

CLIMATE CHANGE AND ITS IMPACT OF PUBLIC HEALTH: BANGLADESH PERSPECTIVE

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Abstract: The purpose of this paper is to assess the Climate Change and its Impact of Public Health: Bangladesh Perspective and to suggest other useful methods that can be attempted in imparting knowledge to the humanity. Climate change affects public health equally directly and indirectly. Public are showing directly to changing weather conditions patterns (temperature, precipitation, sea-level rise and more frequent extreme events) and indirectly through changes in the quality of water, air and food, and changes in ecosystems, agriculture, production, individual settlements and the financial system. These direct and indirect exposures can reason death, disability and affliction. Health troubles enhance vulnerability and decrease the ability of individuals and groups to adapt to climate change.

Key words - climate change, health, adaptation, household, vulnerable community

INTRODUCTION

Bangladesh has been recognized as one of the countries to be most adversely precious by global climate change. Bangladesh is a low-lying country with high population thickness and a large agricultural sector this is susceptible to environmental changes. In recent years, the economy has grown and diversified though intensified agricultural production, a burgeoning ready-made garments sector, large-scale international labor migration, and effective small-scale business development supported by microfinance.

In the decades since becoming independent, Bangladesh has also been successful in improving most measures of human development and in halving the proportion of the population living in poverty (BBS 2011). At the same time, the country has improved strategies to cope with natural disasters such as flooding, storms, and cyclones especially since the devastating cyclone of April 1991 (Chowdhury et al.1993; Rana, Rajib, and Rahman 2011).

However, the rural population is largely dependent on agriculture, especially rain-fed and Ground water-irrigated rice production. Encroachment of salt water in coastal areas, depleting ground water aquifers due to widespread expansion of tube wells for agriculture and domestic use, reduced replenishment due to declining river levels especially in dry seasons all jeopardize agricultural productivity and the livelihoods of the rural population (Mirza 1997, 2002, 2004). Dependence on high yielding varieties of rice and other crops that rely on groundwater irrigation especially during the dry winter months has driven improved agricultural productivity since the 1970s. However, these improvements are vulnerable to changes in climate and water supply. Extreme weather events, such as storms, tornados, cyclones, flooding, and cold snaps, can further damage crops and undermine fragile livelihoods.

DEFINITION OF CLIMATE CHANGE

Climate change is identified as an average weather condition of an area characterized by its own internal dynamics and by changing in external factors that affect climate (Trewartha et al., 1980). United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as the change resulting from long term direct and indirect activities that induces changes in the compared time which are much more than the natural change (Daily Star, 2011). On the other hand, the weather is a set of all the phenomena occurring in a given atmosphere at a given time (IAC, 2011).

Climate change is the biggest global health threat of the 21st century and is increasingly recognized as a public health priority (WHO, 2009; Lancet, 2011; Young et al., 2002; Yongyut, 2009). Climatic variables are vital environmental factors, which establish ecological niches of tree species and their patterns of distribution (Avise, 2000; IPCC, 2001; Yongyut, 2009). Species-distribution models (SDMs), and forecasted global climate data, indicated that up to 43% of a sample of tree species in Amazonia could become non-viable by 2095 (Peralvo, 2004; Yongyut, 2009). Human induced climate change threatens ecosystems and human health on a global scale (IUCH, 2010). Climate change will have its greatest impact on those countries, which are already the poorest in the world, and it will deepen inequities, and the effects of global warming will shape the future of health among all peoples. Nevertheless, this message has failed to communicate most public discussion about the climate change (The Lancet, 2011). During this century, earths average surface temperature raises are likely to surpass the safe threshold of 2°C above preindustrial average temperature. Rises will be greater at higher latitudes, with medium-risk scenarios predicting 2 to 3°C rises by 2090, and 4 to 5°C rises in northern Canada, Greenland, and Siberia (Costello et al., 2011). The average temperature of today's world has already increased by 0.6°C from the middle of the 1800s. In the last century, average temperature of earth has increased

by 1.5 to 4.5°C leading to melting of polar and mountain ice and thus sea level rise. It has also been shown that if climate change continues unabated, in the year 2050, production of rice will decrease by 8% and that of wheat by 32% (Daily Star, 2011u). An update on the IPCC's fourth assessment identified that if there is no action to cut emissions, there is a potential for a temperature rise as much as 7°C by 2100. The fourth assessment report of the IPCC in 2007 also concluded that it was "unequivocal" that the Earth is warming and that human activities play a role in this change. Over the last 50 years, "cold days, cold nights, and frost have become less frequent, while hot days, hot nights, and heat waves have become more frequent." The linear warming trend over the last 50 years of, on average 0.13°C per decade, is nearly twice that for the last 100 years. The total temperature increase from the period 1850 to 1899 to the period 2001 to 2005 has been 0.76°C (New Nation, 2011a).

OBJECTIVES OF THE STUDY

1. The objectives of the study are as follows:
2. To identify different types of Climate Change and Infectious Disease.
3. To find out the beneficiary activities of prevention of diseases
4. To identify different types of non communicable diseases.

METHODOLOGY OF THE STUDY

In a broader sense of the term, methodology considers all techniques, strategies, approaches to be applied at every phases of conducting the research, especially, in collecting, processing and analyzing information. Methodological consideration also involves the reliability and validity of techniques and findings. Documentary analysis has used for the study. Data are facts, figures and other relevant materials, past and present, serving as the bases for study and analysis.

Research Design

A descriptive cross sectional study/research was conducted in assessing the environmental impact on Public Health in Bangladesh. The participants were who fulfill the inclusion criteria and completed a structured questionnaire.

Study Period

The study was conducted for a period from January 2014 to June 2016.

Study Area

The study was conducted in-

1. Environment--Zone-9: Old Brahmaputa Floodplain: Mymensingh Jamapur Districts.
2. Environment--Zone -14: Gopalganj Khulna Peat Basin: Gopalganj Madaripur Districts.
3. Environment--Zone -29: Brown Hills: Sylhet, Cox's bazar Districts and all over the Bangladesh.

Study Population

The target populations of the study were medical professionals (medical doctors/medical officers, medical teachers), traditional physicians (homeopath & allopath and village doctors), medical businessman (pharmacist, MR/SMO), NGO service providers and civil society members of the study area of Bangladesh.

Selection Criteria

Inclusion Criteria

- i. Medical professionals (medical teachers, medical doctors/medical officers) (public or private) who works and live in Bangladesh
- ii. Traditional (homeopath & allopath) physicians (public or private) who works and live in Bangladesh
- iii. NGO service providers who works and live in Bangladesh
- iv. Medical businessman (Pharmacist and medical representative) who works and live in Bangladesh,
- v. Civil society members who lived in Bangladesh
- vi. Respondents who were voluntarily willing to participate in the study

Exclusion Criteria

Respondents who were absent in the day of data collection.

Sample Size Estimation

Sample Size

Calculation of sample size by using the following formula-

$$n = \frac{Z^2 \cdot 1-\alpha/2 \cdot P \cdot (1-P)}{d^2}$$

Here:

n= The desired sample size

z= Standard normal deviation, usually set 1.96 which corresponds to 95% CL

Since there is no ready reference on the environmental impact, we can assume p = 10% to be adequate.

So,

p= 10%= 0.1,

q= (1-p) = (1- 0.1) =0.9

d= Degree of precision and in this study it will set at 5%

So sample size-

$$n = (1.96)^2 \times (0.1)(0.9) / (.05)^2$$

$$= 138.29$$

Due to allocation of data collection time, the feasible sample size was 250.

Sampling Method

The sample was selected through purposive manner. For the purpose of the study we interviewed and group discussed five (05) types of concern-

- Medical professionals (medical teachers, medical doctors/medical officers)- 50 from different (public or private) organization;
- Traditional (homeopath & allopath) physicians- 50 from different (public or private) organization;
- NGO service providers- 50 from different organization;
- Medical businessman (Pharmacist and medical representative)-50 from and
- 50 from members of civil society in Bangladesh

Data Collection Procedure

Data was collected from primary Sources. The data was collected based on purposively selected different area and organization. The secondary data collection method has focused on extensive literature review covering relevant national-level studies and reports. Websites of relevant organizations were analytically surfed through. Besides, newspapers, conference proceedings, working papers, Medical Journals, Articles, Term paper, Research Report, and other sources of information were also explored to the optimum level.

Research Instruments

For collection of primary data a structured questionnaire was developed based on the research objectives. Pre-testing of the questionnaire was done on similar types of community. After the pre-testing, revision of the items and questions was formulated based on the findings.

Study Methods

Data was collected by environmental and Public Health Survey, Interactive Group Discussion (IGD) and Case Studies by the researcher at their consent and convenience.

Data Processing

Data Management Plan

The completed questionnaires was collected and checked for completeness and clarity of the information and compiled. The data from all the completed questionnaires was analyzed by means of SPSS software.

Data Analysis Plan

There was frequency table of the variable with mean and standard deviation.

RESULTS AND DISCUSSION

The desire of this research was to identify the environmental impact on public health in Bangladesh through primary and secondary data. So we tried our best to incorporate all relevant issues through descriptive cross sectional study and sampling method was purposive sampling. There were six categories of the respondents: medical officers, medical teachers, traditional physicians, NGO service providers, medical businessmen and civil society members. The participants in this study were who fulfill the inclusion criteria and structural questions were delivered to a sample of 250 respondents. (Medical professionals-50, Traditional physicians-50, NGO service providers-50, Medical businessmen-50 and civil society members-50 respondents).

Table-1: Age Distribution of the respondents

| Medical professionals N=50 | | Traditional Physicians N=50 | | Medical businessmen N=50 | | NGO service providers N=50 | | Civil society members N=50 | |
|----------------------------|-------|-----------------------------|-------|--------------------------|-------|----------------------------|-------|----------------------------|-------|
| Age in years | | Age in years | | Age in years | | Age in years | | Age in years | |
| 25-30 # | 03 | 25-30 # | 04 | 25-30 # | 10 | 25-30 # | 03 | 25-30 # | 02 |
| % | 06.0 | % | 08.0 | % | 20.0 | % | 06.0 | % | 04.0 |
| 31-40 # | 21 | 31-40 # | 13 | 31-40 # | 23 | 31-40 # | 17 | 31-40 # | 13 |
| % | 42.0 | % | 26.0 | % | 46.0 | % | 34.0 | % | 26.0 |
| 41-50 # | 15 | 41-50 # | 19 | 41-50 # | 14 | 41-50 # | 24 | 41-50 # | 14 |
| % | 30.0 | % | 38.0 | % | 28.0 | % | 48.0 | % | 28.0 |
| 51-60 # | 11 | 51-60 # | 14 | 51-60 # | 03 | 51-60 # | 06 | 51-60 # | 21 |
| % | 22.0 | % | 28.0 | % | 06.0 | % | 12.0 | % | 42.0 |
| Total # | 50 | Total # | 50 | Total # | 50 | Total # | 50 | Total # | 50 |
| % | 100.0 | % | 100.0 | % | 100.0 | % | 100.0 | % | 100.0 |
| Mean: 38.68 | | Mean: 40.86 | | Mean: 36.20 | | Mean: 39.66 | | Mean: 50.08 | |
| SD ± 0.891 | | SD ± 0.926 | | SD ± 0.833 | | SD ± 0.772 | | SD ± 0.922 | |

The average age of the medical professionals were 38.68 years and standard deviation (SD) was ± 0.891 years. It was found that the highest respondents rate age of 31-40 (42.0%) years. The average age of the traditional physicians were 40.86 years and standard deviation (SD) was ± 0.926 years and the highest respondent's rate age of 41-50 (38.0%) years. The average age of the medical businessmen were 36.20 years and standard deviation (SD) was ± 0.833 years and the highest respondent's rate age of

31-40 (46.0%) years. The average age of the NGO service providers were 39.66 years and standard deviation (SD) was ± 0.772 years and the highest respondent's rate age of 31-40 (34.0%) and 41-50 (48.0%) years. The average age of the civil society members was 50.08 years and standard deviation (SD) was ± 0.922 years. It was found that the highest respondents rate age of 41-50 (28.0%) and 51-60 (42.0%) years.

Table-2: Gender Distribution of the respondents

N=250

| Gender | Medical professionals N=50 | | Traditional Physicians N=50 | | Medical business man N=50 | | NGO service providers N=50 | | Civil society members N=50 | |
|--------|-------------------------------|-------|--------------------------------|-------|------------------------------|-------|-------------------------------|-------|-------------------------------|-------|
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Male | 32 | 64.0 | 45 | 90.0 | 42 | 84.0 | 26 | 52.0 | 35 | 70.0 |
| Female | 18 | 36.0 | 5 | 10.0 | 8 | 16.0 | 24 | 48.0 | 15 | 30.0 |
| Total | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 |

As the table shows that 64.0% of the medical professionals were male and 36.0% were female, 90.0% traditional physicians were male and 10.0% were female. On the other hand half of the NGO service providers were male (52.0%) and female (48.0%). In the civil society members, 70.0% were male and 30.0% were female.

Figure-1: Distribution of the Respondents by Religion

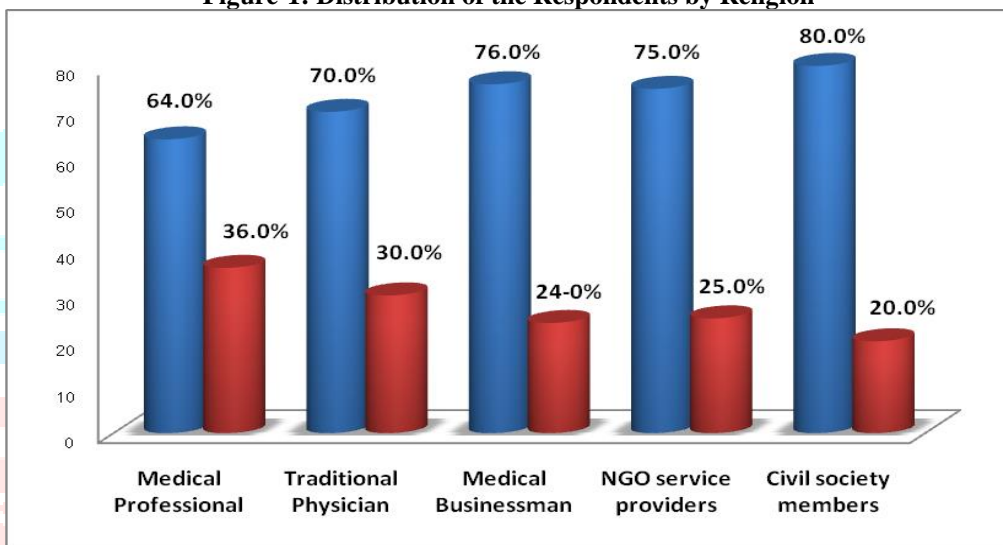


Figure-1 shows that among the medical professionals 64% were Muslim and 36% were Hindu; it was found that traditional physicians were 70% Muslim and 30% Hindu; among medical businessmen 76% were Muslim and 24% were Hindu; on the other hand it was found that religion of NGO service providers were 75% Muslim and 25% Hindu; among civil society members 80% were Muslim and 20% Hindu.

Figure-2: Distribution of the Respondents by Profession

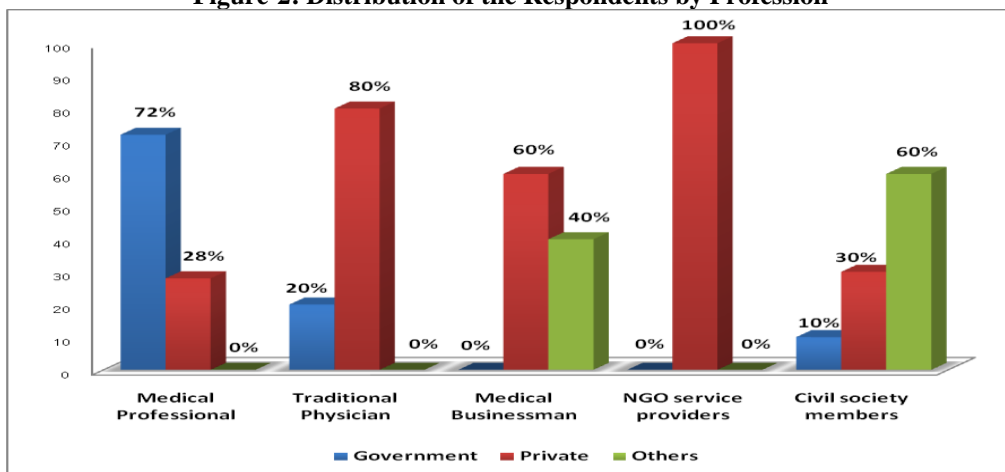


Figure-2 shows that out of 50 medical professionals, regarding with the profession of the respondents, the result revealed that 72% were Government service and rest of 28% were private service; out of 50 traditional physicians, regarding with the profession of the respondents, the result revealed that only 20% were Government service and majority 80% were private service; among medical businessmen 60% were Private service and 40% others; on the other hand among NGO service providers, it was found that

all of them were Private service; and majority 80% were private service; out of 50 Civil society members, the result revealed that only 10% were Government service, 30% private service and 60% others(no service) respectively.

Figure-3: Distribution of the Medical Professional by Qualification

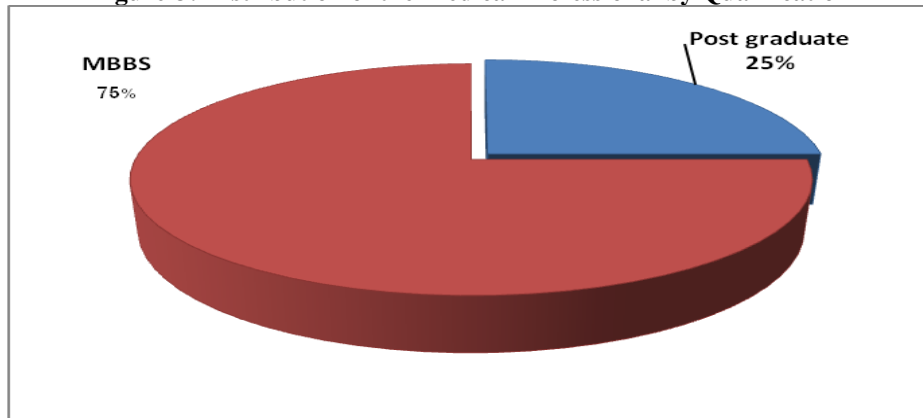


Figure-3 show that educational qualification of Medical Professionals, it was found that all most all of the Medical Professionals were MBBS (75%) and 25% were post graduates from medical science.

Figure-4 Distribution of the Traditional Physicians by Qualification

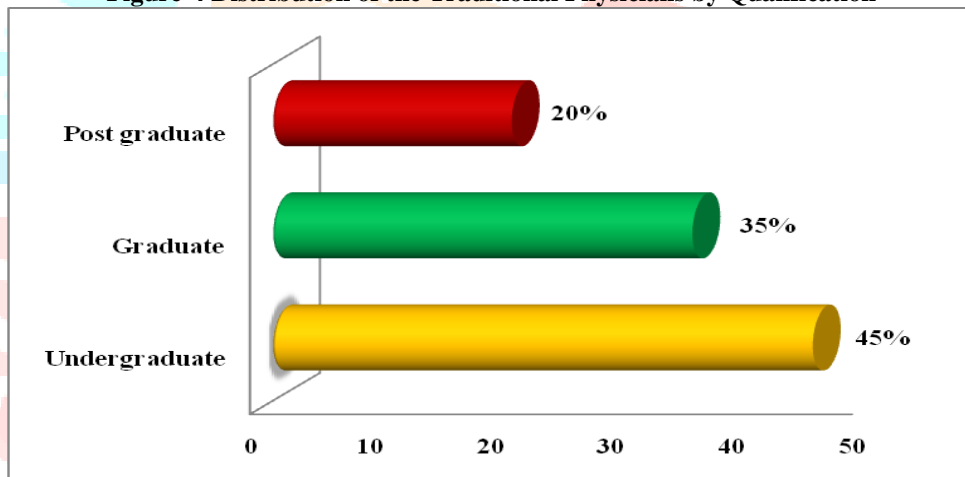


Figure-4 show that educational qualification of Traditional Physicians (Homeopathic, Ayurbathic and village doctors), it was found that less than half of the Traditional Physicians were undergraduates (45%); 35% were graduates and only 20% were post graduates.

Figure-5: Distribution of the Medical Businessman by Qualification

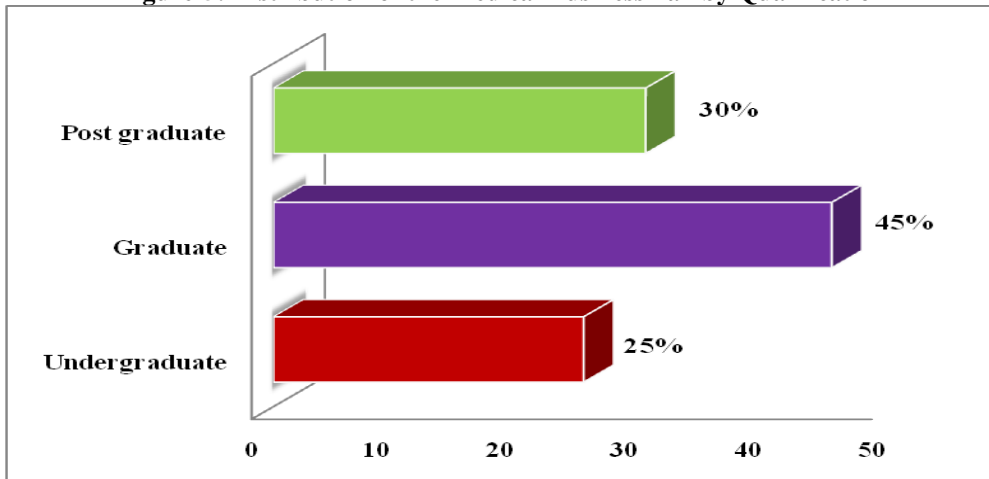


Figure-5 show that educational qualification of medical businessmen (Pharmacists, Medical Representatives, MSPO), it was found that less than half of the medical businessmen were graduates (45%); 30% were post graduates and (25%) were undergraduates.

Figure-6: Distribution of the NGO Service Providers by Qualification

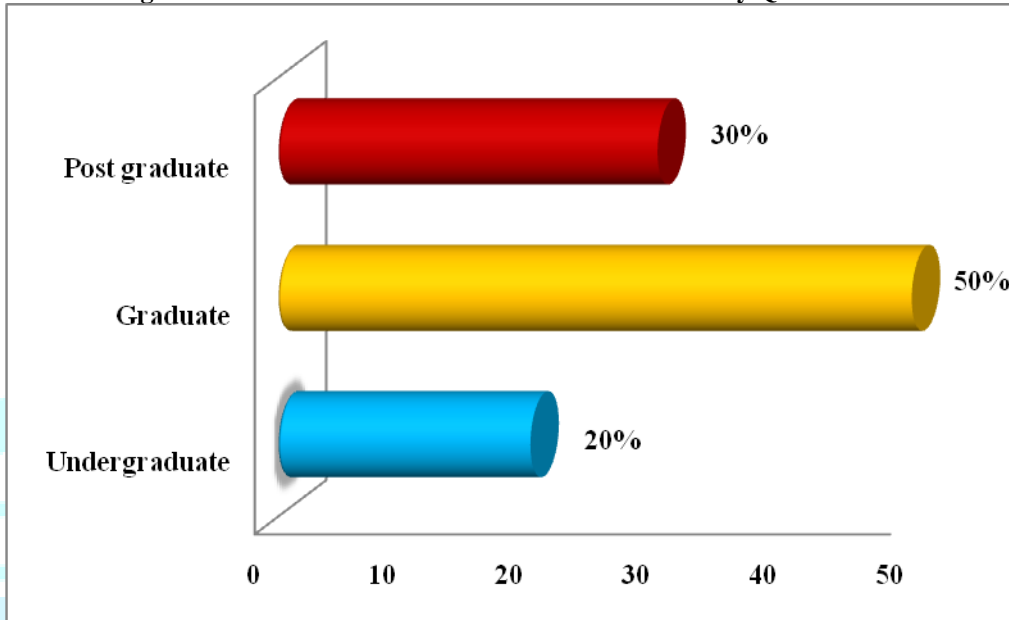


Figure-6 show that educational qualification of NGO Service Providers, it was found that half of the NGO Service Providers were graduates (50%); 30% were post graduates and (20%) were undergraduates.

Figure-7 Distribution of the Civil Society members by Qualification

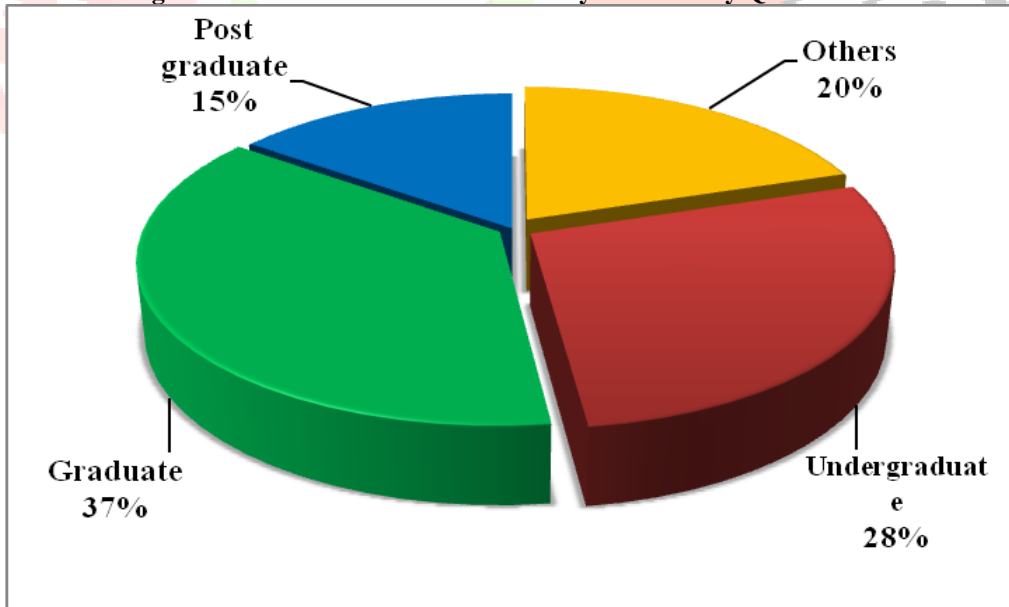


Figure-7 show that educational qualification of Civil Society members, it was found that more than one third of the Civil Society members were graduates (37%) and 28% were undergraduates; of them 20% were others and only 15% were post graduates.

Table-3: Number and percent distribution of medical professional’s opinion by environmental monsoon disease

| Response | Environmental monsoon diseases | | | | | | | | | | | |
|----------|--------------------------------|---|--------|---|---------|---|---------|---|--------------|---|-------|---|
| | Seasonal flu | | Asthma | | Malaria | | Cholera | | Skin disease | | Burns | |
| | # | % | # | % | # | % | # | % | # | % | # | % |
| | | | | | | | | | | | | |

| | | | | | | | | | | | | |
|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-------|
| Yes | 50 | 100.0 | 35 | 70.0 | 12 | 24.0 | 36 | 72.0 | 35 | 70.0 | 00 | 00.0 |
| No | 00 | 00.0 | 15 | 30.0 | 38 | 76.0 | 14 | 28.0 | 15 | 30.0 | 50 | 100.0 |
| Total | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 |

Table-3 show that out of 50 medical professionals, regarding with environmental monsoon diseases, it was multiple response questions, the results revealed that entire medical professionals said seasonal flu (100%) as environmental monsoon diseases and all most all of them said asthma (70%), skin diseases (70%) and cholera (72%) as environmental monsoon diseases; few of them said malaria (12%) as environmental monsoon diseases; all of the medical professionals said burns (100%) not as an environmental monsoon diseases.

Table-4: Number and percent distribution of medical professionals by summer diseases showing high intensity infection

| Response | Summer diseases showing high intensity infection | | | | | | | | | | | |
|----------|--|-------|----------------------|-------|----------------------|-------|--------------|-------|----------------------|-------|----------------------|-------|
| | Seasonal fever | | Respiratory diseases | | Water borne diseases | | Heat strokes | | Fungal skin diseases | | Soil borne parasites | |
| | # | % | # | % | # | % | # | % | # | % | # | % |
| Yes | 40 | 80.0 | 40 | 80.0 | 38 | 76.0 | 26 | 52.0 | 26 | 52.0 | 06 | 12.0 |
| No | 10 | 20.0 | 10 | 20.0 | 12 | 24.0 | 24 | 48.0 | 24 | 48.0 | 44 | 88.0 |
| Total | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 |

Table-4 show that out of 50 medical professionals, regarding with the summer disease showing high intensity infection, it was multiple response questions, the results revealed that all most all of the medical professionals believed seasonal fever (80%), respiratory diseases (80%) and water borne diseases (76%) showing high intensity infection of summer disease; more than half of the medical professionals believed heat strokes (52%), fungal skin diseases (52%) showing high intensity infection of summer disease. Near about all most of them believed soil borne parasites (88%) not showing high intensity infection of summer disease.

Table-5: Number and percent distribution of medical professionals by non communicable diseases

| Response | Non communicable diseases | | | | | | | | | | | |
|----------|---------------------------|-------|-----------|-------|---------|-------|------------|-------|------------|-------|------|-------|
| | Heart diseases | | Diabetics | | Cancers | | Arthritics | | Rheumatism | | Gout | |
| | # | % | # | % | # | % | # | % | # | % | # | % |
| Yes | 48 | 96.0 | 48 | 96.0 | 44 | 88.0 | 08 | 16.0 | 02 | 04.0 | 02 | 04.0 |
| No | 02 | 04.0 | 02 | 04.0 | 06 | 12.0 | 42 | 84.0 | 48 | 96.0 | 48 | 96.0 |
| Total | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 |

Table-5 show that out of 50 medical professionals, regarding with non communicable diseases, it was multiple response questions, the results revealed that all of the medical professionals said heart diseases (96%), diabetics (96%) and cancer (88%) as non communicable diseases; all most all of the medical professionals said arthritics (84%), rheumatism (96%) and gout (96%) not as non communicable diseases.

Table-6: Number and percent distribution of medical professionals by priority family medication system during hazards

| Response | Priority family medication system | | | | | | | | | | | |
|----------|-----------------------------------|-------|-----------|-------|--------------|-------|-------------------|-------|----------------------|-------|--------------------|-------|
| | Individual basis | | Age basis | | Gender basis | | Mobile unit based | | Family welfare based | | Geographical based | |
| | # | % | # | % | # | % | # | % | # | % | # | % |
| Yes | 30 | 60.0 | 41 | 82.0 | 16 | 32.0 | 32 | 64.0 | 33 | 66.0 | 18 | 36.0 |
| No | 20 | 40.0 | 09 | 18.0 | 34 | 68.0 | 18 | 36.0 | 17 | 34.0 | 32 | 64.0 |
| Total | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 | 50 | 100.0 |

Table-6 show that out of 50 medical professionals, regarding with priority family medication system during hazards, it was multiple response questions, the results revealed that all most all of the medical professional (82%) gave priority family medication system as age basis (children, adolescent & old) during hazards; more than half of the medical professionals gave priority family medication system as mobile unit based (house to house, habitat to shelter) (64%), as family welfare base (integrated medication system) (66%), as individual basis (60%) during hazard; one third of respondents gave priority family medication system as gender basis (32%) and geographical based (36%).

CONCLUSION

This research is a descriptive cross sectional study in assessing the environmental impact on public health in Bangladesh. The sample was selected through purposive manner and executives by structural questionnaires. For the purpose of the study Investigators interviewed and group discussed five (05) types of concern-Medical professionals (medical teachers, medical doctors/medical officers)-50 from different (public or private) organization; Traditional (homeopath & allopath) physicians-50 from different (public or private) organization; NGO service providers-50 from different organization; Medical businessman (Pharmacist and medical representative)-50 and 50 from members of civil society in Bangladesh. Inclusion criteria are the respondents who were voluntarily willing to participate on the day of data collection. Investigator was explained to them on the objectives and purpose of the survey and assured that there were no consequences of answering those questions, the respondents who were absent in the day of data collection were excluded.

Regarding with general information, it is found that the average age of the respondents are 38.68 years of medical professionals, 40.86 of traditional physicians, 36.20 of medical businessmen, 39.66 of NGO service providers and 50.08 years of civil society members. Gender distribution of the respondents most of them are male and most of them are Muslim in religion. Profession of the respondents most of the medical professional (72.0%) are government service, all most all of the traditional physicians (80.0%), medical businessmen (60%), civil society members (30%) are private service. Most of the medical professional had graduate (MBBS) level, less than half of the traditional physicians had undergraduate but medical businessmen and NGO service providers had graduate level and one third civil society members had also graduate level.

For data about environmental monsoon diseases, it is found that near about all of the respondents 234 (93.6%) believed seasonal flu, majority believed asthma and skin disease and more than half believed cholera and not believed and not believed malaria on the other hand none of them believed gout as environmental monsoon diseases.

All most all of the respondents believed non communicable diseases are diabetics, heart diseases, majority of the respondents answered cancer diseases and less than half of them gave answer arthritics, rheumatism and gout as non communicable diseases. All most all of the them agree that summer diseases of seasonal fever, respiratory diseases and water borne disease and less than half of answer heat strokes and fungal skin diseases showing high intensity infection.

From study, local comprehensive medication activities are the important beneficiary activities then monthly awareness meeting and monthly staff orientation meeting are the beneficiary activities of diseases prevention. At the same time majority of them replied weekly medi-care stocks inventory, fortnightly diseases incidence documentation and weekly disaster preparedness program review are not beneficiary activities of disease prevention.

During hazards the impact of environment priority family medication system, entire civil society members, majority medical professional, traditional physicians, medical businessmen and NGO service providers gave priority normally as individual basis, age(children, adolescent and old) basis, family welfare based integrated medication system and house to house, habitat to shelter mobile unit based family medication system during hazards. Impact of environment it is also important to geographical basis family medication system.

Environmental affected area the different Agencies (Govt. & Private) run their programs to welfare of the affected people. From study entire respondents gave first priority family welfare of the environmental affected area the health awareness programs run by different Government Agencies, International and national organization, Private organization, volunteer groups. Majority of them gave second priority the family welfare programs of diversified medical education program of the different agencies as well as family welfare of diversified medical treatment system activities run by different Agencies. Half of them gave priority extension immunization program, diseases prevention vaccination programs, family planning programs as well as child nutrition program run by different agencies.

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