An Overview of the Burden of Diseases and Risk Factors in Bangladesh

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Abstract

Bangladesh faces significant healthcare challenges driven by its dense population, limited infrastructure, and socioeconomic and environmental factors. Education, employment, and urban-rural disparities significantly affect health outcomes, particularly in chronic diseases like diabetes and cardiovascular conditions. Malnutrition, encompassing underweight and obesity, remains a critical issue, worsened by rural-urban nutritional inequalities. Environmental factors such as air pollution and poor water quality contribute to communicable diseases like tuberculosis, dengue, and diarrheal illnesses, creating further strain on the healthcare system. These issues impose severe economic burdens, with healthcare costs often causing financial hardship for vulnerable populations. Chronic diseases and malnutrition are closely linked to socioeconomic status, while environmental factors exacerbate the prevalence of communicable diseases. Addressing these challenges demands targeted interventions, including improving healthcare infrastructure, reducing environmental risks, and promoting health equity. Evidence-based policies focused on socioeconomic and disease-specific factors are essential to improve health outcomes in Bangladesh.

Keywords: Bangladesh, Healthcare disparities, Non-communicable diseases, Communicable diseases, Malnutrition, Socioeconomic factors, Environmental health

1. Introduction

Bangladesh, a country with a population of over 142.3 million as per the 2011 Census [1], faces significant challenges in its healthcare system due to high population density and inadequate healthcare infrastructure [2]. The country's health sector is influenced by a multitude of factors, including social determinants of health (SDH) such as parental education, employment, mother's autonomy, and geographical contextual factors [3]. Studies have shown that there are notable disparities in health outcomes among different demographic groups in Bangladesh, with variations in mortality rates among children of different age groups based on these social determinants [3]. Additionally, socioeconomic status (SES) plays a crucial role in the prevalence of chronic non-communicable diseases (NCDs) in Bangladesh, with differences observed between urban and rural populations [4].

Malnutrition is a pressing issue in Bangladesh, with studies highlighting the double burden of malnutrition among ever-married women, indicating a significant prevalence of underweight and

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overweight/obesity over the years [5]. Furthermore, rural-urban disparities in nutritional status have been documented, emphasising the prevalence of both underweight and overweight individuals in the country [6]. The impact of socioeconomic inequalities on women's undernutrition has also been studied, revealing concerning levels of undernutrition among women in Bangladesh [7]. Additionally, the issue of drinking water salinity in coastal areas poses a health crisis, with implications for hypertension and overall population health [8].

NCDs present a significant health challenge in Bangladesh, with studies focusing on the risk factors associated with conditions like hypertension and diabetes mellitus [9]. The prevalence of hypertension among elderly individuals has been investigated, emphasising the need for personalised health programs for this demographic group [10]. Additionally, insufficient physical activity among the elderly population has been studied, with projections indicating a substantial increase in the elderly population in Bangladesh by 2050 [10].

The country's health sector is further complicated by external factors such as climate change, which has implications for vulnerable populations and the prevalence of communicable diseases like diarrhoea and pneumonia [11]. Public perceptions regarding the impact of climate change on human health have also been explored, shedding light on community attitudes towards this critical issue [12]. Furthermore, the potential effects of environmental changes, such as sea level rise, on human migration patterns in Bangladesh have been modelled, highlighting the complex interaction between livelihoods, population dynamics, and internal migration [13].

The aim of this review is to analyse the burden of diseases and their risk factors in Bangladesh by identifying prevalent non-communicable and communicable diseases, exploring contributing environmental, and socioeconomic factors, and assessing the economic and social impact in Bangladesh.

2. Method

A comprehensive search was conducted using the PubMed, Scopus, Cochrane Library, and Google Scholar databases. The search strategy incorporated MeSH terms to ensure thorough coverage. The MeSH terms used included Bangladesh, Health Status, Noncommunicable Diseases, Malnutrition, Socioeconomic Factors, Health Disparities, Risk Factors, Climate Change, Water Supply, Sanitation, Hypertension, Diabetes Mellitus, Rural Population, Urban Population, Health Policy, and Public Health. The search included studies published in English and up to 2024.

3. Disease burden and risk factors

Recognising the disease burden and associated risk factors in Bangladesh is essential for implementing effective public health interventions and formulating informed policy decisions. Various studies have explored different aspects of the country's disease burden, encompassing both chronic and infectious conditions. For instance, research has identified a rising mortality trend from chronic diseases such as stroke, ischemic heart disease, chronic kidney disease, chronic pulmonary disease, and diabetes [14]. These findings highlight the imperative to address chronic diseases to enhance population health outcomes.

Likewise, research focusing on specific illnesses such as acute lymphoblastic leukaemia (ALL) has emphasised the need for analysing the global burden of such diseases by region,

sex, and age to inform prevention and treatment strategies [15]. A comprehensive understanding of the burden of conditions like ALL enables healthcare systems to allocate resources more efficiently, thereby reducing morbidity and mortality rates.

Hypertension is a prevalent cardiovascular disorder affecting a considerable portion of the adult population and significantly contributing to the overall disease burden [16]. Addressing hypertension as a modifiable risk factor for cardiovascular, cerebrovascular, and renal diseases is crucial, necessitating targeted interventions for effective management [16].

The burden of NCDs in Bangladesh extends to issues such as malnutrition and lifestyle-related challenges, underlining the need for comprehensive strategies to address these problems [17]. Identifying risk factors associated with NCDs among different population groups, including adolescents and rural residents, is essential for developing personalised interventions to mitigate their impact [18, 19].

Furthermore, the importance of monitoring progress toward universal health coverage in Bangladesh has been emphasised to ensure equitable access to healthcare services and address systemic gaps [20]. By evaluating current monitoring frameworks and aligning them with global recommendations, policymakers can enhance the effectiveness of healthcare delivery and improve health outcomes across the population.

4. Non-Communicable Diseases

NCDs pose a significant health challenge in Bangladesh, with conditions such as cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases accounting for a substantial portion of the disease burden in the country [4]. The prevalence of NCDs in Bangladesh is alarming, with these conditions contributing to 61% of the total disease burden, indicating a pressing need for effective strategies to address these health issues [4]. The transition from communicable to non-communicable diseases has been evident in Bangladesh, reflecting changes in lifestyle, healthcare infrastructure, and environmental factors [21]. This shift underlines the importance of focusing on preventive measures and improving healthcare services to combat the rising prevalence of NCDs in the country [21].

Cancer, a major component of NCDs, is a significant concern in Bangladesh, with a high incidence and mortality rate reported for various types of cancer [22]. In 2012 alone, there were approximately 14.1 million new cancer cases globally, with 8.2 million deaths attributed to the disease, highlighting the substantial impact of cancer on public health worldwide [22]. In Bangladesh, the burden of cancer is notable, with rising trends in cancer-related deaths projected for the coming years [23]. The International Agency for Research on Cancer has estimated increasing cancer-related death rates in Bangladesh, emphasising the urgency of implementing effective cancer control measures in the country [23].

Diabetes is another prevalent NCD in Bangladesh, with a growing burden of diabetes mellitus observed in recent decades [24]. The global burden of diabetes has been on the rise, with projections indicating a significant increase in the prevalence of diabetes worldwide [25]. In Bangladesh, the burden of diabetes adds to the overall disease burden, necessitating comprehensive management and preventive strategies to address this public health challenge [24]. The socioeconomic implications of chronic NCDs, including diabetes, emphasise the need for targeted interventions to reduce the impact of these conditions on individuals and healthcare systems in Bangladesh [24].

Respiratory diseases, including chronic respiratory conditions, contribute to the disease burden in Bangladesh, further highlighting the multifaceted challenges posed by NCDs in the coun-

try [4]. The prevalence of respiratory diseases, along with other NCDs, accentuates the complex interplay of risk factors such as lifestyle choices, environmental exposures, and genetic predispositions in shaping the health outcomes of the population [4]. Addressing the burden of respiratory diseases requires a holistic approach that integrates preventive measures, early detection, and access to quality healthcare services to mitigate the impact of these conditions on public health in Bangladesh.

In addition to the burden of NCDs, the socioeconomic implications of managing these conditions in Bangladesh are substantial, with a significant proportion of households experiencing catastrophic health expenditure and distress financing related to hospitalisation [26]. The financial strain imposed by healthcare costs further exacerbates the challenges faced by individuals and families dealing with NCDs, emphasising the need for equitable healthcare financing mechanisms and support systems to alleviate the economic burden on the population [26].

5. Communicable Diseases

In Bangladesh, communicable diseases such as tuberculosis, dengue, and diarrheal diseases pose a significant burden on public health. Tuberculosis remains a major concern in the country, with an estimated 46 positive cases per 100,000 suspected individuals and approximately 73,000 deaths annually, ranking Bangladesh 5th globally in terms of tuberculosis disease burden [27]. The prevalence of tuberculosis in Bangladesh is alarming, with a high incidence rate of 221 cases per 100,000 people per year, as reported by the World Health Organisation (WHO) [28]. This high burden of tuberculosis highlights the pressing need for effective control and prevention strategies to mitigate the impact of this infectious disease on the population.

Additionally, multidrug-resistant tuberculosis is also a growing issue in Bangladesh, further complicating the management and treatment of the disease [29]. The development of multidrug-resistant tuberculosis poses challenges to the healthcare system and highlights the importance of addressing risk factors associated with the emergence of drug-resistant strains [29]. Efforts to combat multidrug-resistant tuberculosis require a comprehensive understanding of the factors contributing to its spread and the implementation of targeted interventions to prevent its escalation.

In addition to tuberculosis, dengue fever is another significant public health concern in Bangladesh, particularly during the monsoon season when the incidence of dengue tends to rise [21]. The country has experienced large outbreaks of dengue, with thousands of confirmed cases and fatalities reported annually [30]. The burden of dengue fever in Bangladesh is substantial, with hundreds of thousands of cases and numerous deaths recorded in recent years [31]. The increasing prevalence of dengue underscores the need for effective vector control measures and public health interventions to reduce the transmission of the virus and mitigate the impact of dengue outbreaks on the population.

Furthermore, diarrheal diseases contribute to the overall disease burden in Bangladesh, affecting a significant portion of the population and posing challenges to public health infrastructure [32]. The incidence of diarrheal diseases, often linked to poor sanitation and hygiene practices, emphasises the importance of implementing measures to improve water quality, sanitation facilities, and hygiene behaviours to prevent diarrheal illnesses in communities across Bangladesh [32]. Addressing the burden of diarrheal diseases requires a multi-faceted approach that encompasses public health education, infrastructure development, and access to clean water sources.

6. Maternal and Child Health

The disease burden in Bangladesh presents a complex interaction of various health challenges, with a significant focus on maternal and child health issues such as maternal mortality and child malnutrition. While historically communicable diseases have been a major concern in the country, there has been a noticeable shift towards NCDs like cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases [33]. This transition highlights the evolving health sector in Bangladesh and the need for targeted interventions to address these emerging health threats.

Child malnutrition stands out as a critical public health problem in Bangladesh, with a substantial portion of children suffering from malnutrition. The Bangladesh Demographic Health Survey (BDHS) Report 2014 highlighted alarming statistics, indicating that a significant percentage of children were underweight, stunted, and wasted [34]. These indicators point to the pervasive nature of malnutrition among children in the country, reflecting underlying issues related to food security, healthcare access, and socio-economic disparities.

Additionally, the prevalence of child malnutrition in Bangladesh is influenced by various factors such as parental education, household income, and maternal nutritional status. Studies have shown that children from underweight mothers, parents with lower levels of education, and poorer households are at a higher risk of experiencing stunting and being underweight [35]. Addressing these socio-economic inequalities and improving education and income-generating activities among disadvantaged households are crucial steps in reducing the burden of child malnutrition in Bangladesh.

Also, the association between low birth weight and malnutrition in children under five years further accentuates the complex relationship of factors contributing to child health outcomes in Bangladesh. Despite socio-economic progress and interventions aimed at improving child nutrition, malnutrition remains a significant challenge, necessitating a comprehensive approach that considers factors such as maternal education, socio-economic status, and birth intervals [36]. These findings highlight the multifaceted nature of child malnutrition in Bangladesh and the need for holistic strategies to combat this persistent public health issue.

Furthermore, the impact of malnutrition on child mortality and morbidity cannot be understated. Malnutrition is identified as one of the major causes of child mortality and morbidity in Bangladesh, emphasising the urgent need to address nutritional deficiencies among children to improve overall health outcomes [37]. Efforts to reduce childhood malnutrition not only have the potential to lower mortality rates but also contribute to improved maternal and child health outcomes, paving the way for a healthier future generation in Bangladesh [36].

7. Environmental Factors

Air pollution and water and sanitation issues pose significant risks in Bangladesh, impacting both the environment and public health. Studies have highlighted that high blood pressure, smoking, and outdoor air pollution are among the top risk factors for mortality in the country [38]. Bangladesh stands out as a leading country in South Asia concerning air pollution, with ambient and indoor Particulate Matter (PM) 2.5 contributing to about 21% of all deaths. This pollution not only affects the air but also seeps into water sources, leading to health risks for residents due to the consumption of aquatic organisms contaminated with pollutants like Polycyclic Aromatic Hydrocarbons (PAHs) [39].

Geographically, Bangladesh's low-lying riverine landscape makes it particularly vulnerable to the impacts of climate change, exacerbating issues related to air pollution [40]. The country's urban areas, especially during the dry season from November to April, face severe air quality problems, with Dhaka suffering from high levels of pollution, particularly PM2.5 [41]. The industrial cities in central Bangladesh are heavily burdened by air pollution, with a significant increase in PM2.5 and other pollutants [42]. Additionally, Chittagong, the commercial capital of Bangladesh, is experiencing critical health impacts due to poor air quality [43].

In terms of water and sanitation, Bangladesh faces challenges related to inadequate access to improved water sources and sanitation facilities. The WHO estimates that 60% of the population in Bangladesh lacks access to improved water and sanitation, highlighting a significant gap in basic necessities [44]. The situation is further complicated by factors such as population growth and urbanisation, which may worsen water quality despite efforts to improve sanitation [45]. Studies have shown that poor water quality, sanitation, and hygiene practices contribute to diarrhoea and growth faltering in children, emphasising the importance of addressing these issues for public health [46].

Efforts to mitigate the impact of environmental factors on health in Bangladesh include research on the nexus between methane and air pollution using advanced modelling techniques like Machine Learning and Geographically Weighted Regression Modelling [47]. Additionally, interventions such as the promotion of LPG cookstoves and improved cooking practices aim to reduce household air pollution, a significant health risk in South Asia [48]. However, challenges persist, as evidenced by the inadequate utilisation of handwashing facilities in Bangladesh, making it difficult to implement hygiene practices effectively to reduce diarrhoeal diseases and other health risks [49].

8. Socioeconomic Factors

Socioeconomic factors play a significant role in shaping health outcomes and risks in Bangladesh. Poverty, urbanisation, and demographic changes are key determinants of various health issues in the country. Research has shown that these factors are closely linked to conditions such as obesity, caesarean section deliveries, child mortality, malnutrition, diabetes, sexually transmitted infections, and non-communicable diseases.

A study highlighted that factors such as overweight or obesity, higher education, urban living, and wealth quintile significantly contribute to the prevalence of caesarean section deliveries among women in Bangladesh [50]. This highlights how socioeconomic status and urbanisation can impact maternal health outcomes. Additionally, research found significant gender differences in child mortality risk factors in urban and rural areas of Bangladesh, emphasising the role of demographic disparities in health outcomes [51].

Furthermore, studies like the one conducted have shown a concerning increase in overweight and obesity rates among non-pregnant women in Bangladesh, associated with a higher risk of chronic illnesses like hypertension and cardiovascular diseases [52]. This trend reflects the impact of changing demographics and lifestyle factors on the health profile of the population.

Likewise, research on diabetes prevalence in Bangladesh highlighted the role of socioeconomic factors as risk determinants [53]. The study emphasised the need to understand and address the socioeconomic disparities contributing to the burden of diabetes and pre-diabetes in the country. Similarly, researchers have discussed how identifying and presenting risk factors for non-communicable diseases to policymakers could aid in addressing the growing crisis of such diseases in Bangladesh [54].

Additionally, studies have shed light on the challenges faced by older persons in rural Bangladesh, indicating a link between socioeconomic factors, depression, and health outcomes in this demographic [55]. This emphasises the importance of considering the unique vulnerabilities of different population groups based on their socioeconomic status and living conditions.

9. Economic and Social Impact

In Bangladesh, the economic and social impacts of various factors such as healthcare costs, productivity loss, and quality of life are significant and multifaceted. One crucial aspect influencing the country's socio-economic development is international migration and the remittances it brings. Studies have shown that remittances play a vital role in reducing poverty, increasing household expenditure, savings, and maintaining the quality of life, thereby contributing to gender equality [56]. Additionally, the impact of health conditions like diabetes extends beyond individual health to economic implications. Research on the social and economic impact of diabetes in Bangladesh highlights the substantial costs associated with the disease, including direct and indirect healthcare expenditures, medication adherence, and overall quality of life [57].

Additionally, the role of foreign direct investment (FDI) in enhancing the Bangladeshi economy is a critical consideration. Like many developing nations, Bangladesh views FDI as a key driver of economic growth and development [58]. However, the reliance on out-of-pocket payments for healthcare in Bangladesh poses a significant financial burden on households. Studies have indicated that such payments lead to economic hardships for families, emphasising the need for alternative healthcare financing mechanisms to alleviate this strain [59]. One potential solution proposed is the implementation of Social Impact Bonds (SIBs) to reduce out-of-pocket healthcare costs and improve health outcomes in the country [60].

Furthermore, the issue of catastrophic health expenditure in Bangladesh has forced millions of individuals into poverty, underlining the urgent need for universal health coverage to protect the population from financial risks associated with healthcare [61]. The high prevalence of out-of-pocket healthcare expenditures in the country, constituting a substantial portion of total healthcare spending, further emphasises the necessity of addressing this financial burden on households [62]. Additionally, the reluctance of women from lower socio-economic backgrounds to utilise maternal healthcare services due to cost implications has been identified as a barrier to improving maternal and child health outcomes in Bangladesh [63].

In terms of healthcare utilisation and expenditure, disparities exist based on factors such as age, sex, and socio-economic status. Research has shown that age and sex play significant roles in determining healthcare expenditure patterns within households in Bangladesh, highlighting the need for targeted interventions to address these disparities [64]. Furthermore, the impact of occupational illnesses on labour productivity, particularly in the informal sector, sheds light on the economic consequences of health issues on workforce efficiency and overall economic productivity in urban Bangladesh [65].

Efforts to address healthcare financing and access in Bangladesh have also been explored through initiatives such as employer-sponsored health insurance schemes for specific vulnerable populations like garment workers [62]. Additionally, the potential for microcredit programs to empower the ultra-poor, improve livelihoods, and enhance health outcomes has been recognised as a promising avenue for socio-economic development in the country [63].

10. Discussion

Bangladesh faces a dual burden of diseases, characterised by a significant prevalence of both non- NCDs and communicable diseases. NCDs such as cardiovascular diseases, diabetes, and cancer dominate the disease area, reflecting shifts towards urbanisation, changing lifestyles, and aging populations [4]. In contrast, communicable diseases like tuberculosis, dengue fever, and diarrheal illnesses continue to exert a substantial toll on public health, exacerbated by environmental factors and socio-economic disparities [27, 32]. The rise in NCDs highlights the need for preventive health measures and enhanced healthcare infrastructure, whereas communicable diseases necessitate robust disease control strategies and public health interventions.

Socio-economic factors play a pivotal role in shaping health outcomes in Bangladesh, yet their impact varies significantly across different disease profiles. Poverty, education levels, and urbanisation influence the prevalence and management of diseases such as diabetes and maternal and child malnutrition [34, 50]. However, while communicable diseases like tuberculosis and diarrheal illnesses also exhibit socio-economic gradients, the burden is often exacerbated by environmental factors such as poor sanitation and hygiene [28, 45]. Addressing socio-economic disparities is crucial for improving health equity across both NCDs and communicable diseases, although specific approaches are needed to account for particular disease dynamics and local contexts.

Environmental factors pose significant risks to public health in Bangladesh, with contrasting impacts from air pollution and water sanitation issues. High levels of air pollutants contribute to respiratory diseases and cardiovascular disorders, particularly in urban areas [38]. In contrast, inadequate access to improved water sources and sanitation facilities perpetuates the burden of diarrheal diseases, highlighting the urgent need for infrastructure improvements and hygiene promotion [46]. While both environmental challenges require comprehensive interventions, the strategies differ in scope and implementation due to varying sources of contamination and health impacts.

The economic implications of disease burden in Bangladesh encompass both direct healthcare costs and broader socio-economic impacts, with significant disparities between NCDs and communicable diseases. Out-of-pocket expenditures for healthcare contribute to financial hardships, particularly for chronic NCDs such as diabetes and cardiovascular diseases [59]. In contrast, communicable diseases impose economic burdens through productivity losses and healthcare system strain, exacerbated by outbreaks such as dengue fever [30]. Strategies such as social impact bonds and microcredit programs offer potential solutions to alleviate economic burdens across both disease profiles, yet their effectiveness may vary depending on disease-specific contexts and population needs.

11. Conclusion

In conclusion, addressing the complex health challenges in Bangladesh requires a nuanced approach that recognises and responds to the contrasting dynamics of disease burden, socio-economic determinants, environmental challenges, and economic implications. By comparing and contrasting these dimensions across non-communicable and communicable diseases, policymakers and public health professionals can adapt interventions to prioritise prevention, improve healthcare access, and promote health equity. Future research and policy efforts should focus on integrating evidence-based strategies to achieve sustainable health improvements and mitigate the impact of diseases on population well-being in Bangladesh.

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