Review

Emerging Burden of Cardiovascular Diseases in Bangladesh

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As a result of an epidemiological transition from communicable to non-communicable diseases for last few decades, cardiovascular diseases (CVD) are being considered as an important cause of mortality and morbidity in many developing countries including Bangladesh. Performing an extensive literature search, we compiled, summarized, and categorized the existing information about CVD mortality and morbidity among different clusters of Bangladeshi population. The present review reports that the burden of CVD in terms of mortality and morbidity is on the rise in Bangladesh. Despite a few non-communicable disease prevention and control programs currently running in Bangladesh, there is an urgent need for well-coordinated national intervention strategies and public health actions to minimize the CVD burden in Bangladesh. As the main challenge for CVD control in a developing country is unavailability of adequate epidemiological data related to various CVD events, the present review attempted to accumulate such data in the current context of Bangladesh. This may be of interest to all stakeholder groups working for CVD prevention and control across the country and globe.


Key words: Bangladesh, Cardiovascular diseases, Heart, Stroke, Burden, Population

Introduction

Cardiovascular diseases (CVD) are being considered as an important cause of mortality and morbidity in many developing countries including Bangladesh1-6. Bangladesh has been witnessing an “epidemiological transition”7 from communicable to non-communicable diseases (NCDs) for last few decades2, 8, 9. During the period 1986-2006, estimated chronic disease-related mortality increased from 8% to 68%, whereas estimated communicable disease mortality dropped from 52% to 11% in a part of rural Bangladesh8. This epidemiological transition toward a higher chronic disease burden, particularly by CVD, is occurring most likely as a consequence of rapid urbanization2, 4, 10-12, change in dietary habits and lifestyle2, 4, 11, 13, 14, popularity of fast food items and beverages4, 15, rising consumption of tobacco4, 11, 16, increase in buying capacity1, 15, decrease in the levels of physical activity2, 4, 14, 16-18, successful immunization programs against childhood infectious disease9, and concomitant decline of infec-
In this paper, we have used the term “cardiovascular diseases (CVD)” according to the definitions of Global Burden of Disease (GBD) cause categories in terms of International Classification of Diseases, Tenth Revision (ICD-10) codes \(^{20}\). Here CVD includes the following: 1) rheumatic heart disease (ICD-10 code: I01-I09), 2) hypertensive heart disease (ICD-10 code: I10-I13), 3) ischemic heart disease (ICD-10 code: I20-I25), 4) cerebrovascular disease (ICD-10 code: I60-I69), 5) inflammatory heart diseases (ICD-10 code: I30-I33, I38, I40, I42), and 6) other cardiovascular diseases (ICD-10 code: I00, I26-I28, I34-I37, I44-I51, I70-I99) \(^{20}\).

Methods

We performed an extensive literature search from a wide range of literature sources. The flow diagram of literature search and selection methods is shown in Fig. 1. To find out relevant studies, we searched...
Data from the World Health Organization (WHO) regarding age-standardized death rates for cardiovascular diseases in South Asian countries in 2008 are shown in Fig. 2. Overall CVD mortality in Bangladesh was higher than that in Sri Lanka, Nepal, Myanmar, Maldives, and India. The differences in age-adjusted cardiovascular mortality across the countries may be explained, to some extent, by some important factors, such as variability in availability and accessibility of intensive care units, invasive coronary care, and thrombolytic therapy in the hospitals. Moreover, over the past decades, these factors have contributed to the difference in CVD death rates between the developing and developed part of the globe. Fig. 2 also illustrates that age-standardized CVD death rate in Bangladesh was higher among males than in females. The government “Health Bulletin 2013” reported that diseases of the circulatory system, which include CVD, were the top most causes of deaths (12,149 deaths; 12.2%) across 504 public hospitals in Bangladesh in 2012.

PubMed and Scholar Google using search terms “cardiovascular diseases,” “coronary artery disease,” “ischemic heart disease,” “myocardial infarction,” “cerebrovascular diseases,” or “stroke” in combination with a common keyword “Bangladesh” during each search (for example, “cardiovascular diseases and Bangladesh”). We screened papers that were published between 1971 and 2014. Reference lists from the selected papers were also searched manually to identify potentially relevant articles. In addition, we searched Bangladeshi local journals (those not indexed in PubMed), WHO databases, websites, book chapters, and reports.

Results and Discussion

Mortality and Morbidity Caused by CVD in Bangladesh

Data from the World Health Organization (WHO) regarding age-standardized death rates for CVD in South Asian countries in 2008 are shown in Fig. 2. Overall CVD mortality in Bangladesh was higher than that in Sri Lanka, Nepal, Myanmar, Maldives, and India. The differences in age-adjusted cardiovascular mortality across the countries may be explained, to some extent, by some important factors, such as variability in availability and accessibility of intensive care units, invasive coronary care, and thrombolytic therapy in the hospitals. Moreover, over the past decades, these factors have contributed to the difference in CVD death rates between the developing and developed part of the globe. Fig. 2 also illustrates that age-standardized CVD death rate in Bangladesh was higher among males than in females. The government “Health Bulletin 2013” reported that diseases of the circulatory system, which include CVD, were the top most causes of deaths (12,149 deaths; 12.2%) across 504 public hospitals in Bangladesh in 2012.
During the period 2008-2012, the number of outdoor visits and admissions in the National Institute of Cardiovascular Diseases (NICVD), Dhaka, Bangladesh showed a rising trend. Total number of outdoor visits increased from 147,570 to 174,366, whereas total number of admissions increased from 33,946 to 44,559 over that 5-year period. In 2005, a study was conducted in several Southeast Asian countries, including Bangladesh, to find out the self-reported prevalence of chronic diseases among the general population. In this study, Van Minh et al. reported that the prevalence of “self-reported heart disease” among 25-64 years aged Bangladeshi male population in three different locations/settings ranged from 5.3% to 66.3%, whereas the prevalence among the female population was the lowest amongst all South Asians, and it was 6 years lower compared with the non-South Asians (5.8 years). However, the prevalence of various CVD among Bangladeshi general population is summarized from a range of selected studies in Table 1.

Ischemic Heart Disease

According to the WHO data, overall age-standardized death rate for ischemic heart disease (IHD) in Bangladesh was 203.7 per 100,000 in 2008, which was higher in comparison with the IHD death rates in Sri Lanka, Nepal, Myanmar, Maldives, and India. In Bangladesh, mortality due to IHD was relatively lower among females than males. However, IHD was the most common cause of death among the estimated total deaths due to different types of CVD. Acute myocardial infarction (AMI) appeared as the top leading cause (3.7%) of deaths across 504 public hospitals in Bangladesh in 2012, as reported by the “Health Bulletin 2013”.

According to the morbidity profile of the patients admitted to five medical college hospitals in Bangladesh, myocardial infarction was at the 3rd position (2.82%) as a cause of hospitalization in 2012, whereas acute myocardial infarction was the top leading cause (27.75%) of admissions in NICVD, Dhaka, Bangladesh during the same year. Similarly, AMI was found to be the most common (28.4%) reason of hospitalizations in the cardiology department of Sher-E-Bangla Medical College, Barisal, Bangladesh over a period of May 2010 to April 2012. A global case-control study of risk factors for early acute myocardial infarction reported that the mean age (51.9 years) for the occurrence of acute myocardial infarction among Bangladeshi population was the lowest amongst all South Asians, and it was 6 years lower compared with the non-South Asians (58.8 years). A number of studies reported the burden of IHD in different contexts and cohorts consisted of either the general population or the hospital-based patients in Bangladesh. The IHD burden was found as high as 18.9% among 106 hospitalized stroke patients, whereas a lower prevalence (2.7%) was reported in a cluster (n=226) of rural elderly population. In 2001, Zaman et al. investigated the IHD burden among 447 adults in a rural community of Bangladesh. In this study, the investigators reported that the overall prevalence of IHD was 3.4%, whereas the prevalence in 157 men (4.6%) was approximately twice of that in 290 women (2.7%). Another study conducted by Ahsan et al. revealed that the prevalence of IHD was 17.2% among 163 adult subjects in an urban setting of Dhaka city.

Rheumatic Fever and Rheumatic Heart Disease

Rheumatic fever and rheumatic heart disease are prevalent among children Bangladesh. Among the estimated deaths due to different types of CVD, rheumatic heart disease contributes 3% of total male deaths and 4% of total female deaths in 2008. The “Health Bulletin 2013” reported that there were a total of 27,479 outdoor visits by the patients (38.6% males and 61.4% females) suffering from rheumatic heart diseases and related conditions to the National Center for Control of Rheumatic Fever and Heart Diseases, Dhaka, Bangladesh in 2012. Average daily number of outdoor visits to this hospital was 75.3. Ahmed et al. conducted a community-based study among 5923 rural Bangladeshi children aged 5-15 years, where the prevalence of rheumatic fever and rheumatic heart disease was found to be 1.2 per 1000 and 1.3 per 1000, respectively. In another study, Zaman et al. reported a higher prevalence (15.7%) of rheumatic fever among 337 outpatient department (OPD) attendees aged 5-20 years in the National Center for Control of Rheumatic Fever and Heart Diseases, Dhaka, Bangladesh. In 2005, a national cross-sectional survey was conducted to determine the prevalence of rheumatic fever and rheumatic heart disease among Bangladeshi children. This survey revealed that the prevalence of rheumatic fever was 0.6 per 1000 (CI: 0.4-0.9), and the prevalence of rheumatic heart disease was 0.3 per 1000 (CI: 0.2-0.5). However, in another contemporary study, Majumder et al. reported a comparatively higher prevalence of rheumatic fever (4.22 per 1000) among the children of a rural school in Bangladesh.

Cerebrovascular Disease

Fig. 5 shows age-standardized death rates for cerebrovascular disease (CeVD) in South Asian countries in 2008. Bangladesh had an overall CeVD mor-
### Table 1. Prevalence of cardiovascular diseases among general population in Bangladesh from a range of selected studies

<table>
<thead>
<tr>
<th>Disease</th>
<th>Diagnostic criteria</th>
<th>Author</th>
<th>Study Period</th>
<th>Study setting</th>
<th>Age range in years</th>
<th>Sample size</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ischemic heart disease</strong></td>
<td>Presence of pathological Q wave on electrocardiogram, or on medication for IHD</td>
<td>Zaman et al.(^{23})</td>
<td>2001</td>
<td>Rural</td>
<td>≥ 20 Male: 157 Female: 290</td>
<td>Male: 4.6% Female: 2.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identified by using standardized WHO questionnaires</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Based on electrocardiogram</td>
<td>Ahsan et al.(^{24})</td>
<td>2007</td>
<td>Urban</td>
<td>Mean age: 44.8 ± 8.3</td>
<td>163</td>
<td>17.20%</td>
</tr>
<tr>
<td></td>
<td>Diagnostic criteria not mentioned</td>
<td>Ahmed et al.(^{25})</td>
<td>2007</td>
<td>Rural</td>
<td>≥ 50</td>
<td>226</td>
<td>2.70%</td>
</tr>
<tr>
<td><strong>Heart disease</strong></td>
<td>Self-reported by the respondents</td>
<td>Van Minh et al.(^{21})</td>
<td>2005</td>
<td>DSS site: HSID</td>
<td>25-64 Male: 2016 Female: 2007</td>
<td>Male: 6.4% Female: 7.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DSS site: WATCH</td>
<td>25-64 Male: 1000 Female: 1000</td>
<td>Male: 66.3% Female: 77.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DSS site: Matlab</td>
<td>25-64 Male: 1047 Female: 1026</td>
<td>Male: 5.3% Female: 10.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Left ventricular hypertrophy</td>
<td>Diagnostic criteria not mentioned</td>
<td>2007</td>
<td>Rural</td>
<td>≥ 50</td>
<td>226</td>
<td>2.20%</td>
</tr>
<tr>
<td><strong>Rheumatic fever</strong></td>
<td>Clinical diagnosis</td>
<td>Banoo et al.(^{40})</td>
<td>1987</td>
<td>Urban school</td>
<td>4-17</td>
<td>4349</td>
<td>43.9 per 1000</td>
</tr>
<tr>
<td></td>
<td>Mahmud et al.(^{41})</td>
<td>1989</td>
<td>Urban school</td>
<td>5-18</td>
<td>5011</td>
<td>0.9 per 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Begum et al.(^{45})</td>
<td>1990</td>
<td>Urban school</td>
<td>5-15</td>
<td>10,538</td>
<td>2.4 per 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Revised Jones Criteria</td>
<td>Ahmed et al.(^{26})</td>
<td>1991</td>
<td>Rural</td>
<td>5-15</td>
<td>5923</td>
<td>1.2 per 1000</td>
</tr>
<tr>
<td></td>
<td>Updated Jones Criteria 1992</td>
<td>Zaman et al.(^{31})</td>
<td>2005</td>
<td>Urban and rural</td>
<td>5-19</td>
<td>Male: 28,999 Female: 27,828</td>
<td>Male: 0.6 per 1000 Female: 0.6 per 1000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Majumder et al.(^{30})</td>
<td>2005</td>
<td>Rural school</td>
<td>4-18</td>
<td>947</td>
<td>4.22 per 1000</td>
</tr>
<tr>
<td></td>
<td>Rheumatic heart disease</td>
<td>Banoo et al.(^{40})</td>
<td>1987</td>
<td>Urban school</td>
<td>4-17</td>
<td>4349</td>
<td>5.1 per 1000</td>
</tr>
<tr>
<td></td>
<td>Mahmud et al.(^{41})</td>
<td>1989</td>
<td>Urban school</td>
<td>5-18</td>
<td>5011</td>
<td>2.8 per 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ahmed et al.(^{20})</td>
<td>1991</td>
<td>Rural</td>
<td>5-15</td>
<td>5923</td>
<td>1.3 per 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zaman et al.(^{31})</td>
<td>2005</td>
<td>Urban and rural</td>
<td>5-19</td>
<td>Male: 28,999 Female: 27,828</td>
<td>Male: 0.3 per 1000 Female: 0.3 per 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clinical diagnosis; echocardiography not used</td>
<td>Begum et al.(^{45})</td>
<td>1990</td>
<td>Urban school</td>
<td>5-15</td>
<td>10,538</td>
<td>0.2 per 1000</td>
</tr>
<tr>
<td></td>
<td>Majumder et al.(^{30})</td>
<td>2005</td>
<td>Rural school</td>
<td>4-18</td>
<td>947</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>WHO screening protocol for neurological diseases and finally clinical evaluation by a neurological team</td>
<td>Mohammad et al.(^{34})</td>
<td>NA</td>
<td>Door-to-door survey</td>
<td>≥ 40</td>
<td>15,627</td>
<td>3.0 per 1000</td>
</tr>
<tr>
<td></td>
<td>Identified by using standardized WHO questionnaires</td>
<td>WHO(^{42})</td>
<td>2004</td>
<td>Urban and rural</td>
<td>≥ 30 Male: 2276 Female: 2118</td>
<td>Male: 17 per 1000 Female: 22 per 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-reported by the respondents</td>
<td>Van Minh et al.(^{21})</td>
<td>2005</td>
<td>DSS site: HSID</td>
<td>25-64 Male: 2016 Female: 2007</td>
<td>Male: 2.0% Female: 1.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DSS site: WATCH</td>
<td>25-64 Male: 1000 Female: 1000</td>
<td>Male: 0.5% Female: 0.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DSS site: Matlab</td>
<td>25-64 Male: 1047 Female: 1026</td>
<td>Male: 1.6% Female: 1.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Screening by WHO stroke surveillance instrument, then diagnoses were confirmed by physicians</td>
<td>Zaman et al.(^{34})</td>
<td>2007</td>
<td>Rural</td>
<td>≥ 30 Male: 827 Female: 882</td>
<td>Male: 14.5 per 1000 Female: 4.5 per 1000</td>
<td></td>
</tr>
</tbody>
</table>

NA = Not available; DSS: demographic surveillance system; HSID = Health System and Infectious Disease; WATCH = Woman Abuse Tracking in Clinics and Hospitals.
prevalence of stroke in a Bangladeshi population aged 40 years and above. In this study, among 15,627 study participants, a total of 47 participants were found to have stroke, indicating an overall prevalence of 3.00 per 1000 (95% CI: 0.95-2.45), and the prevalence was comparatively higher among males and rural people. In another study, Van Minh et al. revealed that the prevalence of "self-reported stroke" in three different sites of Bangladesh ranged from 0.5% to 2.0% among males and from 0.7% to 1.8% among females in 2005. Furthermore, Zaman et al. reported a stroke prevalence of 9.4 per 1000 (95% CI: 4.8-13.9) in a rural population of Bangladesh, where the prevalence was 3.2 times higher in males than in females.

Fig. 3. Age-standardized death rates per 100,000 for ischemic heart disease in South Asian countries by persons, males, and females, 2008.


*Ischemic heart disease was coded according to the definitions of Global Burden of Disease (GBD) cause categories in terms of International Classification of Diseases, Tenth Revision (ICD-10) codes, and included the diseases belonging to ICD-10 codes I20-I25*.

tality of 108.3 per 100,000, which was comparatively higher than the death rates in Sri Lanka, Nepal, Myanmar, and Maldives. Age-standardized death rate due to CeVD was found to be higher among males than in females in Bangladesh, (Fig. 5). Moreover, CeVD contributes to approximately one-fourth of the estimated total deaths caused by different types of CVD in Bangladesh (Fig. 4). Of 4870 total deaths occurred in a rural area of Bangladesh during 2005-2008, 1250 deaths were caused by stroke, indicating a population-attributable mortality of 25% for stroke. In the "Health Bulletin 2013," stroke (not specified as hemorrhage or infarction) was reported as the top 6th cause (1.1%) of deaths across 504 public hospitals in Bangladesh in 2012. Mohammad et al. conducted a community-based door-to-door survey to find out the prevalence of stroke in a Bangladeshi population aged 40 years and above. In this study, among 15,627 study participants, a total of 47 participants were found to have stroke, indicating an overall prevalence of 3.00 per 1000 (95% CI: 0.95-2.45), and the prevalence was comparatively higher among males and rural people. In another study, Van Minh et al. revealed that the prevalence of "self-reported stroke" in three different sites of Bangladesh ranged from 0.5% to 2.0% among males and from 0.7% to 1.8% among females in 2005. Furthermore, Zaman et al. reported a stroke prevalence of 9.4 per 1000 (95% CI: 4.8-13.9) in a rural population of Bangladesh, where the prevalence was 3.2 times higher in males than in females.
**Fig. 4.** Estimated total deaths ('000) for different type of cardiovascular diseases in Bangladesh by sex, 2008


Cardiovascular diseases were coded according to International Classification of Diseases, Tenth Revision [ICD-10], and included 1) Rheumatic heart disease [ICD-10 code: I01-I09], 2) Hypertensive heart disease [ICD-10 code: I10-I13], 3) Ischaemic heart disease [ICD-10 code: I20-I25], 4) Cerebrovascular disease [ICD-10 code: I60-I69], 5) Inflammatory heart diseases [ICD-10 code: I30-I33, I38, I40, I42], and 6) Other cardiovascular diseases [ICD-10 code: I00, I26-I28, I34-I37, I44-I51, I70-I99].

**Table 2.** Cardiovascular diseases among hospital-based patients in Bangladesh from a range of selected studies

<table>
<thead>
<tr>
<th>Disease</th>
<th>Diagnostic criteria</th>
<th>Author</th>
<th>Study Period</th>
<th>Study setting</th>
<th>Age range in years</th>
<th>Sample size</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic heart disease</td>
<td>Based on electrocardiogram</td>
<td>Mollah et al. 26)</td>
<td>NA</td>
<td>Hospitalized stroke patients</td>
<td>Mean age : 60 ± 13.7</td>
<td>106</td>
<td>18.90%</td>
</tr>
<tr>
<td></td>
<td>Diagnoses done by hospital physicians</td>
<td>WHO 42)</td>
<td>2004</td>
<td>Patients attended emergency, OPD, and IPD in four medical college hospitals</td>
<td>≥ 30</td>
<td>Male: 2360</td>
<td>Female: 1423</td>
</tr>
<tr>
<td></td>
<td>Previously known cases, or newly diagnosed cases in the hospital</td>
<td>Saha et al. 27)</td>
<td>2008-2009</td>
<td>Hospital-based CKD-V patients</td>
<td>&gt; 18</td>
<td>300</td>
<td>18.30%</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Patients with persistent or recurrent dyspnea plus two of the followings:</td>
<td>Saha et al. 27)</td>
<td>2008-2009</td>
<td>Hospital-based CKD-V patients</td>
<td>&gt; 18</td>
<td>300</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>Raised jugular venous pressure, bibasilar crackles, pulmonary venous hypertension or</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>interstitial edema on chest X-ray</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>Individuals having atrial or ventricular rhythm disorder requiring therapy</td>
<td>Saha et al. 27)</td>
<td>2008-2009</td>
<td>Hospital-based CKD-V patients</td>
<td>&gt; 18</td>
<td>300</td>
<td>4.70%</td>
</tr>
<tr>
<td>Left ventricular</td>
<td>Individuals required to meet voltage criteria and had either the S-T segment</td>
<td>Saha et al. 27)</td>
<td>2008-2009</td>
<td>Hospital-based CKD-V patients</td>
<td>&gt; 18</td>
<td>300</td>
<td>9%</td>
</tr>
<tr>
<td>hypertrrophy</td>
<td>characteristics or T wave characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rheumatic fever</td>
<td>Revised Jones Criteria</td>
<td>Zaman et al. 28)</td>
<td>1994-1995</td>
<td>Hospital OPD attendees</td>
<td>5-20</td>
<td>337</td>
<td>15.70%</td>
</tr>
<tr>
<td>Stroke</td>
<td>Diagnoses done by hospital physicians</td>
<td>WHO 42)</td>
<td>2004</td>
<td>Patients attended emergency, OPD, and IPD in four medical college hospitals</td>
<td>≥ 30</td>
<td>Male: 2360</td>
<td>Female: 1423</td>
</tr>
</tbody>
</table>

NA = Not available; CKD-V = Chronic Kidney Disease stage-V; OPD = Outpatient department, IPD = Inpatient department.
Adequate attention to both categories of diseases may not be possible by the existing low resource health care system. Ongoing CVD Prevention and Control Programs in Bangladesh

Prevention and control of NCDs has been given one of the topmost priorities in the current Health, Population and Nutrition Sector Development Program (HPNSDP) 2011-2016 in Bangladesh. Bleich et al. identified a total of 11 governmental and non-governmental chronic diseases programs currently running in Bangladesh. Of these NCD programs, following five programs/institutes have already established CVD prevention and control activities as one of their major objectives: 1) Non-communicable Disease Control and Public Health Intervention Program of Socioeconomic Consequences of CVD Burden in Bangladesh

From the studies and reports discussed above, it is evident that the burden of CVD in terms of mortality and morbidity is on the rise in Bangladesh. The health and socioeconomic consequences of CVD burden may be complicated by the fact that a considerable proportion (43.3%) of Bangladeshi people are living in poverty. The government health care facilities may not be able to provide appropriate best possible management to the large number of CVD patients from lower socioeconomic class. On the contrary, expensive interventions and costly drugs will be accessible and affordable only to the elite minority through few private hospitals. Given that, like other developing countries, Bangladesh is already facing the double burden of communicable and NCD, and paying adequate attention to both categories of diseases may not be possible by the existing low resource health care system.

Ongoing CVD Prevention and Control Programs in Bangladesh

Prevention and control of NCDs has been given one of the top most priorities in the current Health, Population and Nutrition Sector Development Program (HPNSDP) 2011-2016 in Bangladesh. Bleich et al. identified a total of 11 governmental and non-governmental chronic diseases programs currently running in Bangladesh. Of these NCD programs, following five programs/institutes have already established CVD prevention and control activities as one of their major objectives: 1) Non-communicable Disease Control and Public Health Intervention Program of...
the Directorate General for Health Services; 2) National Institute of Cardiovascular Disease (NICVD); 3) National Heart Foundation (NHF); 4) Health Care Development Project (HCDP), part of the Diabetes Association of Bangladesh (DAB); and 5) Upazilla NCD Project. A non-governmental organization (NGO) named Centre for the Rehabilitation of the Paralysed (CRP-Bangladesh) is currently providing stroke rehabilitation services and long-term stroke care to the patients with stroke. However, the establishment of efficient systems for the estimation of CVD-related burden is one of the essential components of any CVD control program that is still lacking in Bangladesh.

Need for Well-Coordinated Intervention Strategies and Efforts

There is an urgent need for well-coordinated national intervention strategies and public health actions to minimize the CVD burden in terms of mortality and morbidity in Bangladesh. Because the existing health care infrastructure in Bangladesh is equipped to handle mostly the infectious and nutritional deficiency disorders, it must be rearranged to combat the challenge of growing CVD burden. Collaborative involvement and participation of all stakeholders, including governmental and non-governmental agencies, physicians, researchers, professional organizations, patient support groups, and mass media, is urgently required in order to design and implement the CVD prevention and control measures across the country.

Implementation of the specific policy recommendations that were formulated on the basis of findings of the “Non-Communicable Disease Risk Factor Survey Bangladesh 2010” may be a good initiative to address the CVD burden issue. The “Committee on Preventing the Global Epidemic of Cardiovascular Disease” has documented a series of recommendations to combat the growing epidemic of CVD in the developing world. These recommendations may be useful to local policy makers and health leaders in Bangladesh. Local professional societies may come forward to organize CVD education and public awareness programs for grass-roots level population. An effective campaign for the primary prevention of CVD requires adequate funding that should be ensured by governmental organizations and non-governmental donor agencies.

Despite advances in the knowledge and understanding of CVD around the world, including a number of Asian countries like Japan, Korea, and Singapore, there is limited academic infrastructure for conducting CVD-related studies in Bangladesh. Innovative policy-relevant researches targeting to explore cost-effective intervention strategies for combating the CVD burden should be a specific area of focus. Furthermore, our literature search showed that longitudinal cohort studies of CVD in the context of Bangladesh are significantly lacking. Such studies are essential to find out the local incidence of CVD and to understand the disease progression and prognosis. However, conducting long-term cohort studies in Bangladesh is always quite challenging for the local researchers. The main challenge for CVD control in a developing country like Bangladesh is the unavailability of adequate epidemiological data related to fatal and non-fatal CVD events. The present review attempted to accumulate such data in the current context of Bangladesh, which may be of interest to all stakeholder groups working for CVD prevention and control across the country. Although our article focuses on the emerging CVD burden in Bangladesh, which may be of interest to all stakeholder groups working for CVD prevention and control across the country. Although our article focuses on the emerging CVD burden in Bangladesh, it reflects the similar situation prevailing in many developing countries. Therefore, our recommendations and call for public health actions in the field of cardiovascular prevention are concurrently applicable to other developing countries throughout the world.

Conflict of Interest

The authors declare no conflict of interest. The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions or policies of the institutions with which they are affiliated.

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