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Shifting from infectious diseases to non-communicable diseases: A double burden of diseases in Bangladesh

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Double burden diseases are a serious global problem, which is currently affecting many low and middle income countries, including Bangladesh. However, proper understanding of the need for a joint intervention against both infectious diseases and non-communicable diseases (NCD) has arisen only recently. Excessive intake of calories and poor health hygiene is one of the main common factors behind those conditions and risk factors, along with other lifestyle choices and genetic predisposition. The keys to controlling double burden diseases are primary prevention through promotion of healthy life style which is necessary during all phase of life. Action to reduce should focus on preventing and controlling the risk factors in an integrated manner. Intervention at all levels of society, from communities to governments, private organizations and non-governmental groups, is essential for prevention by amplifying awareness of people about a perfect and healthy lifestyle.

Key words: Infectious disease, non-communicable disease, nongovernment organizations, government strategies.

INTRODUCTION

The World Health Organization (WHO) stated “in many regions, that some of the most formidable enemies of health are joining forces with the allies of poverty to impose a double burden of disease, disability and premature death in many millions of people” (WHO, 2011a). This is what is happening in South Asia, which has one quarter of the global population, but where about half of the population live below the poverty line and has limited access to health care. The persistent anguish of infectious diseases is now being coupled with the non-communicable diseases (NCDs) from the aging population, posing tougher problems for these middle- and low-income countries (MLICs) of having to face a double burden of disease with limited resource. The demographic and epidemiological transition has wrought this double burden of diseases in today’s world. South Asia has made fair economic progress in recent decades, but is struggling to find a road towards sustainable development (Abul-Ghaffar, 2004).

NCDs are increasingly recognized as the next big challenge for the health sector in low- and middle-income countries (LMICs). Since the United Nation (UN) high level meeting on NCDs, held in New York in 2011, many studies have identified the increasing contribution of NCDs and their underlying risk factors to the global burden of disease. These findings have implications for health services and systems, particularly in LMICs, where the prevalence of NCDs is rising, often surprisingly rapidly, and where the global debate on health systems has been mainly focused on communicable disease and maternal and child health (Helan and Krishna, 2013).

Similar to many low income countries around the world, Bangladesh is in the midst of an epidemiologic transition, where the burden of disease is shifting from a disease profile dominated by infectious diseases, under-nutrition and conditions of childbirth to one increasingly characterized by NCDs (Bleich et al., 2011). Indeed, in the context of developing economies, there is considerable

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evidence to support the hypothesis that infectious cause from under nutrition is primarily concentrated among the poor, while NCD's from over nutrition is a problem among better-off groups, (Subramanian and Smith, 2006) even though this social pattern is likely to change as countries like Bangladesh attain a certain level of economic development. For understanding demographic and epidemiological transitions, Health and Demographic Surveillance System (HDSS) has played an important role in developing and resource-constraint setups, where accurate information on vital events (e.g. births, deaths) are not properly recorded. The primary aim of this study was to assess current health situation and trend of disease burden shifting from infectious to NCD's among the people living in Bangladesh.

Emerging diseases

Emerging diseases are diseases that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range. Some of these diseases are new and hence our body posses no natural defense against them. They include AIDS and Ebola (Library Think Quest, 2013).

Re-emerging diseases

Re-emerging disease are age-old diseases that have increased its prevalence again. These diseases include tuberculosis, cholera, malaria, etc. These diseases were previously treatable, but have developed resistance to the drugs used to treat them. The increased in migration due to war and international travel has also facilitated the spread of disease. Cholera, for example has increased due to increase in shipping. Malaria has also increased due to the resistance developed to the drugs used to kill the parasites and its mosquito-borne vector (Library Think Quest, 2013).

Double burden of disease

Double burden of disease refers to the dual burden of NCDs and infectious diseases upon the LMICs. In fact, NCDs such cardiovascular diseases and diabetes are emerging and imposing now a new burden to those countries with limited resources and yet they are still struggling to meet the challenges of infectious diseases such as tuberculosis and HIV/AIDS (Wiki, 2013).

METHODOLOGY

Information was retrieved from documents available mainly in electronic database and on the websites of specialized journal, using the terms double burden disease and health impact of double burden disease in Bangladesh. Results and comment from other researchers work were also evaluated. Around 90 research papers were retrieved from the database (websites) of several national and international publications and among them, about 38 research papers were reviewed for preparation of this article. The most important, being online collection from different public health journals on double burden disease related issues, reports on quantitative and qualitative studies, policy analysis of the existing situation in Bangladesh, and government strategies. A scrutiny of the article revealed that some paper works were also presented in international conferences. Collected documents were skim read to cases, whether they contained information in conjunction with Bangladesh health structure and double burden diseases. Data accruing from the research paper were analyzed and data were presented in table, chart and picture as per the requirement.

The epidemiologic transition

The first epidemiologic transition was associated with a rise in infectious diseases that accompanied the neolithic revolution. The second epidemiologic transition involved the shift from infectious to chronic disease mortality associated with industrialization. The recent resurgence of infectious disease mortality marks a third epidemiologic transition characterized by newly emerging, re-emerging, and antibiotic resistant pathogens in the context of an accelerated globalization of human disease ecologies (Ronald et al., 1998).

The epidemiological transition model developed by Omran (1971) "focuses on the complex changes in patterns of health and disease, the interactions between these patterns, and their demographic, economic, and sociologic determinants and consequences" (Agyei-Mensah and Aikins, 2010).

The model shows a distinctive shift in the disease pattern of a population. Mortality falls during the demographic transition. The acute, infectious diseases are reduced, while chronic, degenerative diseases increase in prominence, causing a gradual shift in the age pattern of mortality from younger to older ages (Omran, 1971). Following are the consequences: decline in deaths from infectious diseases; increase in deaths from degenerative diseases; decline in overall death rates; increase in life expectancy (Omran, 1998).

Global scenario

The global scenario of double burden of diseases shows different situations in developed and developing countries due to their respective socio-economic conditions. There are commonalities in the major risk factors, but huge differences in their approaches to provide health care support to their respective population. The leading global risks for mortality are high blood pressure (responsible for 13% of deaths globally), tobacco use (9%), high blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%). These risks are responsible for raising the risk of chronic diseases such as heart disease, diabetes and cancers. They affect countries across all income groups: high, middle and low (Figure 1) (WHO, 2011b).

There is an increasing trend in developing countries, where the demographic and socio-economic transition imposes more constraints on dealing with the double burden of infectious and non-infectious diseases arising from a poor environment which is characterized by ill-health systems. It is predicted that, by 2020.

NCDs will cause seven out of every ten deaths in developing countries. Among NCDs, special attention is devoted to cardiovascular disease, diabetes, cancer and chronic pulmonary disease. The burden of these conditions affects countries worldwide but with a growing trend in developing countries. Preventative strategies must take into account the growing trend of risk factors associated with these diseases. It may also be noted that despite

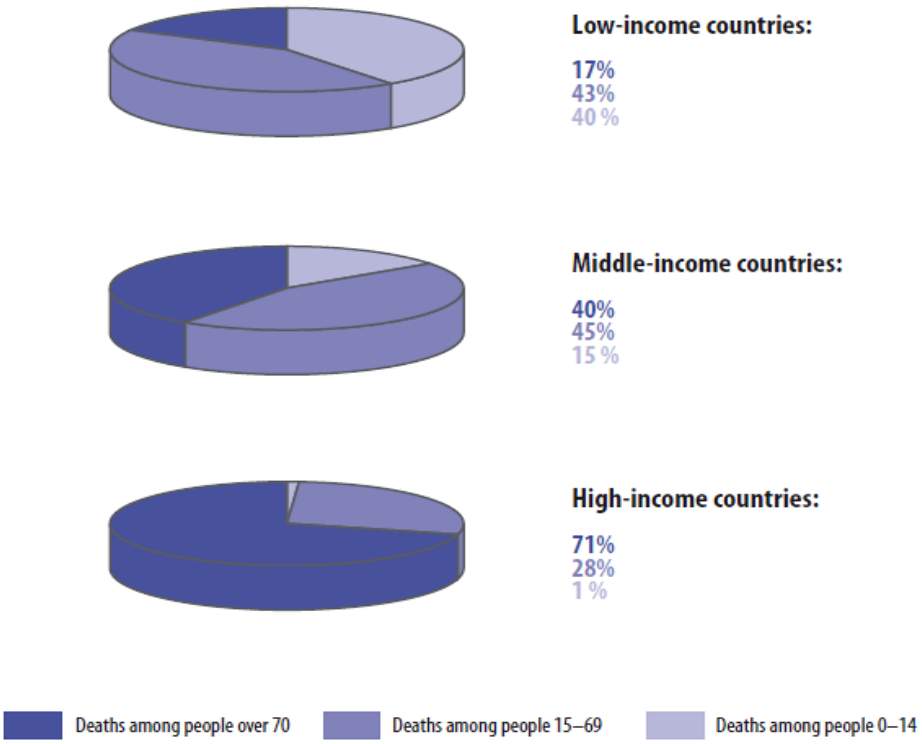

Figure 1. The top 10 causes of death (WHO, 2011b).

the success of vaccination programmes for polio and some childhood diseases, other diseases like AIDS, tuberculosis, malaria and dengue are still out of control in many regions of the globe (Boutayeb, 2005). Most of the Asian countries are double burdened in the following ways due to this epidemiological transition: (1) infections and nutritional deficiencies are receding but still prevalent; (2) cardiovascular diseases (CVDs), cancers, diabetes, neuropsychiatric ailments and other chronic diseases are increasing.

Estimating the burden of non-communicable diseases

1. Mortality, morbidity, and disability attributable to the major NCDs account for about 60% of all deaths and 47% of the global burden of disease; these rates are expected to rise.
2. Almost half of the adult disease burden in South Asia is attributable to NCDs.
3. Environmental factors are the major determinants of almost all NCDs.
4. Obstacles to managing the NCDs epidemic in South Asia include sedentary lifestyles, extreme poverty, and inadequate health systems.
5. Establishment of surveillance systems for NCDs and their risk factors is essential for developing prevention strategies and monitoring the impact of control programmes.
6. Pilot programmes are now under way in some of the countries to establish and evaluate such systems (Abdul-Ghaffar et al., 2004).

Burden of NCDs in South Asia

The demographic transition in South Asia along with unplanned urbanization and human lifestyle changes are adding the burden of NCD, where infectious diseases are still highly rampant. Double burden of diseases in LMICs is well recognized. Thus proper understanding of the need for a joint intervention against both infectious diseases and NCDs has taken place only recently (Bygbjerg, 2012). In 2008, the proportion of premature deaths due to NCD in population less than 60 years of age in low-income countries was 41%, in lower middle-income countries 28%, and in high-income countries only 13% (WHO, 2011c). The most frequent causes of death, which includes cardiovascular diseases, diabetes, cancers and chronic lung disease, and the main underlying risk factors were increased blood pressure (13% of deaths globally), tobacco use (9%), elevated blood glucose levels (6%), physical inactivity (6%), and overweight and obesity (5%) (WHO, 2009a). Excessive intake of calories is one of the main common causes behind those conditions and risk factors, together with other lifestyle choices and genetic predisposition.

Conversely, infectious diseases are still difficult to control, especially in young children, even despite the fact that most of the necessary tools and knowledge about their prevention, treatment and control are available (Rudan et al., 2012). These tools are both effective and reasonably priced, but they do not reach those, who need them (Bahl et al., 2009). Four communicable diseases still account for nearly 50% of global child mortality-acute respiratory diseases, diarrhoea, neonatal sepsis and malaria (WHO, 2008). An important underlying risk factor for those diseases is undernutrition. It was estimated that as much as 35% of child deaths could be attributed to macro- and micro-nutrient undernutrition (Black et al., 2008). Additionally to its effect on mortality, undernutrition also affects human development in many aspects (Ivana Kolčić, 2012).

The burden of non-communicable diseases, widely seen as problems of developed countries, is increasing even in countries where hunger is endemic. This sharp increase is associated with changes in lifestyles, increased smoking and shifts in dietary habits: meat and dairy products with high fat, sugar and salt, as well as

Table 1. Vital statistics of Bangladesh (WHO, 2009b).

Total population	148,692,000
Gross national income per capita (PPP international $)	1,810
Life expectancy at birth m/f (years)	69/70
Probability of dying under five (per 1 000 live births)	46
Probability of dying between 15 and 60 years m/f (per 1 000 population)	163/136
Total expenditure on health per capita (Intl $, 2010)	57
Total expenditure on health as % of GDP (2010)	3.5

reduced physical activity. The developing countries of the region now shoulder a double burden of communicable and NCDs. As the region battles communicable diseases, NCDs have emerged as serious health threats.

Smoking

Solitary is largest avoidable cause of illness and untimely death. Smoking affects every limb in the body and causes a range of cancers. It harms both smokers and non-smokers. Above 100,000 children worldwide start smoking each day. Around half of them live in Asia.

Cardiovascular diseases and diabetes

Drug mistreatment disrupts life in addition to threatening human security. The pervasiveness of HIV/AIDS reached very high in a very short stage of time. As the NCD epidemics advance, the risk of cardiovascular diseases affects all sections of society, with the poor being the most susceptible. Diabetes has risen more rapidly in South Asia than in some other parts of the world.

Obesity

Obesity is a major contributing factor to the global burden of disease and disability often co-exists with under-nutrition in increasing number of countries. The rise of childhood obesity is upsetting. Obesity and overweight pose a major risk for serious diet-related chronic diseases, including type 2 diabetes, cardio-vascular disease, hypertension as well as certain types of cancer.

Mental health

Mental health emerged as a major public health issue. Worldwide, depressive disorders and schizophrenia are responsible for 50 to 60% of all suicide cases. Five out of 10 leading causes of disability are related to mental disorder, including depression. With increasing population ageing in the region, mental disorders are commonly associated with old age, such as despair and senile dementia.

Hearing

Around 120 to 140 million people worldwide have disabling hearing difficulties, mainly due to exposure to noise. Din pollution is in charge for sleep disturbances, cardiovascular and psycho-physiological effects such as hypertension and anxiety.

Work-related diseases and injuries

An estimated 1 to 2 million people pass away from work-related diseases and injuries annually. Work-related unwell health is in attendance in all settings international. The risks and hazards connected with work are largely knowledgeable by means of additional than not restricted to, low-income and other vulnerable groups, such as women, children and minorities (Financial Express, 2012).

These figures are likely to be higher if current diagnostic criteria are used for diagnosis. South Asians have been observed to have a high risk of developing diabetes at lower levels of body mass index than Western populations.

Double burden of diseases in Bangladesh

Bangladesh is in the early stages of the demographic transition, which is expected to advance in the future. The proportion of the population (65 years and above) will move from 4.5% in 2000 to 6.6% in 2025 (U.S Census Bureau, 2013).

Along with demographic transition, Bangladesh has also been going through a rapid epidemiologic transition in which NCDs now account for two-thirds of all deaths. In 2004, NCDs accounted for 61%, with the remainder from communicable diseases and maternal and child health (MCH) issues. Of the total burden, CVD accounts for 13.4%, mental health 11.2%, cancer 3.9%, respiratory diseases 4.0%, diabetes 1.2%, and injuries 10.7% (U.S Census Bureau, 2013). However, the vital statistics of Bangladesh (Table 1) shows that in reality the life expectancy has increased which is indicative of the fact that the government has taken the problem seriously and addressing it with its meager resources.

Bangladesh is yet to develop a national NCD plan that includes a human resources plan to cover prevention, diagnosis and treatment. At present, there is no investigation of NCD related morbidity and mortality. There is a need for more complete surveillance and information related to the economic burden of these diseases. Coordination is lacking between public and private services. However, drugs for treating NCDs are not included in the list. The strategic plan recognizes the role of different actors, but fails to identify strategies to engage NGOs, academic institutions, research organizations and autonomous purchasing power parity (PPP). There is minimal involvement of private agencies, NGOs, PPPs and development partners in NCDs (Alam et al., 2013).

Furthermore, there is lack of clear business case and advocacy strategy, and community awareness of the issue is low. NCD prevention and treatment are not included in the primary care essential services package. Most people, including the poor, use private practitioners for first line clinical care. It is unclear how these services will be coordinated. It is also mentioned in this paper that more research needs to be done on social and economic factors related to NCDs. Research on health insurance is needed. Public and private insurance models should be examined and should

Table 2. Bangladesh's HDI Trends (UNDP, 2013).

Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2005 PPP$)	HDI value
1980	55.2	4.4	2	0.649	0.312
1985	56.9	4.5	2.4	0.715	0.333
1990	59.5	5	2.9	0.762	0.361
1995	62.1	6	3.3	0.860	0.397
2000	64.7	7	3.7	1.003	0.433
2005	66.9	8	4.2	1.220	0.472
2010	68.6	8.1	4.8	1.631	0.508
2011	68.9	8.1	4.8	1.701	0.511
2012	69.2	8.1	4.8	1.785	0.515

Table 3. Bangladesh's HDI indicators for 2012 relative to selected countries and groups HDI (UNDP, 2013).

Country	HDI value	HDI rank	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (PPP US$)
Bangladesh	0.515	146	69.2	8.1	4.8	1,785
Pakistan	0.515	146	65.7	7.3	4.9	2,566
Nepal	0.463	157	69.1	8.9	3.2	1,137
South Asia	0.558	-	66.2	10.2	4.7	3,343
Low HDI	0.466	-	59.1	8.5	4.2	1,633

include NCDs (Alam et al., 2013).

At present there is no investigation of NCD related morbidity and mortality. A national survey of NCD risk factors was carried out in Bangladesh, using WHO STEPS approach. This first nationally representative survey provides essential information on key indicators of NCD risk factors and creates opportunities for policy makers and stakeholders to adopt appropriate interventions. Almost all adults (98.7%) have at least one risk factor and a significant section of people have two or more risk factors (Islam, 2012).

Bangladesh has been experiencing epidemiological transition from communicable disease to non communicable disease (NCD) which has burdened the health system and inflicted great cost on the society. Cardiovascular disease, diabetes, chronic respiratory disease, cancers and other NCDs evolve from the complex interaction of multiple determinants and risk factors such as tobacco use, unhealthy diet, physical inactivity and excess adiposity. Targeted interventions to identify and address these determinants and risk factors have become a public health priority for Bangladesh. Different studies have been conducted to identify these common risk factors and prevalence of NCDs in Bangladesh. However, there exists no accepted surveillance system for NCD at the national level (Islam, 2012).

NCDs have been taking an increasingly greater toll both socially and economically in Bangladesh, and the epidemiologic transition is well documented. Key development partners, including the major donors, are yet sufficiently focused on NCDs to provide support specifically for combating chronic diseases. Policy makers have a key role in this process (Alam et al., 2013).

The trend of selected causes of death demonstrates that in next two decades, deaths due to communicable diseases will decline substantially and the mortality due to NCDs will increase at massive proportions. It can be possible through establishing proper diagnostic facilities and referral system by incorporating such provisions in the next Strategic Investment Plan and updating the health policy accordingly. The policy makers should also devise provisions of behavior change activities to prevent major NCDs (namely: diet, exercise, periodic screening of risk factors) and treatment of selected NCDs into the Essential Services Package (ESP), in addition to the existing services (Karar et al., 2009).

General health situation

Though Bangladesh is the world's worst climate victim where natural disasters, huge loss of lives, assets and infrastructures are almost annual event and then the population density is the highest in the world (980 km^2), yet the country is making steady progress. The following statistics speak for themselves: UN-MDG4 Award in 2010 (IMR41/1,000 Live Births-BBS, 2008); MMR194/100,000 live births (BMMS, 2010), that is, a 66% reduction in MMR between 1990 and 2010 (574 vs. 194/100,000 live births) MDG5 requires 75% reduction by 2015; Full immunization coverage rate for children: >75% (EPI, CES 2009); Life expectancy at birth: 67 years (BBS, 2008); Poverty rate: 35.2% (2010), 43.8% in 2005 (8.6% reduction in 5 years) (Shah Monir Hossain, 2011).

Bangladesh's human development index (HDI) value and rank

Bangladesh being a poor country economically now stands at a cross road of spending on economic and social development activities or addressing the new dimension of double burden of diseases. Bangladesh's HDI value for 2012 is 0.515, which is in the low human development category, positioning the country at 146 out of 187 countries and territories. The rank is shared with Pakistan. However, between 1980 and 2012, Bangladesh's HDI value increased from 0.312 to 0.515, an increase of 65% or average annual increase of about 1.6% which is very encouraging (Tables 2 and 3 and Figure 3).

Table 2 reviews Bangladesh's progress in each of the HDI

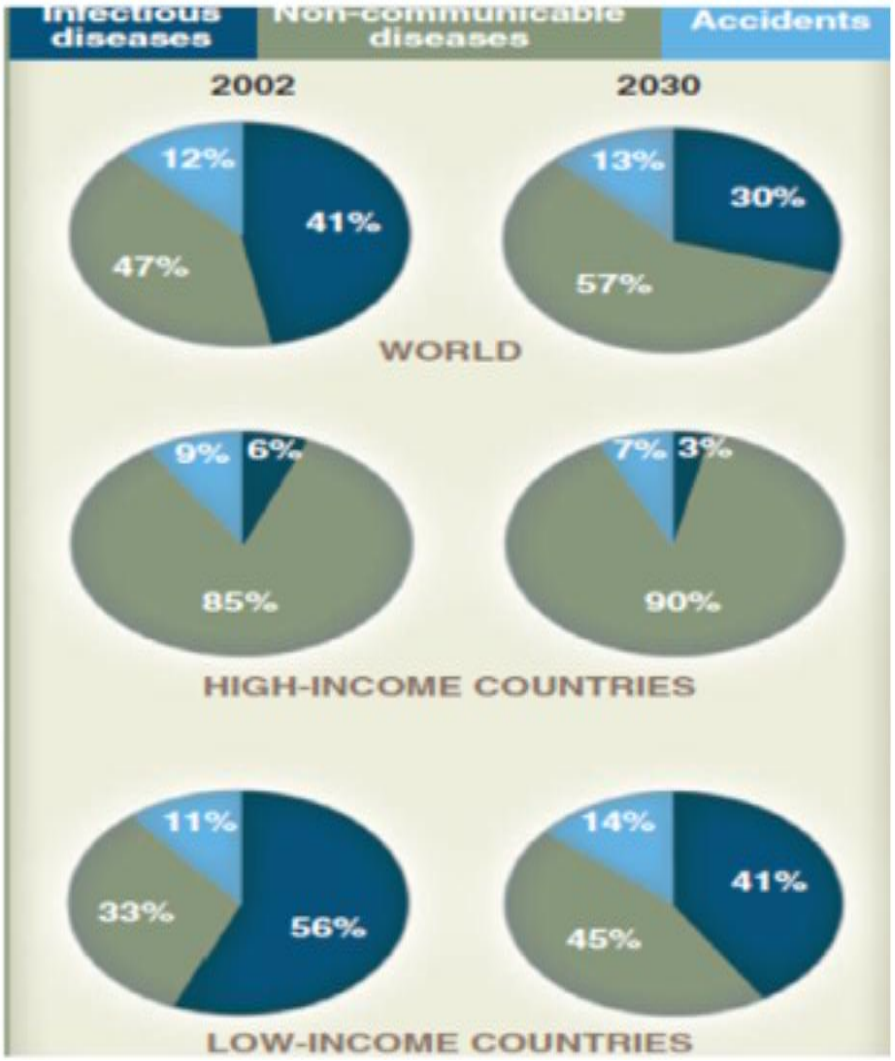

Figure 2. Proportional distribution of disability.
The proportional distribution of disability adjusted life years, contributable to infectious diseases and NCDs for (top) the world, (middle) high-income countries, and (bottom) low-income countries for 2002 and 2030 (Mathers and Loncar, 2004).

indicators, based on consistent time series data. In spite of the looming threat of double burden of diseases between 1980 and 2012, Bangladesh's life expectancy at birth increased by 14.0 years, mean years of schooling increased by 2.8 years and expected years of schooling increased by 3.7 years. Bangladesh's gross national income (GNI) per capita increased by about 175% between 1980 and 2012. All indicators of Bangladesh show a positive tendency of progress. Table 2 indicates that, with many limitations, it has been able to prosper. The demographic indicators show a decline in death and birth rates and increases in life expectancy (Table 4). The proportional distribution of disability adjusted life years, contributable to infectious diseases and NCDs for the world's top, middle and high-income countries, and bottom low-income countries for 2002 and 2030 (Mathers and Loncar, 2004) are shown in Figure 3. The demographic indicators also show a decline in death and birth rates and increases in life expectancy (Table 4). The key health indicators of MCH in Bangladesh are very impressive. Comparisons of data of different health indicators available at different times are shown in Table 5. In South Asia households, air pollution from solid fuels are the main risk factor for disease, where as blood pressure is the main factor East Asia and South East Asia (Table 6). Prevalence of Diabetes in Bangladesh was projected to be 2.2 where as in Bhutan, it was projected to be 2.1 (Table 7).

Statistics

Though Bangladesh is addressing the issue of double burden of diseases in a most formidable manner yet the danger impends as in any other LMICs. A broad prognosis made by World Bank is as follow to elucidate the burden in Bangladesh.

CVD

CVD is estimated to be the main cause in 25.1% of deaths and is projected to be the main cause in 37.2% of deaths in 2030. Ischemic heart disease (IHD) is the leading cause of death and is responsible for 12% of all mortality while cerebrovascular disease (or stroke) is the sixth leading cause of death (in 2005).

Table 4. Basic indicators (UNICEF, 2003).

Variable	Value
Under-5 mortality rank	61
Under-5 mortality rate, 1990	143
Under-5 mortality rate, 2010	48
Infant mortality rate (under 1), 1990	99
Infant mortality rate (under 1), 2010	38
Neonatal mortality rate, 2010	27
Total population (thousands), 2010	148692
Annual no. of births (thousands), 2010	3038
Annual no. of under-5 deaths (thousands), 2010	140
GNI per capita (US$), 2010	640
Life expectancy at birth (years), 2010	69
Total adult literacy rate (%), 2005-2010*	56
Primary school net enrolment ratio (%), 2007-2009*	89
% share of household income 2000-2010*, lowest 40%	22
% share of household income 2000-2010*, highest 20%	-

The demographic indicators show a decline in death and birth rates and increases in life expectancy.

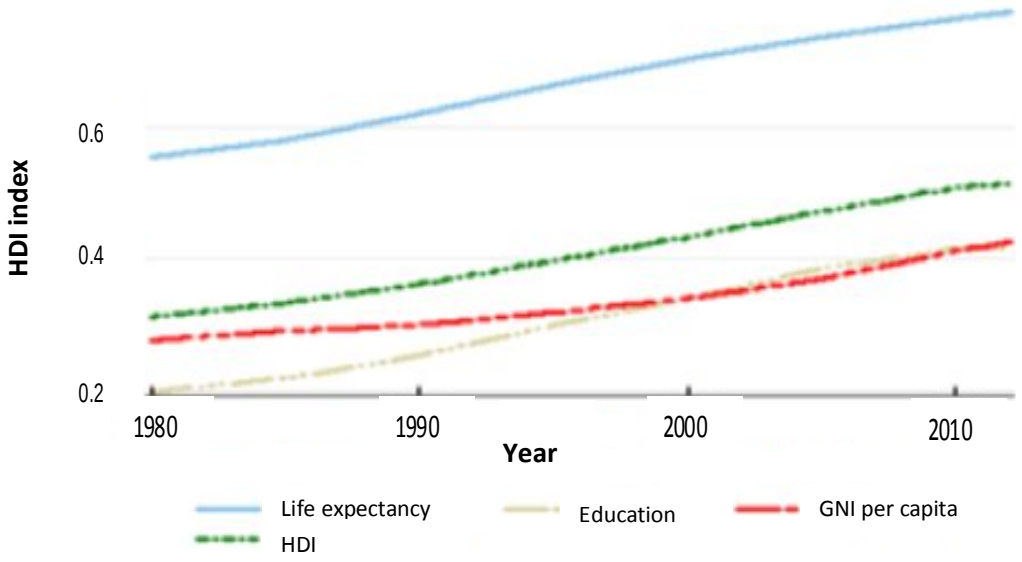

Figure 3. Trends in Bangladesh's HDI component indices 1980-2012 showing the contribution of each component index to Bangladesh's HDI since 1980. Bangladesh being the youngest country in the region is progressing well in the development of HDI (UNDP, 2013).

Diabetes

The prevalence is estimated to be 6.9% (7.5% male and 6.5% female). Urban-area studies find higher prevalence than in rural areas (urban approximately 8 to 10%).

Cancer

Cancer causes 7.5% of deaths; 70.7% of all cancer deaths were among men in 2008. By 2030, cancer deaths are projected to constitute 12.7% of the total. Among men, the leading cancer is mouth/oropharynx, followed by lung, and then esophagus; for women, mouth/oropharynx cancer is followed by cervical and breast cancer.

Asthma and respiratory diseases

A small national sample estimated 6.9% prevalence of asthma. For those over 30 years, the estimated prevalence of chronic obstructive pulmonary disease (COPD) is about 3%. Nearly 90% of the population use solid fuels, including biomass such as dung and

Table 5. Key health indicators in Bangladesh (World Bank, 2008).

Indicator	Then	Now
Life expectancy	44 (1970)	66 (2008)
Under-5 mortality rate per 1,000 live births	233 (1975)	54 (2008)
Immunization coverage	1% (1980)	89% (2008)
Underweight children under 5	70.5% (1985)	47.8% (2005)
Maternal mortality ratio per 100,000 live births	648 (1986)	322 (2001)
Total fertility rate	7 (1978)	2 (2008)
Contraceptive prevalence	7.7% (1975)	55.8% (2007)
Antenatal care coverage	25.7% (1994)	52.2% 2007)
Births attended by skilled health personnel	9.5% (1991)	24.4% (2009)

The key health indicators of MCH in Bangladesh are very impressive. Comparisons of data of different health indicators which were available at different times.

Table 6. Top five risk factors for disease in five selected regions (Robinson and Hort, 2013).

Australasia	East Asia	South Asia	South- East Asia	Oceania
High body mass index	High blood pressure	Household air pollution from solid fuels	High blood pressure	High fasting plasma glucose
Tobacco smoking including second-hand smoke	Tobacco smoking including second-hand smoke	Tobacco smoking including second-hand smoke	Tobacco smoking including second-hand smoke	High body mass index
High blood pressure	Diet low in fruits	High blood pressure	Household air pollution from solid fuels	Tobacco smoking including second-hand smoke
Alcohol use	Ambient particulate matter pollution	Childhood underweight	Diet low in fruits	Household air pollution from solid fuels
Physical inactivity and low physical activity	Household air pollution from solid fuels	Diet low in fruits	High fasting plasma glucose	Alcohol use

wood or coal for routine cooking and heating. 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 COPD and an estimated 32,330 from acute lower respiratory infection in children under the age of 5 years.

Hypertension

Approximately 25% of slum dwelling women and 38% of non-slum women had hypertension compared to 18 and 25% among men, respectively.

Injuries

Road traffic injuries are the most common cause of serious injuries among men (40 to 45% among urban men). The leading cause of injury-related death among children (1 to 17years) is drowning (59.3%) followed by road traffic accidents (12.3%). Among women, 57% reported serious injuries due to domestic accidents, including domestic violence.

Smoking

Prevalence is higher than in other South Asian countries (males 47%, females 4%) while smoking prevalence among youth is similar (boys 9%, girls 5%). More prevalent among the poorest men (70%) (World Bank, 2009). Another study revealed that 98.7% of the population has at least one risk factor, most of which are related to lifestyle. The estimated number of current adult tobacco smokers is 21.9 million (21.2 million males and 0.7 million females). The smoking rate in rural areas is slightly higher (23.6%) than in urban areas (21.3%). Around 27.2% (25.9 million) of the adult population currently use smokeless tobacco. Prevalence is similar in males (26.4%) and females (27.9%). Current smokeless tobacco use is more prevalent in rural areas (28.8%) compared to urban areas (22.5%). Among all adults, 45% were exposed to second-hand smoke in public places. Males were more exposed (69.4%) than females (20.8%). Among all persons engaged in indoor occupations, 63% (11.5 million) were exposed to second hand smoke in indoor areas of the workplace; among nonsmokers, 75.7% (5.1 million) were exposed to second hand smoke at these workplaces. A substantial proportion of gross domestic profit (GDP, 1.4%) is burned out for purchasing cigarette and biri.

Table 7. Prevalence of diabetes in South Asia, 2000 and 2025 (projected in 1998).

Country	2000	2025
Bangladesh	2.2 (1564)	3.1 (4032)
Bhutan	2.1 (19)	2.3 (39)
India	4.0 (22878)	6.0 (57243)
Maldives	2.5 (3.2)	3.0 (9.2)
Nepal	2.2 (263)	2.6 (638)
Pakistan	7.1 (5310)	8.7 (14523)
Sri Lanka	2.6 (318)	3.5 (617)

Values are percentages (number of people with diabetes, 000s) (Abdul-Ghaffar et al., 2004).

Table 8. CVD mortality (Shah Monir Hossain, 2011).

Type of CVD	% among all deaths
Heart attack	2.4
Stroke	3.6
Other CVD	6.5
Total CVD	12.5

The overall daily per capita consumption of fruit was 1.7 servings and of vegetables 2.3 servings against their minimum daily requirement of 5 servings in either form. Considering the cutoff as minimum recommended amount, 95.7% did not consume adequate fruit or vegetables on an average day.

Physical inactivity, particularly among female and urban residence is low. Sedentary lifestyle in urban population is a major risk factor. Prevalence of low level of physical activity is quite high (27%).

Although under nutrition is a major concern in sections of the population, around one fifth (18%) of the adult population were reported to be overweight and this is higher in women (22%). Around 17.9% of the survey population in the Bangladesh, NCD risk factor survey had hypertension. Population data indicated an increasing trend in diabetes prevalence especially in urban areas.

A percentage of documented diabetes of around 3.9% is among people aged >25 years. However, studies that used blood sugar measurement revealed a higher prevalence. In rural adults, the prevalence is about 5%. In urban area the prevalence is just double (10%) (Sheikh and Islam, 2012).

The major NCDs of Bangladesh are diabetes, CVD, hypertension, stroke, chronic respiratory diseases, and cancer (Shah Monir Hossain, 2011). While the national NCD risk factor survey in 2010 is that: 99% of the survey population had at least one NCD risk factor; 29% had 3 risk factors, the message is clear, hardly anyone without a risk factor; and rural inhabitants and urban slum dwellers particularly suffer the most (Shah Monir Hossain, 2011).

In relation to our population and socio-economic conditions, these figures are high but not as yet threatening.

RESULTS

Preliminary finding of Bangladesh Census 2011

The country faces double burden of diseases, both CDs and NCDs. High burden of CDs was historical in a developing and tropical country like Bangladesh. But, NCD burden is rapidly increasing due to social transition, unhealthy dietary habit and rapid urbanization. In terms of the number of lives lost due to ill-health and disability, NCDs account for 61% of the total disease burden. The under-privileged communities in the country are bearing the heaviest toll of this burden. CVD mortality rate for heart attack is 2.4%, where as for stroke is 3.6% (Shah Monir Hossain, 2011; Table 8).

Communicable diseases (emerging and re-emerging) in Bangladesh

Bangladesh is a densely populated country, where communicable disease burden is significant, and WHO Bangladesh provides technical support in strengthening national capacity for effective management of major communicable diseases such as HIV/AIDS, tuberculosis, malaria, leprosy, pneumonia, diarrhoeal diseases, tuberculosis, measles, and vector-borne diseases, like dengue, visceral leishmaniasis (kala azar), filariasis. An effective surveillance system for major communicable diseases is being established and made operational. Epidemic preparedness and response capacity has been enhanced for outbreak investigations and interventions (WHO, 2010).

However, the situation is under control and steady progress is being made: (1) overall an infectious disease, as a cause of mortality, has declined substantially since 1990, (2) diarrhoeal disease mortality has declined by 90%, but still needs to decrease further, (3) pneumonia mortality has not improved substantially, and needs zinc and vaccine programmes to bring these rates down, and (4) tuberculosis needs to be controlled before HIV/AIDS becomes prevalent.

Over the last several decades Bangladesh has made remarkable progress in reducing the human health burden of infectious disease, especially in children, largely due to reduction in mortality from infectious diseases.

Despite substantial progress, vaccine preventable diseases remain important causes of ill health and premature death in Bangladesh. The recent national demographic and health survey shows 62% of deaths among children under the age of 5 years were attributed to infectious diseases. This accounts for 55 deaths per 1000 live births.

Drug-resistant infectious diseases will continue to strain resources and threaten existing methods for effective therapy. In some cases like measles, affordable vaccines are available but under-utilized while diseases like Haemophilus influenzae type B (Hib), hepatitis B, typhoid, and pneumococcal diseases for which safe and effective vaccines exist, but cost is a barrier to their introduction, acceptance, and use (ICDDR, 2013).

Very recently, there has been a Chikungunya outbreak in Bangladesh. It poses a big threat and likely to emerge in Bangladesh as a major public health problem. These

emerging and reemerging infectious diseases are superimposed on a substantial baseline of established infectious diseases (Kahhar, 2012).

DISCUSSION

A host of factors relating to community, economic, ecological and physical conditions significantly affect the health profile of a society. Evidence shows that enhanced water and sanitation, education, largely of women and girls, and additional equitable access to healthcare services can substantially cause improvements in the overall health sector. Furthermore, equitable revenue distribution reduces lack of communication. Many of the factors may encompass an impact on each addition, leading to multiplier effects. Some of these factors are in turn worsened through ill health, leading to a nasty cycle (Financial Express, 2012).

The double burden of diseases is high in South Asia, though there are differences among countries and within urban and rural areas of each country, depending on the level of developmental and epidemiological transition. Many of these disease burdens occur in the productive mid-life period and will, therefore, adversely affect workforce productivity and economic development. Although the absence of well established disease surveillance mechanisms prevents precise estimation of the size of NCD burdens, the direction of change is clear, that is, the burden is rising. More accurate estimation of these burdens, their risk factors, and time trends would help to better inform policy and to monitor change in response to public health interventions. Even at the current state of knowledge, however, the magnitude of the problem is large enough to demand urgent attention and action (Abul-Ghaffar, 2004).

The high levels of maternal BMI >23 are consistent with nationally-representative data of the Bangladesh Demographic Health Survey (BDHS), which have also demonstrated significant levels of maternal over-weight. This double burden of disease (concomitant existence of high levels of under and over nutrition) in the Integrated Nutrition Project (INP) areas needs to be addressed by Plan Bangladesh in the form of healthful diet and lifestyle promotion alongside existing under-nutrition interventions (Talukder et al., 2006).

The demographic transition in the world has given rise to epidemiological transition which in its fifth phases has led the different countries to face the challenge of having to deal with double burden of infectious and NCDs. The developed countries have already entered the fifth phase of this transition but the middle and low income countries due to financial and social constraints are yet to stabilize their positions in this transitional process.

Bangladesh is in the midst of an epidemiologic transition. The disease pattern is shifting from a profile dominated by infectious diseases, under-nutrition and conditions of childbirth to one increasingly characterized by NCDs. The effects of this double burden of diseases in Bangladesh are not yet readily felt but prognosis indicates that as the country progresses and life style of people change, the effects could be sever. However, as of now the progresses made by Bangladesh in different sectors of health and MCH is very impressive despite resource scarcity and climatic conditions.

A few key converging factors have contributed to these achievements. The government of Bangladesh has shown policy continuity and commitment to improving health conditions, placing particular emphasis on improving the health conditions of its citizens and targeting the poor, women and children. Innovative practices and approaches for targeting and empowering the most vulnerable, together with effective partnerships with non-governmental organizations (NGO) have contributed to these successes. NGOs have also played a key role in developing novel approaches and practices as well as in delivering services to hard-to-reach groups.

Donor assistance has also been critical to the development of Bangladesh generally and the health sector in particular. Underlying these factors is a strong sense of social contract and social solidarity, to which the spirit of cultural homogeneity contributed (Sheikh and Islam, 2012). There is a need for the global and national actions set out in the political declaration of the 2011 high level meeting on NCDs. The likely agreement of member states on a framework of indicators and targets for monitoring the progress of NCDs at the World Health Assembly in May 2013 is another indicator of progress in the right direction. Health sector reform needs to go hand in hand with other changes for policy makers. The kind of multi-sectoral approaches required to control NCDs effectively need to be forged by health policy makers. The recent WHO strategy ‘Changing Mindsets’ calls for greater collaboration between researchers and policy makers to drive health system transformation and strengthening. In a post-2015 environment, however, health priorities will need to change. The role of NCDs, particularly their contribution to increasing the demand for health services and changing the nature of that demand, will be dramatic (Robinson and Hort, 2013).

Conclusion

As the double burden grows, ensuring that health systems can adequately address non-communicable diseases (along with communicable diseases) becomes integral to augmenting the capacity of health systems to meet evolving health challenges. Health service delivery needs to adapt to transition from a predominantly acute care model to one that balances prevention with disease management and palliative care. For this to occur, integrating NCD prevention and management into primary health care is essential (Sheikh and Islam, 2012). An integrated communicable disease surveillance system for both communicable and non-communicable diseases

needs to be initiated. Some succinct recommendations are as follows: (1) government should build capacity of the public, private and NGO health service providers, (2) government should establish a NCD referral chain from the community level to district level through community clinics, sub centers, UHFWC, UHC and private health facilities, (3) government should create a coordination mechanism among public, private and NGOs, (4) government should set up a advocacy network at national level to community, (5) government should level to update and create policies for health and other related sectors to reduce risk factors of NCDs, (6) government should community people to be aware of NCDs for prevention and early diagnosis, and government should establish electronic database system (Shah Monir Hossain, 2011).

In spite of such a fast growing private sector, Bangladesh does not have a comprehensive health policy with a vision for the totality of the health sector. As a steward for the health system, the Ministry of Health and Family Welfare is yet to come up with an overarching strategic direction for the health sector as a whole encompassing both the public and the private sector.

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