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Noncommunicable chronic disease in Bangladesh: Overview of existing programs and priorities going forward

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Introduction

Like 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 non-communicable chronic diseases (NCDs) [1–2]. In the World Health Organization's (WHO) South-East Asia Region, NCDs – which include heart disease, stroke, cancer, chronic respiratory diseases and diabetes – are estimated to account for half of annual mortality (54%) and burden of disease (47%) [3–4]. In Bangladesh, one of the poorest countries in the region, the limited available evidence suggests that NCDs are responsible for half of annual mortality (51%) [5], and almost half of the burden of disease (41%) [6].

From 1986 to 2006, the major causes of death in Bangladesh gradually shifted from acute infectious and parasitic diseases to NCDs. In 1986, NCD's (represented 8 percent of total

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deaths compared to 52 percent of deaths due to communicable diseases [1]. Most recent estimates from 2006 indicate that NCD's represent 68 percent of total mortality while communicable diseases account for only 11 percent of total deaths.

Three NCDs are responsible for a considerable portion of the mortality, morbidity and health services utilization in Bangladesh, in particular, and South-East Asia, more generally: cardiovascular disease, diabetes and tobacco-related illness. Cardiovascular diseases have become a major and growing contributor to mortality and disability in South-East Asia and rank among the top ten causes of death in Bangladesh [8–9]. The prevalence of diabetes has risen more rapidly in South-East Asia than any other large region in the world. In Bangladesh, it is projected that the number of people with diabetes in Bangladesh will increase from 1.5 million in 2000 to 4 million in 2025 [10]. A recent household survey in Bangladesh estimated that tobacco-related illnesses were responsible for 16 percent of all deaths in the country [11].

Consistent with this shifting epidemiological profile, recent data suggests that preventable risk factors including tobacco, unhealthy diets, physical inactivity, and alcohol are becoming an increasing problem in Bangladesh and in the South-East Asia region [12]. Available evidence suggests high rates of any tobacco use, particularly among men (men: rural – 52%, urban 41%; women: rural – 29%, urban – 17%) [13]; moderate rates of fruit and vegetable consumption among adults (vegetables: 3.2 servings daily; fruit: 1.7 servings daily) [14], and high rates of physical inactivity among adults, particularly women (men: 35%; women: 64%) [15].¹ The recent trends in NCD-related risk factors in Bangladesh point to future increases in NCD prevalence and deaths.

The country's limited resources, weak public health systems, highly unregulated private health sector, and aging population also present significant challenges to effectively tackling the growing burden of NCDs in Bangladesh. Gross national income per capita is \$1440 (using purchasing power parity – PPP – calculations) and 40.8 percent of the population lives on less than \$1 per day. Only \$37 (PPP) per capita is spent on health, over eighty percent of which come from non-government sources such as the private sector (68%) or international aid agencies (15%), and many people have limited access to health care especially for NCDs [17]. The aging of the population (aged 60 year and over), which is projected to increase from 6.5 million (5.1% of the total population) in 2000 to 40.5 million (19% of the total population) by 2050 [18], increases the likelihood that individuals will experience multiple chronic conditions [19].

This paper provides a review of existing programs related to NCDs in Bangladesh and identifies key priorities for the country to help address the NCD burden. The audience is both the leaders in Bangladesh and the international aid agencies that fund nearly 16 percent of all health expenditures in Bangladesh and help set the direction for the country [21]. We particularly focus on cardiovascular disease, diabetes and tobacco-related illness (lung cancer, cancers of the mouth and larynx, stroke and ischemic heart diseases, and chronic obstructive pulmonary disease). These diseases were selected because they are largely preventable and because they are among the leading causes of mortality or morbidity in Bangladesh.

The selected diseases are also consistent with the priorities of the Bangladeshi government. The Health, Nutrition, Population Sector Program (HNPSPP) – a five-year policy and programmatic framework that governs health services in Bangladesh – has identified NCDs

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¹In this survey, data was collected from four rural data collected sites: Matlab, Mirsarai, Abhoynagar, and WATCH. For simplicity, rates of consumption and physical inactivity for only the Matlab area are included. Rates are similar across data collection sites.

as one of five priority areas of the emerging health sector challenges [22–23]. In addition, addressing NCDs is part of the Ministry of Health's cooperation strategy with the WHO to reduce major NCDs and associated risk factors [24], the Strategic Plan for Surveillance and Prevention of Non Communicable Diseases, 2007–2010 [25], and the National Strategic Plan of Action for Tobacco Control, 2007–2010 [26]. The results from this review may also provide useful information for other low income countries with a similar disease profile.

Materials and Methods

There is no repository of NCD programs in Bangladesh. To identify ongoing chronic disease programs in Bangladesh, we used a snowball technique – a sampling strategy which relies on referrals from subjects to generate additional subjects [34]. We started by contacting NCD experts from around the country and directors of known NCD programs. Using this method, we started by contact six initial subjects serving within specialty foundations and in international agencies like the World Bank and World Health Organization. Those sources helped us to identify a total of 15 experts and directors serving in additional specialty foundation/hospitals or service delivery programmes with an emphasis on NCD care within Bangladesh. We also searched PubMed and Ovid Medline (January 1970 to June 2009) for potentially relevant studies. Databases were searched for English-language articles using key words including: 'Bangladesh', 'noncommunicable disease', 'chronic disease', 'prevention', 'diabetes', 'diabetes', 'cardiovascular disease', 'tobacco control', and smoking.' Titles and/or abstracts of these articles were manually searched to identify programs relevant for inclusion in the study. Reference lists from studies were also hand searched to identify additional programs. An extensive grey literature search was conducted by researchers within Bangladesh.

All programs identified as having a focus on tobacco-related illnesses, diabetes or cardiovascular diseases were included in this review. We focused specifically on those aspects of the identified NCD programs related to service delivery, enhancement of health system capacity, patient/community education or environmental changes. In future reviews, it would also be important to examine the financing and health impact of identified NCD programs; however this information was not routinely collected.

We compared the goals and activities of the identified programs to the six objectives of the World Health Organization Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases [27].

Results

We identified a total of 11 NCD programs in Bangladesh – at varying levels of development – focusing on tobacco-related illness, diabetes or cardiovascular disease (Table 1). Of the identified programs, roughly half involved diabetes. With the exception of the tobacco control efforts, most of the programs focused on a specific disease. This is significant because many of the people with a chronic disease have multiple chronic diseases and there is overlap in the prevention and treatment of NCDs.

Only three of the eleven programs addressed the reduction of primary risk factors: two programs to reduce tobacco use, and one to encourage better nutrition to prevent diabetes – a key obstacle for Bangladesh to effectively reduce the morbidity and premature mortality due to NCDs. The programs were roughly divided between the government and nongovernment organizations (NGOs). Specific findings related to the three areas of focus – services delivery, health system capacity, patient/community education and environmental changes – are detailed below.

Service Delivery

Five of the identified NCD programs enhanced service delivery through provider education or clinical care. Of note, most of the education for health service professionals involved short-term training opportunities. The Bangladesh Institute of Research and Rehabilitation for Diabetes offers training to primary care doctors about the primary and secondary care of diabetes as well as diabetes care for patients. The National Institute of Cardiovascular Disease provides training to nurses and paramedics about CVD as well as services to prevent and treat CVDs. The Upazilla NCD Project provides training to physicians, nurses and other health professionals and developed training manuals

Health System Capacity

Two programs helped to increase health system capacity. The Health Care Development Project improved infrastructure by building of hospitals and clinics which may directly or indirectly impact NCD's. The Noncommunicable Disease Control and Public Health Intervention program of the Directorate General for Health Services provided equipment for improving the quality of NCD care.

Key informant interviews indicated that the public sector is in the early stages of organizing NCD services at the primary care level. NCD care exists within both the public and non-state sectors in Bangladesh. NCD care has developed in a fragmented environment as it operates outside of the interest of international donors. The World Bank and the World Health Organization have recently initiated steps to provide overall leadership in the framework for NCD surveillance, prevention and treatment in Bangladesh as well as working with the Ministry of Health and Family Welfare to create unity of effort in this new priority area.

Patient/Community Education

Seven of the identified programs helped to improve patient community education about NCDs. For example, the National Heart Foundation and the Child Sponsorship Program provide heart and diabetes awareness 'camps', respectively, in rural parts of the country. Another example is the NGO, Improving Diabetes Nutrition Education, which created a nutrition based website and disseminates diabetes-related nutritional information.

Environmental Changes

One policy facilitated environmental changes to address NCDs. The Smoking and Tobacco Usage Act (2005) called for the removal of tobacco billboards and the restriction of tobacco in public places such as schools, hospitals and airports. This legislation also required that health warning labels on tobacco products comprise at least 30 percent of the packaging.

Consistency with the WHO Global Action Plan for NCDs

The extent to which the NCD activities in Bangladesh are consistent with the six objectives outlined in the World Health Organization *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases* is described in Table 2. The NCD efforts in Bangladesh have partially met five of the six criteria outlined by the global strategy and failed to meet one. Key reasons for this include the lack of rigorous evaluations of NCD programs in Bangladesh; the infancy of most programs and their primary focus on development and implementation rather than on evaluation or research and the lack of programs focused primarily on expanding NCD-related research; the local focus of most programs (with the exception of the national programs to combat tobacco use. In this discussion, we offer recommendations to help Bangladesh meet the WHO objectives for control of NCDs.

Discussion

Bangladesh is a country of 140 million people, and by the middle of the century its population is projected to grow by half (to 235 million). A key demographic shift between now and then is expected to be the rapid aging of the population – projected to account for a quarter of the population by 2050 [18]. This trend will surely increase both the burden of NCDs and the strain on the health care system. The goal of this paper was to examine the existing programs in Bangladesh focused on NCDs, particularly tobacco-related illness, diabetes and cardiovascular disease. Despite the current lack of focus on non-communicable diseases within the health-related resources in Bangladesh, we identified a total of 11 programs dedicated to managing NCDs. These are on the vanguard of NCD programs in Bangladesh and most likely will serve as the basis for future programs. Unfortunately, there are few rigorous evaluations of the programs, limiting their ability to provide learning on how to expand these programs.

The small number of programs to reduce key NCD risk factors, which are critical drivers of the NCD burden, suggests that additional resources should be devoted to primary or secondary prevention of tobacco use and other important factors that drive the NCD profile in the country. Existing efforts to reduce NCD risk factors should focus on interventions proven to be cost-effective such as smoking cessation, cigarette taxes or advertising bans on tobacco products [44–45]. Studies by the World Bank and other entities and individual researchers have identified many low cost and cost-effective preventive activities for NCDs that exist [46]. The main challenge is to find ways to adopt and implement them in Bangladesh. Focusing on those interventions which offer high economic value or net savings will help maximize limited resources and potentially encourage more support from donors.

Our finding that NCD efforts in Bangladesh are less than optimal is consistent with a recent paper published by the World Bank regional office in South-East Asia which found that, while there has been a strengthening of commitment and capacity to prevent and control NCDs, there is a need to enhance the capacity to address critical gaps in national policies and programs for the prevention and control of NCDs [43].

Going forward, Bangladesh might benefit from the World Health Organization package of essential NCDs. This tool identifies protocols, health promotion, prevention and management of NCD's at the primary care level which have been developed for use in low resource settings [48]. Another important tool which may help strengthen NCD care in Bangladesh is the World Health Organization toolkit for monitoring health systems [49]. It includes a set of indicators and measurement strategies covering the core health system building blocks.

Recommendations to help Bangladesh meet the six objectives of the WHO *Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases* are described in Table 3 and focus on three main areas: knowledge, implementation and policy.

We suggest that efforts be made to improve the knowledge base related to the NCD burden. Given that one of the primary objectives of the Demographic Surveillance System (DSS) at Matlab – the oldest and largest demographic surveillance site in a developing country – is the production of timely and reliable population-based health information to support evidence-based health policies [35], Bangladesh's DSS data collection should be expanded to allow for the surveillance of mortality and morbidity of NCD's. However, Bangladesh is already beginning to collect relevant NCD data. Currently, several surveillance activities are underway including: the Bangladesh Network for Noncommunicable Disease Surveillance and Prevention (BanNet) a platform for the collaboration of organizations promoting and collecting information on NCD surveillance and the National Survey on NCD Risk Factors.

There is also a plan to incorporate an NCD InfoBase into the website of the Directorate General of Health Services in an effort to provide accessible trend data which can be used to update guidelines and inform policy.

We also recommend that efforts be made to improve the monitoring and evaluation of existing and planned NCD programs, such as assessing their effects on health or their cost-effectiveness. For example, the Smoking and Tobacco Product Usage Act which went into effect in May 2009 should be evaluated by both process and outcome indicators to estimate its health and economic impact. Studies which examine the impact of increased health system infrastructure (e.g., health professionals, facilities) on access to care for NCDs will also be important. Another important area of evaluation will be the association between increased population awareness of NCDs and willingness/ability to seek care.

In addition, we recommend that primary health care activities should be strengthened [36] and enhanced by incorporating secondary and tertiary prevention into the management of chronic disease – such as reducing recurrence, slowing progression, avoiding complications and maximizing function and quality of life [37]. Improved secondary and tertiary prevention is particularly important in Bangladesh where approximately 90 percent of the population works in the informal sector [39], making it difficult to reach them through traditional venues and where informal sector health care providers, who are major providers of health care to the poor, represent roughly 80 percent of health care workers [40]. To further address implementation gaps, we additionally recommend that the number of health care workers with expertise in NCDs be increased.

Successfully addressing knowledge and implementation gaps will be largely dependent on complimentary policy efforts. Within the public sector, the Essential Services Package (ESP) – which provides guidelines for service delivery should be updated to incorporate NCDs such as diabetes, tobacco-related diseases and CVD. Going forward, the ESP should be periodically updated to include those NCD which represent a large portion of mortality or the burden of disease in Bangladesh. Currently, the ESP focuses primarily on maternal care, communicable disease and child health [41]. The ESP also includes services related to arsenic diseases, environmental and occupational health, injury prevention and the management of violence against women.

Despite the gaps we identified in the existing NCD-related programs in Bangladesh, several beginning or planned programs suggest that Bangladesh is making strides to improve the prevention of NCDs. The Center for the Control of Chronic Diseases in Bangladesh (C3D) – a program which aims to develop community-based prevention and management programs - will evaluate the link between noncommunicable diseases and poverty and identify the health systems response to NCDs [47]. Another important step was the inclusion of noncommunicable diseases as one of five priority areas for the emerging health sector challenges outlined by the Health, Nutrition, Population Sector Program [22]. A third key effort was the launch of the governments' Strategic Plan for Surveillance and Prevention of Noncommunicable Diseases, 2007–2010 [26].

One of the major problems that low income countries face is the lack of cost effective programs designed for their specific population with demonstrated sustainability in similar countries. Other low income countries may benefit from adapting examples from countries like Bangladesh to fit their own needs and resources. Concrete examples of programs which have been successful in tackling chronic disease in low income countries exist [1]. One example is the recent adoption of the Agita program [2] – it was initially started in San Paulo Brazil to increase the level of exercise in the community and has expanded to many different countries in Latin America.

Limitations

There are several limitations of this research worth noting. The lack of a nationally representative NCDs surveillance system makes it difficult to know whether the NCDs targeted in this study represent the highest mortality or largest burden of disease in the country. However, the evidence is clear that the diseases focused on in this study do represent a significant portion of annual mortality in Bangladesh [6] and that NCDs will comprise and increasingly large proportion of mortality and morbidity in the coming decades [1]. Several of the programs identified in this report lacked comprehensive information on their relevant activities. As a result, we may have underreported some of the current activities in Bangladesh focused on NCDs.

Conclusions

In response to the growing burden of NCDs, the Bangladesh government and non-government organizations have taken several steps to implement appropriate programs, but there are still many areas where they could enhance or strengthen their efforts. Key among them is improved monitoring and evaluation of programs and the development of nationally representative surveillance data about the prevalence of noncommunicable chronic diseases and associated risk factors. Advances in these areas, potentially funded by international donors, will greatly facilitate the effective translation of evidence into policy. With effective monitoring and evaluation of ongoing and planned programs, Bangladesh can serve as an example to other countries faced with a similar disease profile.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Noncommunicable chronic disease activities, Bangladesh

Program/Institution	Sector	Target NCD	Objective	Activities
Bangladesh Institute of Research and Rehabilitation for Diabetes (BIRDEM); part of Diabetic Associations of Bangladesh (DAB) Since 1956	NGO	Diabetes; endocrine and metabolic disorders	To provide clinical care for diabetes patients in Bangladesh	Training of PCPs; primary and secondary care of diabetes (inpatient & outpatient); diagnostic services; diabetes education for individuals and family
National Institute of Cardiovascular Disease (NICVD) Since 1978	Government	CVD	To provide emergency cardiac care, and promote prevention and treatment of cardiovascular diseases in Bangladesh	Training of nurses and paramedics on cardiovascular disease; seminars and workshops to prevent NCDs; emergency cardiac care; Services to prevent and treat chronic cardiovascular diseases
National Heart Foundation (NHF) Since 1978	NGO	CVD	To provide cardiovascular care and promote cardiovascular health in Bangladesh	Heart 'camps' throughout rural parts of the country to treat and educate cardiac patients; organized published booklets and educational materials to build awareness of CVD prevention
Health Care Development Project (HCDP); part of the Diabetes Association of Bangladesh (DAB) Since 2006	Public-private partnership co-financed by the Netherlands Development Finance Company and the DAB	All NCDs; testing a model of integrated care service delivery, including a focus on NCDs, in the urban and rural areas	To provide a full spectrum primary, secondary and tertiary care services. HCDP aims to transform the diabetes healthcare model of DAB by forming a countrywide network of self-sustained general healthcare delivery services	In process of building or renovating five new hospitals and eighteen clinics
Primary Prevention of Diabetes	NGO	Diabetes	To develop and implement a long-term National Diabetes Prevention Program	Train doctors and community counselors in diabetes education
Child Sponsorship Program in Bangladesh Since 2003, extended 2007	NGO	Type 1 diabetes	To provide diabetes medicines and supplies to needy children in Bangladesh	Diabetes awareness 'camps' in rural areas for youth and their parents; regular monitoring of glycemic control by HBA1c
Improving Diabetes Nutrition Education Since 2006	NGO	Diabetes	To increase nutrition awareness; train health care providers; and develop new knowledge and strategies for nutritional management of diabetes	Developed a one-day training program for health professional and educational classes for people with diabetes; created a nutrition based website (www.pushit.org); disseminated 2,000 information and nutrition boards
Upazilla NCD Project Since 2007	Government	Diabetes, hypertension	To develop NCD capacity among public and private providers in project sites	Trained 782 physicians, 1,345 nurses, 1,451 medical technologists and 1,347 health assistants; developed NCD training manuals for PCPs and paramedics; developed a two day training module for health professionals and conducted 240 workshops; orientation of private service providers to NCDs risk factors; provision of equipment and other logistic support for NCD care
Noncommunicable Disease Control and Public Health Intervention Program of the Directorate General for Health Services Since 2007	Government	CVD, cancer	To spread awareness of NCDs and NCD care	Develop awareness of NCDs among senior citizens Provide equipment for improving the quality of NCD care

Program/Institution	Sector	Target NCD	Objective	Activities
Bangladesh Anti-Tobacco Alliance Since 1999	NGO	Tobacco-related cancer	To educate the public and policymakers about the dangers of tobacco; strengthen the nation's tobacco control policies and legislation	Training and creation and dissemination of materials; host anti-tobacco workshops; wrote a book on tobacco and cancer
Smoking and Tobacco Product Usage Act, 2005	Government	Tobacco-related cancer	Restricted smoking in public places; restricted tobacco advertising; required health warning labels on tobacco products to take up at least 30% of the packaging; created a loan program for farmers looking to switch from tobacco to other crops	Removal of tobacco billboards, Restriction of tobacco in public places (e.g., schools, hospitals, restaurants, airports, cinemas, vending machines) were also prohibited. Health warning labels on tobacco products are required to take up at least 30 percent of the packaging with one of six warning messages. Importers are required to disclose the ingredients of their products to the Bangladeshi government

Table 2
Comparison between NCD global strategy and strengths/limitations of NCD activities in Bangladesh

NCD Global Strategy	Objective Addressed	Strengths	Limitations
1. Raise the priority accorded to NCDs in development work at global and national levels, and integrate prevention of such diseases into policies across all government departments	Partially	NCDs identified as one of five priority areas of the emerging health sector challenges	Limited resources
2. Establish and strengthen national policies and plans for the prevention and control of NCDs	Partially	- Development of a strategic plan for surveillance and prevention of NCDs - Broad information dissemination to educate the public about NCDs	Infancy of most programs
3. Promote interventions to reduce the main common risk factors for noncommunicable diseases: tobacco use, unhealthy diets, physical inactivity and harmful use of alcohol	Partially	- Efforts to reach rural populations through satellite clinics or mobile prevention and treatment centers - Increase in number of health professionals trained to care for patients with NCDs - Reduction of billboards advertising tobacco products - National Strategic Plan of Action for Tobacco Control, 2007–2010	Local focus of most programs
4. Promote research for the prevention and control of noncommunicable diseases	No	N/A	Emphasis on development and implementation rather than on research
5. Promote partnerships for the prevention and control of noncommunicable diseases	Partially	- Ministry of Health's cooperation strategy with the WHO to reduce major NCDs and associated risk factors - Establishment of the Center for the Control of Chronic Diseases in Bangladesh	Lack of concrete action plans
6. Monitor noncommunicable diseases and their determinants and evaluate progress at the national, regional and global levels	Partially	Beginning to collect NCD surveillance data	Lack of rigorous evaluations of existing NCD programs

Table 3**Recommendations to improve efforts to combat non-communicable chronic disease**

Knowledge Gaps
• Expand surveillance activities to include the measurement of NCD-related morbidity and mortality
• Improve the monitoring and evaluation of existing and planned NCD programs
• Identify remedial risk factors specific to Bangladesh's (South Asian) populations
Implementation Gaps
• Encourage more focus on NCD service delivery
• Improve primary care services by integrating secondary prevention of chronic disease, expanding service delivery to non-traditional health spaces and training informal sector health providers
• Increase number of health care workers with expertise in NCDs through expanded training programs
Policy Gaps
• Update the Essential Services Package (in the public sector) to incorporate NCDs
• Develop insurance mechanisms to protect individuals, particularly the poor, against the costs of emergency care and catastrophic illnesses associated with NCDs
• Increase budgetary allocations to support the primary prevention of NCDs and evaluation of NCD programs
• Bridge the disconnect between NCD disease burden and NCD efforts
• Identify policy instruments to reduce tobacco, dietary, and environmental risk factors for NCDs beyond the health sector