INFECTIOUS AND NON COMMUNICABLE DISEASES : DOUBLE BURDEN TO BANGLADESH

Pradip Kumar Dutta[1] Asif Mujtaba Mahmud[2] Khaleda Islam[3]
AHM Tharakul Mazid[4] Sudipa Dutta[5]

Summary

Infectious diseases pose a significant burden to Bangladesh. Water borne diarrhoeal diseases and respiratory tract infections are most prevalent due to poor quality of life as well as due to poor educational status. Tuberculosis and Malaria are common and Leishmaniasis is endemic in some part of the country. Besides owing to epidemic shift for rapid urbanization non-communicable diseases like Cancer, Diabetes mellitus, Ischaemic heart disease and Stroke are also responsible for significant burden to Bangladesh. Some of the infectious diseases has emerged and reemerged in the recent past. The Zoonotic diseases like Avian influenza A/H5N1, Nipah virus, Japanese encephalitis virus, Rabies and other communicable diseases like Salmonella, Hepatitis E virus, Rotavirus sometimes cause outbreak in certain parts. Most of these diseases are preventable. This review will discuss the super imposed burden of non-communicable disease over emerging and re-emerging infectious diseases of public health importance in Bangladesh and the underlying causes of less progress to improve detection and control.

Key words : Infectious disease; Non-communicable disease; Bangladesh.

Sources and selection criteria

We searched PubMed and the databases of World Health Organization (WHO) for information of infectious diseases in South Asia. We used following search terms: 'Infectious disease' 'Non communicable diseases' and 'Bangladesh' in PubMed clinical queries. We reviewed the references of key papers. We also searched different national newspapers.

1. Professor of Nephrology
Chittagong Medical College, Chittagong
2. Senior Technical Advisor
Challenge TB, Bangladesh
3. Assistant Director
Institute of Epidemiology, Disease Control and Research (IEDCR) Dhaka
4. Post Graduate Trainee
Department of Medicine
Chittagong Medical College Hospital, Chittagong
5. Intern
Chittagong Medical College Hospital, Chittagong

Correspondence: Dr. Pradip Kumar Dutta
Email : duttaprd@gmail.com
Cell : 01819 314623

Introduction

Bangladesh a low middle income populated tropical country is very susceptible to infectious diseases [1,2]. The common emerging, re-emerging and high impact infectious diseases with which Bangladesh is struggling hard are Tuberculosis, Diarrhoeal disease, Salmonella. Vector borne parasitic diseases (Malaria, Filariasis and Leishmaniasis) Vector borne viral disease (Dengue, Japanese Encephalitis and Chikungunya) Zoonotic diseases (Anthrax, Rabies and Nipah) and Influenza (Both seasonal and Avian). The root causes of less progress in management of infectious diseases in Bangladesh are poverty, unhygienic living conditions (Poor excess to clean water and toilet facilities) ignorance, illiteracy, abuse and misuse of antibiotics, climate change (Global warming) newer routes of transmission such as organ transplantion, fragmented referral pathway and failure to incorporate newer vaccine in mass immunization[3]. IEDCR (Institute of Epidemiology Disease Control and Research) is the national disease monitoring wing which with the active help from CDC (Centers for Disease Control and Prevention, Atlanta) does most of the surveillance and outbreak control of infectious disease.

Challange of Tuberculosis (TB)

South East Asia bears 34% of TB burden. Most cases of TB occur in the 15 - 45 age group. Bangladesh ranks 6th on the list of 22 highest TB burden countries and 50% of adult population are infected by TB bacilli and the prevalence of tuberculosis in the Bangladeshi population was 0.5% of the total population. Luckily TB patients co-infected with Human Imunodeficiency Virus (HIV) accounts for only 0.1% [4].

Drug Resistant (DR) TB accounts for 3.6% new cases and 20% previously treated cases globally but Bangladesh accounts 1.4 % of new cases and 29 % of previously treated cases to have Multi Drug Resistant (MDR) TB [5]. Weak public health infrastructure, staff shortages, inadequate funding, lack of awareness about the strategy among

private practitioners and multidrug resistant were the major constrains of TB control at one time. But after 1993 when DOTS (Directly Observed Treatment Short Course) strategy started by both public and private sectors soon National TB (NTB) programme along with other Non Government Organisation (NGO's) have reached Millennium Development Goal (MDG) related targets of halving TB mortality and prevalence by 2015 [6].

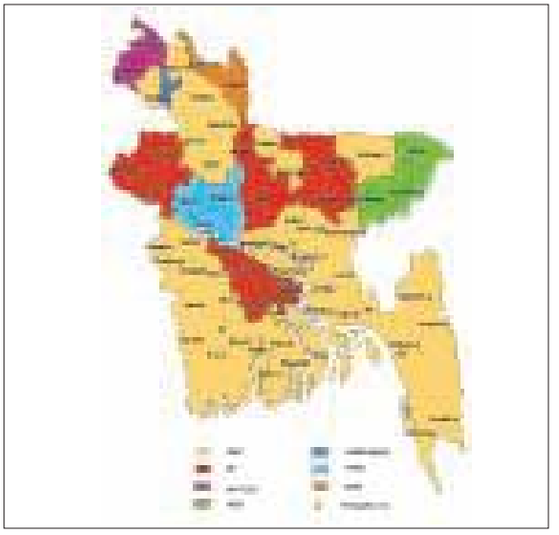

Fig 1 : DOTS Era
Source : Stop TB strategy 2006 [6].

Burden on Malaria, Kala azar and Dengue

Around 3.2 billion people living in 97 countries are at risk of malaria where Bangladesh contributes 14 million of them. The country has 13 endemic regions, Khagrachari being the top of them [7,8].

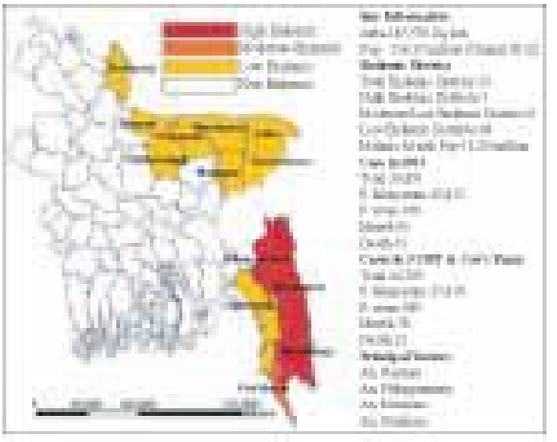

Fig 2 : Epidemiology of Malaria in Bangladesh
Source : The Independent, 27 July, 2015.

There is a significant progress in the control of malaria due to introduction of RDT (Rapid Diagnostic Test) for diagnosis, Insecticide Treated Mosquito Net (ITN) and ACT (Artimisin Based Combination Therapy) for treatment of P. falciparum cases. Thereafter, a steady decline in mortality which came down to 15 in 2013 as against 154 in 2008 showing 90.2 % reduction. The Malaria Strategic Plan (2015-2020) provides the framework and technical guidance for the National Malaria Control Programme (NMCP) to plan and implement interventions for achieving pre-determined goals, objectives and targets. The goal is 'To have achieved 'Zero indigenous transmission' and 'Zero death' aiming malaria elimination in Bangladesh, by 2020 [7].

Leishmaniasis occurs in approximately 100 countries around the world, with an estimated annual incidence of 2 million new cases 0.5 million for Visceral Leishmaniasis (VL) and 1.5 million for Cutaneous Leishmaniasis (CL). India, Sudan, Bangladesh and Brazil account for 90 % of cases of VL. Bangladesh including Nepal and India had succeeded to reduce 75% incidence from 2008 to 2014 in endemic sub-districts [9].

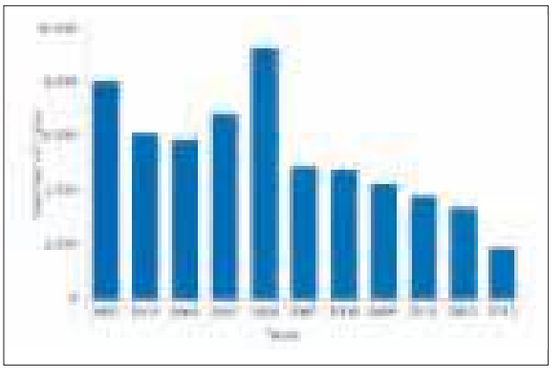

Fig 3 : Number of cases of Leishmaniasis
Source : The Independent, 7 September, 2015.

Dengue, a major public health concern started with the name 'Dhaka Fever' in 1960 has reemerged in 2000, now occurring every year extending its geographical range. Outbreaks of mosquito borne dengue fever and dengue haemorrhagic disease are also increasingly reported. 2015 recorded more than 750, three people have died [10].

Diarrhoeal disease and Influenza

The vulnerable population suffering from diarrhoeal diseases are different in developed and developing countries. Although elderly people are most vulnerable in developed countries but in developing countries most of the sufferers are infant and children. According to World Health Organization (WHO) in developing countries more than 1000 million cases suffer from acute diarrhea annually, 3–4 million succumbs to death, half of these being infants and children. Despite faecal oral transmission, fomites, contaminated hands, food or water are also possible routes to spread diarrhoea. Provided oral reahydration salt, antibiotics and social awareness campaign measures such as the provision of clean drinking water, appropriate disposal of human and animal sewage, and the application of simple principles of hand wash and food hygiene has limited diarrheoal disease related mortality[11]. Interventions targeted at diarrhoea and acute respiratory infections have resulted in substantial declines in deaths in South Asian children, although these diseases still account for almost half of the deaths [12]. Many children do not receive timely and appropriate care. WHO and Unicef's strategy for reducing deaths due to these conditions is centred on the Integrated Management of Childhood Illness (IMCI) initiative a holistic approach of prevention, early detection, and treatment of common childhood infections in countries with limited resources like Bangladesh[13]. Implementation of IMCI strategy can not be implemented totally in Bangladesh due to unavailability of vaccines for Rotavirus, Pneumococcus, and Haemophilus influenzae type b for whole population. International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDRB) is engaged in researches focusing clinical and environmental monitoring and the microbial ecology of disease causing organisms to understand the nature of contamination, and identify appropriate points of intervention to prevent bacterial contamination of foodstuffs.

Emerging Anthrax, Nipah and Chikunguny

A cutaneous anthrax outbreak was detected in August 2009, after 25 years of no reported human outbreaks.Since then anthrax outbreaks repeatedly been reported from different parts of country [14].

Bangladesh also was struggling with Nipah in recent past which was first reported in 2001 and till to date about 209 cases have been reported. As of 11 February 2014, 18 cases of Nipah virus infection have been reported in Bangladesh since the beginning of 2014, of which 9 cases have died. These cases are from 11 different districts (Manikganj, Magura, Faridpur, Rangpur, Shariatpur, Kushtia, Rajshahi, Natore, Dinajpur, Chapainawabganj, Naogaon). In 2015 IEDCR identified 9 Nipah cases, of them 6 (67%) died. These cases are from 6 different districts. The districts are, Nilphamari, Ponchoghor, Faridpur, Magura, Naugaon, Rajbari. Median age of the Nipah cases 13 years (Range: 2 to 45 years) 5 (56%) were male [15].

Chikungunya poses a big threat and likely to emerge in Bangladesh as a major public health problem. The outbreak of Chikungunya fever has been discovered in Dhaka, Dohar & Nababganj of Dhaka district & also in Shibganj of Chapainababganj. According to IEDCR 250 samples have been collected, among them the virus has been identified in the body of 46 persons [16,17]. According to the information of national newspaper 'Prothom Alo' on 24th November 2009, this is the 3rd outbreak in Bangladesh. The 1st one was in Poba Upazilla in Rajshahi district affecting 32 people in 2008. The 2nd outbreak was in Shathiya Upazilla of Pabna in 2009 [1].

Unmeasured incidence of Rabies

Being a high Rabies endemic country about 13 million cases are estimated in a year. Bangladesh has only one laboratory at the central level. Bangladesh has committed to abandon use of nerve tissue vaccine by 2011. Bangladesh is now in the process of using Intradermal Rabies Vaccination (IDRV) though till now using Tissue Culture Vaccine (TCV) or Purified Chick Embryo Cell Culture Vaccine (PCECV) [18].

Antibiotic resistance

One of the cause of poor control of infectious disease in Bangladesh is the development of resistance of common cheap antimicrobials to these diseases. Once commonly used cotrimoxazole for pneumonia or fluoroquinolone used for enteric fever are not effective now due to development of resistance [19,20,21]. The factors for this, are misuse, empirical use, over the counter use, use by village doctors, improper manufacturing or storage facility, use beyond expiry

date, and use of sub therapeutic dose [20,22]. The way to overcome this drug resistance is the development of national and regional guidelines, frequent arrangement of awareness and feedback programme and ultimately implementation of laws. WHO has developed guidelines for rational antibiotic use in developing countries, which can be adapted for local use [23]. Estimated MDR-TB among reported Pulmonary TB cases: 300,000 and Reported cases are 97,000 (45%). Treatment success is 48%. Though the 2015 treatment success target was of ≥ 75% [6].

Fig 4 : MDR enrolled since 2008
Source : Global TB report 2014 [5].

Increasing incidence of Hepatitis B & Hepatitis C

The prevalence of hepatitis 'B and C' in Bangladesh is very high. 4-7% of our population has hepatitis B and 1-3% has hepatitis C [24].

The common causes are unsafe blood donation , drug addiction and reuse of contaminated syringes, lack of maternal screening, commercial sex workers and delay in the introduction of hepatitis B vaccine [25,26,27,28].

Bangladesh introduced hepatitis B vaccine in a phased manner during 2003-2005 into the routine childhood vaccination schedule provided at 6, 10, and 14 weeks of age. The objective of introducing the vaccine in Bangladesh was to reduce hepatitis B disease burden by 80% [29].

There are also published data from Bangladesh identifying Hepatitis 'C' Virus (HCV) to be the etiological agent in 24.1% of patients with chronic liver diseases in Bangladesh [30].

Although the prevalence of HCV is not high in Bangladesh population, considering a population of more than 160 million in Bangladesh, the total number of HCV infected individuals in this country is very high [31].

Burden of Noncommunicable Disease(NCD) in Bangladesh

LMICs (Low and Middle Income Countries) like Bangladesh are subjected to double burden of disease. These countries are struggling with infectious diseases like Malaria, Dengue and tuberculosis at one hand, on the other hand the last straw is NCDs such as Cardiovascular diseases, Stroke and Diabetes which are emerging and imposing now a new burden [32].

NCD accounts for 61% of the total disease burden. This burden is rapidly increasing due to social transition, western dietary habit and rapid urbanization. Rural inhabitants and urban slum dwellers particularly suffer the most. The major NCDs of Bangladesh are Diabetes, Cardiovascular Disease (CVD) Hypertension, Stroke, Chronic respiratory diseases, and Cancer. CVD mortality rate for heart attack is 2.4%, where as for stroke is 3.6% [32].

Diabetes

Like many developing countries, prevalence of diabetes in Bangladesh increased substantially from 4% in 1990 to 10% in 2011 and is projected to reach 13% by 2030. Among diabetic persons, nearly 56.0% (95% CI 51.2–60.7) were unaware that they had diabetes. Prevalence was nearly similar in both sexes (Diabetes: Men 9.3%, Women 10.4%. Pre diabetes: Men 22.9%, Women 23.3%) [33].

Cancer

There are 1.3 to 1.5 million cancer patients in Bangladesh, with about 0.2 million patients newly diagnosed with cancer each year. Lung cancer and Mouth-oropharynx cancer rank as the top two prevalent cancers in males. Other types of cancers are Esophagus cancer and Stomach cancer. In women, Cancer cervix uteri and Breast cancer are most prevalent. Other cancer patients in women, are Mouth and Oropharynx cancer, Lung cancer, and Esophagus cancer. Bangladesh has a unique National Cancer Control Strategy and Plan of Action 2009-2015 formulated with the assistance of WHO with an objective to develop and implement continuum of cancer care through a

comprehensive cancer control programe. Piloting of cervical cancer vaccination has recently been completed. Agency for Research on Cancer has estimated cancer-related death rates in Bangladesh to be 7.5% in 2005 and 13% in 2030 [34,35].

Asthma and Respiratory diseases

Asthma in Bangladesh appears to be a substantial public health problem, an estimated 11.6 million people including 4.1 million children suffer from asthma related symptoms. In one sample the prevalence of asthma (Wheeze in the last 12 months) was found to be 6.9% (95% CI : 6.2–7.6) [36].

In 2002 the disease burden due to indoor air pollution related to solid fuel caused some 46,000 deaths, of which 13,620 were from Chronic Obstructive Pulmonary Disease (COPD) and an estimated 32,330 from Acute lower respiratory infection in children under the age of 5 years [32].

Hypertension

In the NCD risk factor survey conducted in Bangladesh in 2010, the overall prevalence of Hypertension was estimated to be 17.9% for the whole country (19.9% in urban and 15.9% in rural areas) among the population aged 25 years and above [37].

Injuries

The leading cause of injury related death among children (1 to 17 years) is drowning (59.3%) followed by road traffic accidents (12.3%). Among women 57% reported serious injuries due to domestic accidents, including domestic violence [32].

The road safety situation in Bangladesh has been deteriorating with increasing number of road accident deaths. According to police report total number of Road Traffic Accidents (RTA) was 40,927 in Bangladesh during period of 2001-2010 and number of killed person was 32,261. In 2010 3,300 people were killed in RTAs, which rose to 5928 in 2011, a rise of 80%. Approximately 33% of the beds in primary and secondary level hospitals in Bangladesh were occupied by injury related patients.The estimated cost of road accident is 7500 crore Bangladeshi Taka (1 USD=82 BDT) per year. This is said to be 1.5% of Gross Domestic Product (GDP). According to a study conducted by the Accident Research Center (ARC) of Bangladesh University of Engineering and Technology (BUET) the fatality rate of road accidents in Bangladesh is very high, with about 60 deaths per 10,000 vehicles per year as compared with rates of 2 in USA, 1.4 in UK and 3.3 in New Zealand [38].

Smoking

A WHO study showed that 20 million people in Bangladesh use tobacco in some form, including five million women and 57,000 people die every year due to tobacco-related diseases. Smoking prevalence in Bangladesh is 41% among men aged 15 years and over. In women, it was 1.8% among those aged 15 years and over [39].

The smoking rate in rural areas is slightly higher (23.6%) than in urban areas (21.3%). Males were more exposed (69.4%) than females (20.8%). A substantial proportion of gross domestic profit (GDP 1.4%) is burned out for purchasing cigarette and biri [32].

General Health situation in Bangladesh

Being world's worst climate victim we face Natural disasters, huge loss of lives, assets and infrastructures almost annually. Overall an infectious disease, as a cause of mortality, has declined substantially since 1990. Diarrhoeal disease mortality has declined by 90%, but still needs to decrease further. Pneumonia mortality has not improved substantially, and needs zinc and vaccine programmes to bring these rates down. Tuberculosis needs to be controlled before HIV/ Acquired Immuno Deficiency Syndrome (AIDS) becomes prevalent [40].

Health statestics

Poverty rate has declined by 8.6% from 43.8% (2005) to 35.2% (2010) in 5 years. Bnagladesh has achieved UN-MDG 4 Award in 2010 (IMR41/1,000 Live Births-BBS 2008). More than 75% children are under immunization programme. We have life expectancy of 67 years at birth. In 2010 Maternal Mortality Rate (MMR) is 194/100,000 live births (BMMS, 2010) which was 574/100,000 live birth in 1990 (66% reduction in MMR between 1990 and 2010) [41].

Reducing the double burden of infectious and Non-communicable diseases

Bangladesh is experiencing major demographic shifts. With more than 160 million citizens, it is the world's eighth most populous country, but annual population growth has slowed significantly to 1.4%. Recent years have seen accelerating urbanisation, with the proportion of people living in cities rising from 25% to 30% since 2000. As a low-lying country, Bangladesh is also particularly vulnerable to climate change and sea-level rise.

It is high time to start the stoppage of communicable infectious diseases. Ministry of Health and Family Welfare (MOHFW) in collaboration with International Center for Diarrhoeal Disease Control, Bangladesh (ICDDR'B) Center for Disease Control (CDC) Bangladesh Ministry of Fisheries and Livestock, Bangladesh Ministry of Environment & Forests are trying hard to combat this situation for prevention and improvement of these diseases by institutionalizing a one health framework at the animal-human-environment interphase. In Bangladesh active support from certain NGO's and village volunteer have also contributed to the decline of disease in recent years. The ongoing surveillance system in Bangladesh for early detection, management and control is mainly guided by IEDCR.

Conclusion

Bangladesh is now in socioeconomic transition. Non communicable diseases are superseding communicable disease due to better surveillance, detection and management of communicable diseases. Recently emerging dreadful viral diseases 'Ebola', MERS corona virus and 'Zika virus' are a remote threat for Bangladesh due to either absence of vector or least travel from those countries, where there diseases are endemic. Most non communicable diseases can be halted at the earlier stage by changing life style, early detection and early referral. Besides social mobilization, advocacy and media campaign, participatory planning and joint review, resource mobilization and health system strengthening and capacity building, above all technical and financial assistance from national and international agencies are highly required to combat both the problems.

Disclosure

All the authors declared no competing interest.

References

1. Kahhar MA. Emerging and Re-emerging Infectious Diseases: Bangladesh perspective. J MEDICINE. 2012; 13 : 1-2.

2. Demographics of Bangladesh From Wikipedia, the free encyclopedia. https://en.wikipedia.org/wiki/Demographics_of_Bangladesh (Accessed 06 February 2016).

3. Zaidi AKM, Awasthi S and deSilva HJ. Burden of infectious diseases in South Asia. Bmj. 2004; 328;7443:811-815.

4. Editorial. National Tuberculosis Control Programme (NTP):Achieved and yet to achieve. BIRDEM Med J. 2013; 3(1): 1-3.

5. WHO. Global tuberculosis report 2014. Geneva: World Health Organization, 2014. http://www.who.int/tb/publications/global_report/en/ (Accessed February 06, 2016).

6. The STOP TB Strategy World Health Organization 2006. Whqlibdoc.who.int /hq/2006/WHO_HTM_STB_2006.368_eng. (Accessed 07 February 2016).

7. Bangladesh malaria national strategic plan. NSP 2015-2020, NMCP. Section 3, page 12 . static1.1.sqspcdn.com/.../NSP+Malaria+2015-2020+Bangladesh_Full+no (Accessed 07 February 2016).

8. Haque U, Overgaard HJ, Clements ACA, Norris DN, Islam N, Karim J, et al. Malaria burden and control in Bangladesh and prospects for elimination: An epidemiological and economic assessment. The Lancet Global Health. 2014; 2(2): e98–e105.

9. WHO/ South East Asia poised to defeat visceral leishmaniasis (Kala-azar) www.who.int/neglected disease/news/SEARO_poised to defeat VL/en/ (Accessed 07 February 2016).

10. World Health Organization. Dengue fever in India: update. www.who.int/csr/don/ 2003_11_12/en/ (Accessed 07 February 2016).

11. Dockrail DH, Sundar S, Angus BJ, Hobson RP. Infectious disease. In: Walker BR, Colledge NR, Ralston SH, Penman ID, editors. Davidson's principles & practice of Medicine. 22nd ed. Edinbugh.Churchill Livingstone Elsevier. 2015; 306.

12. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year? Lancet 2003;361:2226-2234.

13. Handbook IMCI Integrated Management of Childhood Illness. World Health Organization. Department of Child and Adolescent Health and Development.UNICEF. Geneva:World Health Organization. 2000 http://apps.who.int /iris/handle/10665/66533 (Accessed 07 February 2016).

14. The Daily Star 5 September, 2010;13:c5-8.

15. Nipah situation – IEDCR. www.iedcr.gov.bd.

16. Khatun S, Chakraborty A, Rahman M, et al. An Outbreak of Chikungunya in Rural Bangladesh. Bingham A, ed. PLoS Neglected Tropical Diseases. 2011. 2015;9(7):e0003907. doi:10.1371/journal.pntd.0003907.

18. WHO 2012'Strategic Framework for Elimination of Human Rabies Transmitted by Dogs in the South East Asia Region'.

19. Qazi SA. Antibiotic stratagies for developing countries: Experience with acute respiratory tract infections in Pakistan. Clin Infect Dis. 1999;28:214-218.

20. Shears P. Antibiotic resistance in the tropics. Epidemiology and surveillance of antimicrobial resistance in the tropics. Trans R Soc Trop Med Hyg. 2001; 95:269-271.

21. Zaidi AK, Hasan R, Bhutta ZA. Typhoid fever. N Engl J Med. 2003;348:1182-1184.

22. Okeke IN, Lamikanra A, Edelman R. Socioeconomic and behavioral factorsleadingto acquired bacterial resistance to antibiotics in developing countries. Emerg Infect Dis. 1999;5:18-27.

23. Couper MR. Strategies for the rational use of antimicrobials. Clin Infect Dis. 1997;24(suppl 1): s 154-156.

24. First Hepatitis B & C Patient Conference in Bangladesh organized by Liver Foundation by admin 2013. www.facebook.com/ liver.foundation.

25. World Health Organization. Hepatitis B. WWW.who.int/emc-documents/ hepatitis/ docs/ whocdscsrlyo20022/index.html (Accessed 07 February 2016).

26. World Health Organization. Hepatitis C global prevalence (Update). www.who.int/docstore/ wer/pdf/2000/wer7503.pdf (Accessed 07 Feb 2016).

27. Usman HR, Akhtar S, Rahbar MH, Hamid S, Moattar T, Luby SP. Injections in health care settings: A risk factor for acute hepatitis B virus infection in Karachi, Pakistan. Epidemiol Infect. 2003;130:293-300.

28. Khan AJ, Luby SP, Fikree F, Karim A, Obaid S, Dellawala S, et al. Unsafe injections and the transmission of hepatitis B and C in a periurban community in Pakistan. Bull WHO. 2000;78:956-963.

29. ICDDR, B. Health and Science Bulletin. 2013;11(1).

30. Khan M, Ahmed N, Rabtuan S, Zaki KMJ, Matin MA. Interferon therapy in chronic viral hepatitis in Bangladesh: A preliminary report. Int Hepatol Common. 1995; 3 (suppl): 104.

31. Epidemiology of Hepatitis C Virus in Bangladeshi General Population. Mamun-Al-Mahtab, Salimur Rahman, Fazal Karim, Graham Foster, Susannah Solaiman. BSMMU J. 2009; 2(1): 14-17.

32. Mahmood SAI, Ali S and Islam R. Shifting from infectious diseases to non-communicable diseases: A double burden of diseases in Bangladesh. Journal of public health and epidemiology. 2013;5(11):424-434.

33. Nationwide Survey of Prevalence and Risk Factors for Diabetes and Prediabetes in Bangladeshi Adults. Shamima Akter, Md. Mizanur Rahman, Sarah Krull Abe and Papia Sultana.Diabetes Care. 2014; 37 (1): e9-e10.

34. Syed Md Akram Hussain. Comprehensive update on cancer scenario of Bangladesh. Comprehensive update on cancer scenario of Bangladesh. South Asian J Cancer. 2013; 2(4): 279–284. doi: 10.4103/2278-330X.119901.

35. Cancer control in Bangladesh. Hussain SA, Sullivan R. Jpn J Clin Oncol. 2013; 43(12):1159-1169. doi: 10.1093/jjco/hyt140. Epub 2013.

36. M Rashidul Hassan, Arm Luthful Kabir, Asif M Mahmud, Fazlur Rahman, M Ali Hossain, K Saifuddin Bennoor, Md Ruhul Amin and M Mostafizur Rahman. Self-reported asthma symptoms in children and adults of Bangladesh: Findings of the National Asthma Prevalence Study. Int. J. Epidemiol. 2002; 31(2): 483-488. doi: 10.1093/ije/31.2.483.

37. World Health Organization, Ministry of Health and Family Welfare, Bangladesh. Non-communicable disease risk factor survey Bangladesh 2010. Geneva, 2011.

38. Biswas SK. Road Traffic Injuries: An Emerging Problem in Bangladesh. Faridpur Med. Coll. J. 2012;7(1): 05.

39. National Cancer Control Strategy and Plan of Action 2009-2015. Directorate General of Health Services. Ministry of Health and Family Welfare, Bangladesh. Available from: http:// www.ban. searo.who.int /LinkFiles/ Publication_Cancer_ Strategy.pdf. (Accessed 07 February 2016).

40. Maksudul AABM. Climate and infectious diseases: Global and Bangladesh perspective. J Shaheed Surhrawardy Med Coll. 2011;3(1):1-2.

41. Millennium Development Goals of Bangladesh. www.bbs.gov.bd/.../ userfiles/.../ Millennium_ Development_Goals1.pdf (Accessed 07 February 2016).