-makers is short relative to the projected impacts of climate change, which will require modification of current risk-management approaches that focus only on short-term risks.
- A two-tiered approach may be needed, with modifications to incorporate current climate change concerns into ongoing programmes and measures, along with regular evaluations to determine a programme's likely effectiveness to cope with projected climate risks. For example, epidemic malaria is a public-health problem in most areas in Africa, with programmes in place to reduce the morbidity and mortality associated with these epidemics.
- Pro-active adaptation strategies, policies and measures need to be implemented by regional and national governments, including Ministries of Health, by international organizations such as the World Health Organization, and by individuals. Because the range of possible health impacts of climate change is broad and the local situations diverse, the examples that follow are illustrative and not comprehensive.

The IPCC states that future trends in health are relevant to climate change because the health of populations is an important element of adaptive capacity. Infectious diseases could become more prominent if public-health systems are not efficient or if new pathogens arise that are resistant to our current methods of disease control, leading to falling life expectancies and reduced economic productivity. The total number of people at risk, the age structure of the population, and the density of settlement are important variables in any projections of the effects of climate change.

3. Burden and Distribution of Disease: Bangladesh Scenario

Bangladesh is already vulnerable to outbreaks of infectious, water borne and other types of diseases (World Bank, 2000). The record shows that the malaria incidences increased from 1556 in 1971 to 15375 in 1981, and 30282 in 1991 to 42012 in 2004 (WHO, 2006). Other diseases like diarrhoea, dysentery, etc are also on the rise especially during the summer months. It has been predicted that the combination of higher temperatures and potential increase in summer precipitation may cause spread of many infectious diseases (MoEF, 2005). Climate change also brings about additional stresses like dehydration, malnutrition and heat related morbidity especially among children and the elderly. These problems are thought to be closely interlinked with water supply, sanitation and food production. Climate change has already been linked to land degradation, freshwater decline, biodiversity loss and ecosystem decline, and stratospheric ozone depletion. Changes in the above factors may have a direct or indirect impact on human health as well.

Bangladesh already carries the burden of high population, natural disasters, diminishing and polluted natural resources, and the further burden of increased health problems possibly due to climate change and climate variability will push back its development achievements.

Public health depends on safe drinking water, sufficient food, secure shelter, and good social conditions. A changing climate is likely to affect all of these conditions. The health effects of a rapidly changing climate are likely to be overwhelmingly negative, particularly in the poorest communities.

Some of the health effects due to climate change include:

- Increasing frequencies of heat waves: Recent analyses show that human-induced climate change significantly increased the likelihood of the European summer heat wave of 2003 and of 2007. This has implications for Bangladesh since the elderly and children are those that suffer most from increased temperatures. Even though there has been no formal study on increase of heat waves in Bangladesh, we are already observing yearly trends in temperature rise. Heat wave associated impacts are heat stroke, dehydration, aggravation of cardiovascular diseases in elderly people. It is also to be noted that Bangladesh does not have records on health illness and death related to heat wave but general observation revealed that prevalence of diarrhoea disease increased during extreme temperature and heat wave, particularly children get affected.
- Variable precipitation patterns: Changes in precipitation pattern are likely to compromise the supply of freshwater, thus increasing risks of water-borne diseases. This is also associated with floods and water-logging that increases the incidence of diarrhoea, cholera, along with skin and eye diseases. Agricultural production and food security is also directly linked to precipitation pattern and this impacts nutritional status of the population.
- <u>Malnutrition</u>: Rising temperatures and variable precipitation are likely to decrease the production of agriculture, increasing risks of malnutrition. Malnutrition further increases the vulnerability to infectious, water and vector borne diseases.
- <u>Vector-borne Diseases</u>: Changes in climate are likely to lengthen the transmission seasons of important vector-borne diseases, and to alter their geographic range, potentially bringing them to regions which lack either population immunity or a strong public health infrastructure. Already dengue is a regular disease in the major cities of Dhaka and Chittagong.
- Rising sea levels: This increases the risk of coastal flooding, and may necessitate population displacement, and cause many other health related problems such as cholera, diarrhoea, malnutrition, skin diseases etc. More than half of the world's population now lives within 60km of the sea. Some of the most vulnerable regions are the Nile delta in Egypt, the Ganges-Brahmaputra delta in Bangladesh, and many small islands, such as the Maldives, the Marshall Islands and Tuvalu.

In Bangladesh, millions of people suffer from diarrhoea, skin diseases, malaria, mental disorders, dengue etc. A recent study carried out jointly by Bangladesh Centre for Advanced Studies (BCAS) and the National Institute of Preventive and Social Medicine (NIPSOM) in 2007 indicated that the annual incidence of diarrhoea was 2841273 during 1988-2005 and that of skin diseases were 2623092 during 1998-1996. Other health problems such as malnutrition, hypertension, *kala-azar* also affect people of different regions of the country. The following table shows the incidences of some of the major climate sensitive diseases and their trend in last decades.



Map 1: Distribution of Malaria in Bangladesh

SI. No.	Diseases	Total Incidences	Period	Average incidence per year
1	Diarrhoea	48,302,636	1988-2005	2,842,273
2	Skin diseases	23,697,833	1988-1996	2,623,092
3	Malaria	1,018,671	1974-2004	33,956
4	Mental Disorder	201,881	1988-1996	22,431
5	Dengue	19,830	1999-2005	3,305

 Table 1: Incidence of some major climate sensitive diseases during last decades in Bangladesh

Sources: SEARO-WHO, 2006; DG -Health, 1996, 1997; MOEF, 2005; BBS, 2005

The average annual incidence of malaria increased from 162898 during 1974- 1993 to 301651 during 1984-1993 and 301651 to 507485 during 1994-2003. On the other hand, the annual incidence of Malaria increased by about 85 per cent during 1984-1993 over 1974-1983 and it increased by about 68 per cent during 1994-2003 over 1984-1993.

The incidence of diarrhoea is also marked by an increasing trend over the period 1995 through 2004. Highest incidences of diarrhoea before 2000 were observed in 1988 (2027814 cases) which corresponds to the year of the worst flood situation of the decade. Incidences of some of the diseases like diarrhoea severely increased during natural hazard period. For example, about 77846 cases of diarrhoea were diagnosed during flood of 2004 (UNDP, 2004). In addition to flood, drought, cyclone and the other hazards like salinity intrusion, rainfall, temperature variation etc affects human health through a variety of pathways. These may include contamination of water, less food production, water and vector- borne diseases etc.

4. Overall Assessment and Strategic Issues of Disease Burden in Bangladesh

Since independence more than 30 years ago, the Government of Bangladesh has invested substantially in the institutionalization and strengthening of health and family planning services, with special attention to rural areas, and is committed to HFA with PHC as the key approach. Over the last 30 years there has been a substantial improvement in the health status of the people. Life expectancy at birth has increased to 60.8 (1998), CDR has declined to 4.8 (1998), and TFR reduced from 6.34 (1975) to 3.3 (1999). The IMR is around (1998). Despite these improvements, much still remains to be done. Mortality rates, especially infant and maternal mortality, continue to be unacceptably high. The quality of life of the general population is still very low. Low calorie intake continues to result in malnutrition, particularly in women and children.

Diarrhoeal disease continues to be a major killer. Communicable and poverty-related diseases that are preventable still dominate the top ten causes of morbidity.

The government is aware of this situation and the major shortcomings that need to be addressed, i.e. the development of an efficient project management mechanism across the health system; improvement in the logistics of drug supplies and equipment to health facilities at district and lower levels; improvement in the production and quality of human resources for health; a system to ensure regular maintenance and upkeep of existing health facilities; and the development of a comprehensive plan to improve and assure the quality of health resources provided.

5. Bangladesh's Response to Existing Disease Burden

Health policies and strategies

The cornerstone of national health policy is the Health and Population Sector Strategy which was introduced in 1998. Priority was given to ensure universal accessibility to and equity in healthcare, with particular attention to the rural population. MCH receives priority in the public sector and reproductive health has recently become a priority concern. There has been improvement in the government financial allocation for health. Efforts are being made to develop a package of essential services based on the priority needs of clients, to be delivered from a static service point, rather than providing door to door visits by community health workers. This is a major shift in strategy and will require complete reorganization of the existing service structure. This is expected to reduce costs and increase efficiency as well as meet "peoples' demand". Privatization of medical care at the tertiary level, on a selective basis, is also being considered. The progress that is being made towards achievement of health related MDGs is given below:

Inter-sectoral cooperation: Inter-sectoral committees at the different levels from the national level to the periphery are formed, whenever the need for cooperation exists. At national level, for example, nutrition and population councils are chaired by the prime minister. At the district and thana levels, inter-sectoral coordination committees also exist, while at the lowest administrative level (union), similar committees are formed, e.g., for water and sanitation projects.

Organization of the health system: Committees have been formed, including an interministerial committee, to integrate/merge the health and the family planning departments. Functionally, health and family planning personnel work closely at Thana, union and outreach levels, but a dichotomy exists at the district and national levels. More decentralization of management is also being considered.

Managerial process: The government decided to formulate a national health policy during 1997, for which a health policy committee and five subcommittees were formed. There was a change from a top-down planning process for health to a participatory approach involving the stakeholders in the health sector. The first product that was formulated utilizing this approach was the health sector perspective plan. A new approach to program implementation, which is product oriented and emphasizes on outputs rather than inputs is being tried out with WHO assistance. Decentralization of the management process is also being considered.

Health information system: A weekly epidemiological surveillance and outbreak control reporting system for selected communicable diseases have been initiated throughout the country. The routine HMIS is functioning with some limitation, though activities have been undertaken to strengthen it. Information support is not yet adequate. Use of data remains limited. Strengthening of the HMIS through training, use of data collection tools already designed, and the establishment of information networks with computer support have been planned.

Community action: The roles of the individual, family and community are emphasized in the intensified action programme for PHC implementation, which involves decentralized planning at thana and union level. A total of 12 districts (86 thanas) are now in the intensified PHC programme. Through inter-sectoral collaboration and community participation, a joint action plan has been implemented involving 60,000 village health volunteers (one each for 50 households). The participation of teachers and religious leaders is encouraged. The information department and mass media inputs are also utilized to support IEC activities.

Emergency preparedness: Currently, there is no legislation in the country that underpins the management of natural disasters at national and sub-national levels. In the absence of any

legislation, the Ministry of Disaster Management and Relief in 1997 issued revised "standing orders for disasters." These provide guidelines and instructions to various line departments and ministries. There are separate standing orders for different hierarchical levels of the health sector, which include coordination committees; contingency plans for manpower deployment, essential medical relief supplies and maintaining a database; training in emergency preparedness and response; a communication network; and budgetary allocation for emergency management. A draft "Disaster Management Act" is currently under review.

Health research and technology: Three organizations the Bangladesh Medical Research Council (BMRC), the Institute for Cholera and Diarrhoeal Disease Research, Bangladesh (ICDDRB), and Essential National Health Research (ENHR) carries out biomedical and operational research. They undertake training and provide research grants. Many of their research findings are helpful in making policy decisions. Research units have also been opened by BMRC in medical colleges. Field study stations have been established by BMRC and ICDDRB. BMRC has reorganized itself internally to cope with the growing demands of young researchers. Literature search systems in BMRC and ICDDRB have been modernized.

Health systems research (HSR) is not handled as a separate, independent entity. Individual faculty members and other relevant people have been trained in HSR, but there is no coordination among researchers. Health training institutions have yet to include HSR in their curricula. The research culture is just developing in Bangladesh, hence is no effective critical mass of researchers to form a strong advocacy group. Coordination and networking among researchers and funding agencies are yet to be developed.

Health services

Health education and promotion: Educational support to national health programmes has been provided by the Health Education Bureau (HEB). In recent years emphasis has been on school health education, hospital health education and coordination with NGOs. Constraints include the lack of a national IEC strategy, the low priority given to health education by the health services, underutilization of health education officers, and lack of opportunities for professional advancement of those working in health education. Some issues under consideration are the inclusion of a health education component in the new national health policy and strengthening of coordination among the HEB, ongoing government health programmes and NGOs.

Prevention and control of locally endemic diseases

Dengue: Dengue was an unfamiliar disease in Bangladesh till the outbreak in 2000. It is a reemerging vector borne communicable disease. The outbreak started in summer 2000 as an acute febrile illness in three major cities of Bangladesh (Dhaka, Chittagong and Khulna) with highest incidence in Dhaka district. People of all ages and both sexes are susceptible to dengue. The infection can lead to fatal Dengue Shock Syndrome (DSS). This vector borne disease is transmitted by certain species of Aedes mosquito. Aedes aegypti (and Aedes albopictus) is a peri-domestic mosquito, which lay eggs in small collections of clean water such as flower vases and pots. Usually dengue transmission occurs during the rainy season. In Bangladesh, there was never a serious epidemic of dengue until 2000 except for scattered studies which indicated sporadic cases over the last few years.

Since July 2000 onwards there had been dengue and Dengue Hemorrhagic Fever (DHF) in Dhaka City and cases have also been reported from other major cities in the country. As of 10/8/04, a total of 16,388 Dengue cases were reported of which 210 were fatal. The Case Fatality Rate (CFR) was 1.28 percent. The Director General of Health Services has taken initiatives to develop national guidelines by adapting the WHO guidelines according to the local

needs. The objective of the guideline is to control transmission of Dengue Fever and DHF and reduce morbidity and prevent deaths. This guideline will help to establish Early Diagnosis and Prompt Treatment (EDPT) of Dengue Fever and DHF.

Malaria: In 1992 epidemiological follow-up found that the resistance of Plasmodium falciperum to a number of anti-malarial drugs was increasing and with relation to 1982 the number of malaria cases has doubled (i.e. in 1982 positive cases were 46781 where as in 1992 it rose to 11566). The government introduced a National Guideline for treatment of Malaria in 1994 and this was revised in 2004. The statistics from 2001 to 2005 shows that there is marked increase in the proportion of Plasmodium falciparum cases by year. WHO declared that malaria can not be eradicated and subsequently a new strategy for malaria control was launched. The new strategy is being gradually implemented, and it emphasizes disease control aspects and endorses four technical elements (early diagnosis, prompt treatment, recognition of treatment failures and management of severe and complicated cases in hospitals). Emphasis is also placed on malaria surveillance, preparedness for control of malaria outbreaks/epidemics, and the introduction of insecticide impregnated bed nets. The main constraint is the reduced capacity of the core technical unit for control of vector-borne diseases to take on activities countrywide (MIS, DG-Health, 2007)

Other diseases: *Kala-azar* is a re-emerging disease since the cessation of DDT spraying operations. At least 20 million people in more than 27 districts are at risk. The estimated cumulative disease specific burden is 35,000 cases. Under the project for integrated control of vector-borne diseases, an emergency plan for the control of *kala-azar* was initiated in 1994-95 in 22 thanas of 11 districts (population five million). This was successful and further expansion is now being planned. At least 8,000 *kala-azar* patients have been successfully treated to date. The major constraint is similar to that faced in the control of malaria.

Eighteen (18) million people in 12 districts are considered to be at risk of *filariasis*. A revised strategy for the elimination of *filariasis* is being pilot tested in one district. This strategy involves administering a single dose of ivermectin with albendazole yearly for a period of three years to the total population in the district.

To date 17 AIDS cases have been reported, but 13,000 cases of HIV infection are estimated. Current data available categorizes Bangladesh as a low prevalence country at present.

Prevention, control and management of common diseases and injuries

Acute respiratory infection (ARI) accounts for about 145,000 deaths annually among children less than five years of age. The under-five mortality rate due to ARI was reported to be 33 percent (ICDDRB 1994). Forty to sixty percent of outdoor visits and 30-40 percent of indoor admissions are attributed to ARI. The programme for the control of ARI continues to be implemented on a phased basis according to the recommended WHO strategies.

Diarrhoeal diseases continue to be responsible for much morbidity and mortality, but current strategies have considerably reduced mortality. Multi-sectoral partners were involved in mobilizing the community regarding correct home-based care and timely referral. The availability of ORS has increased through the formation of ORS depot holders in the community. Constraints include inappropriate use of anthelmintics and anti-diarrhoeals, especially in the private sector and the underutilization of health facilities including ORT corners.

6. Policy and Institutional Strategy

The Health and Population Sector Strategy (HPSS) introduced in 1998, which forms the basis for the future national Health policy, is based on several key principles: greater orientation to client needs, especially those of women; improved quality, efficiency and equity of government health services; provision of a package of essential health services; expanded private sector role in providing health and population services; one-stop shopping via co-location of services; and expanded cost recovery and improved efficiency of resources by the public sector.

Some of the main objectives are:

- To allocate more resources to support services for poor, and vulnerable groups (women and children).
- Unifying the existing bifurcated health and family planning service delivery system.
- To achieve an appropriate balance between the public and private sectors in financing and provision of services.
- Decentralization of management through devolution of authority.

The following activities have been identified to achieve the above objectives:

- Deliver an Essential Services Package to the whole population with the aim of maximizing health benefits, relative to per capita expenditures.
- Service delivery mechanism should be unified, restructured and decentralized, both at the thana and hospitals. Other services, particularly hospital-level, are proposed to be provided through partnerships with or commissioning of services to NGOs and private not-for-profit hospitals. The public sector hospital services delivery will be improved through installing greater autonomy of management, local level accountability, cost-recovery, fee retention and utilization, and a drug revolving fund. Integrated support systems should be strengthened. Introducing a sector wide approach to manage the health sector, rather than having a series of projects with their own funding, management, implementation and reporting arrangements. In view of the potential resource gap between the sectoral resource envelope and projected sectoral expenditures, increased reliance on cost recovery for public sector services will be considered.
- Health insurance coverage in urban Bangladesh is proposed to be increased through development of a health insurance scheme for government employees and for employees of state-owned enterprises. At the centre, health will be more integrated and decentralization taken to lower levels. Hospital level services be focused and improved.
- Policy and regulatory framework be strengthened. Existing policies will be reviewed and revised for improving accessibility, affordability and quality of services and for further improvements in affordability, quality and safety of drugs and rational use of drugs.
- New policies on public and private sectoral mix and financing of services will be developed

7. Way Forward

Some possible measures for Bangladesh to reduce health impacts from climate change are given below:

 Water borne diseases are a major public health problem in Bangladesh and changes of climate factors will increase its incidence. To address such problems and reduce possibility of incidences of any climate sensitive diseases, some of the initiatives including policy decisions, scientific tasks and broad research to confirm earlier findings, institutional capacity building to handle consequences may need to be considered.

- The government agencies (e.g. Dg-Health) may initiate climate sensitive diseases surveillance separately or can include a separate component on this in existing national diseases surveillance programme.
- The government may develop climate sensitive diseases dataset and vector data based on geographical distribution for further research and prediction
- Health professionals may need to be trained on climate change and its impacts on human health to deal with future adversity
- The government in association with NGOs/research organizations working on climate change and health issues may initiate training programme for health professionals.
- Awareness programme on climate change impacts on human health would build resilience of the community
- Considering all relevant climate factors and non-climate factors, adaptation strategies on health to climate change can be developed. Climate Change Cell (CCC) can initiate developing this strategy in association with relevant partners GOs/NGOs.
- Improve water supply and sanitation management
- Protection of water resources
- Improve hygienic practices at individual and community level

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