Tuberculosis burden in Bangladesh: epidemiological estimates and people’s perspectives
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CHAPTER 1

GENERAL INTRODUCTION
**General introduction**

*Mycobacterium tuberculosis* (MTB), the micro-organism causing tuberculosis (TB) in humans, was first discovered by Robert Koch on March 24, 1882. After more than a hundred years, the World Health Organisation (WHO) declared a global emergency for tuberculosis in 1993 as the disease continued to be the major cause of death and sufferings to millions of people throughout the globe, particularly from the developing world. Since then, major efforts have been undertaken to control the disease by implementing a standardized TB-control strategy. This “Directly Observed treatment; Short Course (DOTS)” strategy contained five pillars with an emphasis on case-finding and treatment. The strategy was incorporated in the subsequent “STOP TB strategy” formulated in 2006, which adopted wider goals including the need for operational research and community empowerment in the fight against TB.

**TB situation in Bangladesh**

TB continues to be a major public health problem in Bangladesh. The country ranks 6th among the 22 high burden countries of the world according to the yearly WHO-estimates. The actual extent of the tuberculosis problem in Bangladesh is not known precisely, due to the lack of adequate epidemiological data on prevalence, incidence and mortality. The WHO estimate of prevalence was estimated with a very large uncertainty at 434 (218-721)/100,000 population for all types of TB. The estimated incidence remained stable for the last decade at 225 (185-268)/100,000 per year, while the mortality showed a very slow decline (Figure 1).

![Fig. 1: TB situation in Bangladesh 2013](image-url)
Despite an assumed country wide DOTS coverage and good treatment success rate, the TB-case notification rate stagnated, at around 150,000 new smear positive cases (SS+ve) each year from 2006 onwards (Figure 1).\(^4\)

Two-third of the TB patients detected in 2012 had new smear-positive pulmonary TB (PTB), while 15\% had smear-negative PTB and 19\% had extra pulmonary TB (EPTB). Three percent of the TB-cases were diagnosed in children. The proportion of retreatment cases was 4.6\% among all cases notified in 2012. The prevalence of multi drug resistance (MDR) cases among new cases was 1.4 \% (0.7-2.5\%), and among retreatment cases 29\% (24-34\%).\(^4\)

Prevalence estimates obtained from surveys in Bangladesh varied widely. The available epidemiological data from the surveys in 1964-66 and in 1987-88 were re-analysed in 1997 in an attempt to reconcile the estimates of TB-prevalence. This resulted in an estimated prevalence of smear positive TB of 220/100,000 population in 1964-66 survey and 527/100,000 population in 1987-88 survey.\(^6\)

Similarly, the prevalence of infection estimates remained unclear in Bangladesh. The only tuberculin survey was conducted along with the 1964-66 prevalence survey, and provided an estimation of annual risk of tuberculous infection (ARTI) of 2.3\%. It is this estimate which formed the basis of the yearly WHO estimates of the burden of TB in Bangladesh.\(^6\)

The social face of TB in Bangladesh is still complex and puzzling. For example, the difference in TB notifications between men and women appears to be relatively large in the country, with an Female/Male ratio in notified cases of .50 in smear positive cases in 2012.\(^4\) Other local studies reported this ratio as low as 0.39.\(^7\)-\(^11\) It is debated if this difference is a result of differences in exposure, accessibility to services, cough production, or smoking habits. Also the role of stigma might have a differential effect on men and women. Studies in Bangladesh suggest that stigma is more prominent in women than men, precluding adequate identification in the former.\(^11\)-\(^13\)

One of the reasons for providing DOTS free of cost is that everyone with the disease can access treatment when needed, particularly the poorer sections of the population. Case notification data segregated by socio economic strata is not available in Bangladesh but inequities in accessing services in other sectors of the health services\(^14\)-\(^16\) suggest that inequity in service utilization might also be a challenging issue for the TB control programme. It has been recognized that TB control needs to focus beyond therapeutic strategies to include poverty\(^17\),\(^18\) and
tackling the social determinants of TB.\textsuperscript{17} There is a need to obtain better information on socio-economical factor influencing access to TB-services in Bangladesh.

The current DOTS program in Bangladesh depends on passive case finding for TB treatment. The estimated case notification proportion of new smear positive PTB of around 70\% since 2006 suggests that a substantial portion of cases still remains outside DOTS and is probably being treated in the private sector or not accessing care at all.\textsuperscript{19} Passive case finding is influenced by patient’s awareness, accessibility and availability of health services. Knowledge on TB disease, its diagnosis and treatment therefore is an important factor for the management and outcomes. Even when TB-services are accessed, the response of the health staff determines further actions. To improve case notification, there is a need to address the knowledge gaps related to care seeking, and inappropriate actions of care providers in their interactions with potential TB-cases.

**Bangladesh: Population, health systems and TB control services**

Bangladesh has a total 155 million people living in 147,570 Sq. Km areas, giving rise to a density of 1142 persons per /Km\(^2\). About one third of the population lives below the poverty line. The life expectancy at birth is 70 years for both sexes, for male this is 68 and for females 72 years. Bangladesh is one of the low income countries of the world with a GDP-per capita of 2100 USD in 2012. The country has many social and economical problems, political instability, poor infrastructure, corruption, inadequate power supplies, and slow implementation of economic reforms.\textsuperscript{20}

The country is divided into 7 divisions, 64 districts, 460 Upazila (sub-districts with a range of population size 300,000 to 400,000), of which 397 are rural and 63 are semi-urban. In addition, there are 4 main cities run by city corporations, and other smaller municipalities comprising the urban or metropolitan population of the country. The health system in Bangladesh is pluralistic in nature, where many stakeholders, public and private, modern and traditional, coexist and work.\textsuperscript{21} In Bangladesh, there are two types of health care providers: formal and informal. The informal sector includes a large number of unlicensed and unqualified or semi-qualified private practitioners like Village Doctors practicing allopathic medicine, homoeopathic doctors, and traditional healers. Among these, village doctors with very little or no formal training are the dominant type.\textsuperscript{22,23} It is estimated that nearly 95\% of the entire health workforce in Bangladesh is made up by the informal sector, the number of which is steadily increasing.\textsuperscript{24,25} Many NGOs are working in Bangladesh, including
some of the largest in the world (BRAC, Grameen, ASA and Proshika). The private for-profit sector is large and growing at an exponential rate of about 15% per year. The number of private practitioners is estimated to be 3.6 per 1000 population, approximately 5 physicians and 2 nurses per 10,000 people, while there are 12 village doctors and 11 drug sellers per 10,000.25

The basic primary health care unit in Bangladesh is the Upazila Health Complex at Upazila level. It provides out-patient, inpatient and emergency services. Secondary and tertiary health care is provided by general and specialised hospitals at district and divisional levels. In the private health sector, in addition to the private licensed providers (medical graduate or post graduate specialists) clinics and hospitals are becoming more visible with the advent of time. The private traditional and homeopathic providers are available in most of the villages.

**TB control in Bangladesh**

In the pre-DOTS era, TB control in Bangladesh was vertical and based in a limited number of large hospitals in different districts of the country. Chest x-ray and long-term therapy was the mainstay of diagnosis and treatment. In 1993, the government of Bangladesh adopted the DOTS strategy for TB control and started to implement its components throughout the country. This occurred initially in rural areas and was only from 2003 onwards scaled-up to the urban areas. One important feature in expanding TB services was including NGOs in TB-control activities from the beginning. The government commitment continued with subsequent annual development plans. TB-control activities were further strengthened with the availability of funding support from Global Fund for TB, AIDS and Malaria (GFATM) since 2003.26

**The National TB Control Programme**

The services of the National Tuberculosis Control Programme (NTP) are organized under a sub directorate called Mycobacterium Disease Control (MBDC) which reports directly under the governance of the Directorate General of Health Services (DGHS). At the district level, the Civil Surgeon (CS) heads the health administration, and at the Upazila or sub-district level, the Upazila Health and Family Planning Officer (UHFPO) is responsible for TB services. This latter is the basic unit for diagnosis and management of TB patients. Every Upazila has a central centre where microscopy for TB diagnosis is performed and other DOTS-activities
are implemented. This centre is run by government or NGO staff. Additional DOTS services are provided at lower level facilities by Health Assistants, and occasionally by trained village doctors.27,28

The TB services are organised slightly different in urban areas. They are provided under the Urban Primary Health Care Project (UPHCP) which falls under the Ministry of Local government, rural development and cooperative (MoLGRDC). In addition to the 460 Upazila Health Complexes of the country, free TB series are also available through 44 chest diseases clinics at district levels, 11 chest disease hospitals, all 64 districts and all medical college hospitals, 264 urban health centres, prisons and in many garments factory work places.5

**General objective and outline of this thesis**

The overall objective of this thesis is to describe the epidemiology of tuberculosis in Bangladesh and related programmatic issues, and to assess and understand TB in its socio-economic perspectives.

Specific objectives are:

1. To assess the burden of tuberculosis in Bangladesh;
   i. Describe the prevalence of smear positive pulmonary TB in adults (≥ 15 years)
   ii. Estimate the prevalence of TB-infection among children (<15 years)

2. To examine the access of the National Tuberculosis Control Programme (NTP) by different segments of community population.

3. To assess the care seeking behaviour of the individuals with chronic cough (Suspected TB case) and response of the health system to this care seeking

4. To assess the knowledge on TB and health services relating to TB (Programmatic aspects) in TB cases and general population

While focusing on the epidemiological and technical aspects of the disease this thesis also tries to understand TB disease and infection in its social perspectives: in terms of its control and prevention activities adopted and implemented by the NTP, people’s awareness of the disease, and their care seeking pattern and how all these impact on the outcomes of the control programme.
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In chapter 2 we describe the burden of the disease in the country as obtained through the national tuberculosis prevalence survey 2007-2009. We report an estimate of prevalence by different sub groups of population; discuss the results in the light of methodological constraints and implications for the NTP, Bangladesh.

In chapter 3 we describe the results of the tuberculin skin testing (TST) survey, which was carried out along with the disease prevalence survey throughout the country. We report the estimate of the prevalence of infection and the associated Annual Risk of Tuberculous Infection (ARTI) in two age groups of children (5-10 years and 10-14 years). These estimates are discussed in relation to the socio economic position of the persons under survey.

In chapter 4 we discuss the societal and programmatic aspects of tuberculosis in Bangladesh. We describe the access and use of free NTP services by different section of the population using the SEP in the general population, the population under the survey, the detected cases and a sample of cases detected routinely under NTP.

In chapter 5 we elaborate on the care seeking of patients detected actively in the national survey or passively by the NTP. We illustrate the care seeking from the first point of care to the subsequent fourth point of care. The role and practice of the care providers is compared among the formal (Licensed or acceptable to the programme) and informal (unlicensed and unacceptable to the programme) providers wherever the care was sought by the TB cases.

In chapter 6 we discuss the knowledge on TB and on some important programmatic aspects among TB and Non TB cases selected from the same localities during the national survey.

In chapter 7 we describe an operational aspect of TB programme focusing on the quality of the sputum specimen collected during the survey for microscopic detection of TB. We compare its macroscopic features with microscopic tests to validate the quality of sputum.

Chapter 8 provides a general discussion on the findings in this thesis in relation to the TB situation of Bangladesh, methodological issues, and implications of the findings for the TB control and further research.
References


