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Gender differences in delays in diagnosis and treatment of tuberculosis

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Objective To assess the gender variations in delay from symptom onset to help seeking, diagnosis and treatment of tuberculosis (TB) using DOTS at community level, in 10 subdistricts of Bangladesh with 2.5 million people under a non-governmental organization's (Building Resources Across Communities, or BRAC) DOTS programme for TB control.

Design A cross-sectional survey of 1000 newly diagnosed pulmonary TB patients (500 women and 500 men).

Findings Women, in comparison with men, had significantly longer mean and median delays in total delay (63.2 and 61.0 days vs. 60.3 and 53 days, respectively), total diagnostic delay (61.2, 60.0 vs. 58.5, 52.0 days), patient's delay (51.9, 50.0 vs. 48.7, 42.0 days) and treatment delay (2.0, 1.0 vs. 1.9, 1.0 day). Patient's mean and median delays were longer than the health system delay. However, patient gender showed strong association with total delay, total diagnostic delay and patient's delay. Older age of women was significantly associated with longer patient and treatment delay categories, respectively.

Conclusion Compared with men, women experienced longer delays at various stages of the clinical process of help seeking for TB. This warrants appropriate measures to improve the situation.

Keywords Delay, gender, DOTS, tuberculosis, service provider, Bangladesh

KEY MESSAGES

- Both the bivariate and multivariate analyses reveal significantly longer delays for women than for men in most steps of the clinical process for TB control, namely total delay, total diagnostic delay and patients' delay.
- Older women and young men are less likely to be diagnosed with TB through the existing TB control interventions, necessitating special drives to enhance case detection in these particular groups.
- TB control programmes ought to develop and implement evidence-based policy options to address the special issues of women, including the elderly, to maximize their effective access to DOTS services, and strengthen the semi-active case finding mechanisms.

Background

Most DOTS (directly observed treatment–short course) strategies rely greatly on passive case finding (PCF) for tuberculosis (TB) treatment. Though the success of the PCF approach largely depends on the patients' health awareness, ability to recognize the early signs/symptoms and accessibility to health services for immediate self-reporting, such friendly conditions seldom exist

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in most settings, resulting in unacceptable delays in various steps of the clinical process for TB treatment. In fact, delayed diagnosis, especially of smear-positive pulmonary TB (PTB) cases leads to prolonged spread of TB. Thus, delay has been a serious problem for most DOTS strategies including Bangladesh. In effect, whether a diagnosis is early or delayed depends on the behaviour of both the patient and health care services, together with the quality and coverage of health care services (Jaramillo 1998).

Gender inequality in this domain, however, has severe consequences in public health in terms of women's poorer access to health care, delays in diagnosis and treatment, and unnecessary spread of the disease (Diwan *et al*. 1999; Long *et al*. 1999; Yamasaki *et al*. 2001). It can be hypothesized that both patient and health system delays lead to differences between women and men throughout the clinical process, and the pattern of women's utilization of health care providers might differ from that of men. However, over the last couple of years, interest in identifying and addressing gender issues in TB control programmes has increased. Thus, the Special Programme for Research and Training in Tropical Diseases (TDR) of UNICEF/UNDP/World Bank/WHO funded four research teams from Bangladesh, Colombia, India and Malawi to study the gender differentials and barriers within TB control programmes, covering various domains of TB control in each of the four study sites. This study, as a part of the multi-country initiative, aimed to identify delays at different stages of the process of help seeking and treatment for TB at community level with reference to gender.

Methods and materials

Study setting

The study covered 10 subdistricts of the BRAC TB control programme, with 2.5 million people spread over four districts (Mymensingh sadar, Trishal, Muktagacha and Phulpur in Mymensingh; Gobindagonj in Gaibandha; Dinajpur sadar, Fulbari and Parbatipur in Dinajpur district; and Bogra sadar and Kahaloo in Bogra district). In partnership with the government of Bangladesh (GoB), BRAC, a Bangladeshi non-government development organization, implements the National TB Control Programme (NTP) using the DOTS strategy in 283 subdistricts including towns and six cities. The government provides training, monitors quality of services, supplies logistics and drugs, and manages complicated referral cases.

There are BRAC health centres (BHCs) in various parts of the country, and each BHC is equipped with necessary human and material resources for the TB control programme. The BRAC-trained female community volunteer health workers, or *shastho shebikas*, are the nucleus of the programme. They work under the supervision of para-professionals and physicians. People with prolonged cough for more than 3 weeks can report directly to the BRAC laboratory located in each BHC or are referred by *shebikas* for sputum examination. The *shebikas* generally initiate DOT for newly diagnosed cases under the guidance of the BRAC programme organizers or para-professionals. They directly observe new patients swallowing the drugs during the first 2–3 months, while patients who undergo re-treatment are observed for the entire period of treatment. The *shebikas* collect drugs from the BRAC field offices every month. Each patient undergoing treatment makes a deposit of Tk. 200 (US$4; equivalent to about 4 days' local wages) and signs a bond to guarantee treatment completion. After successful completion of treatment, the amount is given back to the respective patient, and BRAC provides some financial incentives to *shebika* as a compensation to her time. Patients unable to pay (e.g. the ultra poor) do not need to make a deposit.

Ethical clearance

Ethical approval was obtained from BRAC and the World Health Organization local office, followed by the informed consent of each study patient. Strict confidentiality was maintained throughout the entire study period.

Study samples and their selection procedures

From March 2001 to September 2002, the programme detected 2806 smear-positive PTB cases in the 10 study subdistricts (826 women and 1980 men). From these, 1000 newly diagnosed smear-positive PTB patients (500 women and 500 men) representing all the 10 subdistricts were conveniently selected from the BRAC treatment registers (average 100 per subdistricts). Inclusion criteria were the same for selecting new women and men patients, who were diagnosed within the 4 weeks of interviews held. The process of inclusion continued until 500 women and 500 men were included in the study. Only 15 patients (1.5%) (5 women and 10 men) were replaced due to their refusal to participate in the study. The patients were diagnosed using the same clinical methods—smearing of sputum and test for Acid Fast Bacilli—and gender comparison was done between the women and men patients only, not between the patients and the general population from where they originated. They were interviewed within the first month of their treatment initiation. Thus, selection bias was minimized.

Data collection

Four experienced and trained field researchers (two women and two men) interviewed the study patients at their homes. They first collected particulars of the TB patients from programme records within 4 weeks of the interviews. The particulars included the dates of sputum submission, TB diagnosis and treatment start. The interviewers asked the patients: (a) what problem did they experience that led them to go for sputum smearing, (b) when did this problem first start (local days/ months etc. were used), (c) what happened then to them, and (d) before visiting the BHC, where did they first go for help outside home, when and why? During probing, especially on the first onset of the problem and first help seeking outside the home, the interviewers used local, family and individual level memorable vital events that occurred in the very recent past, such as religious/cultural festivals, marriage, death, flood, etc. This process enabled the study participants (patients) to count the approximate duration between the events and occurrence of their problems. Thus, the field researchers collected data on all the date-related variables in days, including dates of the first onset of problems, help seeking outside the home, visit to a

BHC, smearing, diagnosis and treatment initiation. The days/dates on onset and first help seeking outside the home were cross-checked with spouses and in-laws for approximate accuracy, whilst the other dates were in the programme records. In this process, the dates of problem onset and prior help seeking (before visiting BHCs) were estimated, and their relative accuracy was ensured. The field supervisors and the principal investigator continuously supervised the data collection activities.

Data management and analysis

Data were double entered and cleaned in Epi Info version 6.04, and analysed in SPSS version 10.0. Different delays were classified into six categories, and each of them was given an operational definition:

(1) Total delay – is the time lag from awareness of first symptom onset to TB treatment initiation;
(2) Total diagnostic delay – is the time lag from first symptom onset to TB diagnosis;
(3) Doctor's delay – is the time lag from first visit to a qualified doctor/BHC to TB diagnosis;
(4) Patient's delay – is the time lag from first symptom onset to first visit to a qualified doctor/BHC;
(5) Treatment delay – is the time lag from TB diagnosis to first treatment initiation; and
(6) Health system delay – is the time lag from first contact with a qualified doctor/BHC to TB treatment initiation.

Bivariate analyses were performed, together with computation of descriptive statistics. Wilcoxon and Kruskal-Wallis tests compared the mean and median delays, respectively, by sex of patients. Due to skewed distributions of some observation values (see Figure 1), the data were transformed by log to control for undue influence of occasional extreme observations. Multiple linear regressions were carried out to determine the predictors of delays in seeking treatment for TB. The independent variables were age, sex and place of residence (rural and urban) while the different types of delay included total delay, total diagnostic delay, doctor's delay, patient's delay, treatment delay, and health system delay. Further, an interaction analysis in terms of age by sex was carried out to examine whether sex difference in different delays varied by function of age. Statistical significance refers to $P < 0.05$, unless otherwise stated.

Results

The mean age of the study patients was 37.7 years, with a higher mean for men than for women (41.8 vs. 33.6 years, $P < 0.000$). Among women, more teenagers were diagnosed with TB. Among men, TB was more prevalent among the elderly (not shown).

Figure 1 shows the distribution of different delays (a–f) in various clinical processes for TB control. An extreme distribution of some observation values was evident, in particular in doctor's delay (c), treatment delay (e) and health system delay (f). Thus, to reduce the undue influence of the extreme observation values, data were transformed by applying log statistics for subsequent bivariate and multivariate analyses.

Table 1 shows the mean and median of different delays at various stages of the process of help seeking for TB by sex of patient. Women had significantly longer mean and median delays in most types of delay observed than men: total delay (63.2 and 61.0 days vs. 60.3 and 53 days, respectively), total diagnostic delay (61.2, 60.0 vs. 58.5, 52.0 days), patient's delay (51.9, 50.0 vs. 48.7, 42.0 days) and treatment delay (2.0, 1.0 vs. 1.9, 1.0 day). However, no significant differences were observed between women and men in doctor's and health system's delays.

The multiple linear regression analyses indicated a significant association between the sex of patients and total delay, total diagnostic delay and patient's delay, i.e. as a result of being women, these patients had longer delays in these variables. Since age did not show association with any delay category in linear regression analyses, we created an interaction variable by multiplying sex with age and then performed the multiple linear regression. The analysis found a significant association of age with patient's and treatment delays, respectively (Table 2).

Discussion

Consistent with many studies conducted in diverse settings, this study found long delays at various stages of the help seeking and clinical process for TB control, and the delay was significantly longer for women in total delay, total diagnostic delay, patient's delay and treatment delay (Hudelson 1996; Pirkis *et al*. 1996; Long *et al*. 1999; Dale *et al*. 2001). Studies in other settings have concluded that the adverse consequences of longer delay at any stage of case detection, diagnosis and treatment may be fatal for patients (Gibson *et al*. 1998), and it may also intensify infectivity within the family and community (Lawn *et al*. 1997). The meager delay in starting treatment, however, indicates a programme's prompt response to patients' needs. Given this encouraging situation, we re-emphasize the importance of early case detection and rapid diagnosis as fundamental for the prevention of any untoward consequence of TB, and to sustain the efficiency and effectiveness of the TB control programme.

However, the critical issue for an effective TB control programme is to identify the sources of delays. Several studies have documented that delays can occur from different sources: (i) patients and providers (Caminero *et al*. 1995; Franco *et al*. 1996; Long *et al*. 1999), and (ii) the health care system itself. This implies that TB suspects are unaware of the importance of appropriate treatment, including its sources and the curability of TB. In addition, various prejudices toward TB patients persist in the community, including fear and avoidance of these individuals. Such socio-cultural factors and beliefs are more disturbing for patients and have an obvious impact on their social lives, in particular on women's marital relations and help seeking behaviour. Moreover, most TB suspects, considering their symptoms normal, often seek help from inappropriate sources, delaying timely consultation with appropriate ones. To overcome these problems, the accelerated hunt for TB case finding, particularly by grassroots workers or *shebikas* during their routine home visits, needs to be maintained.

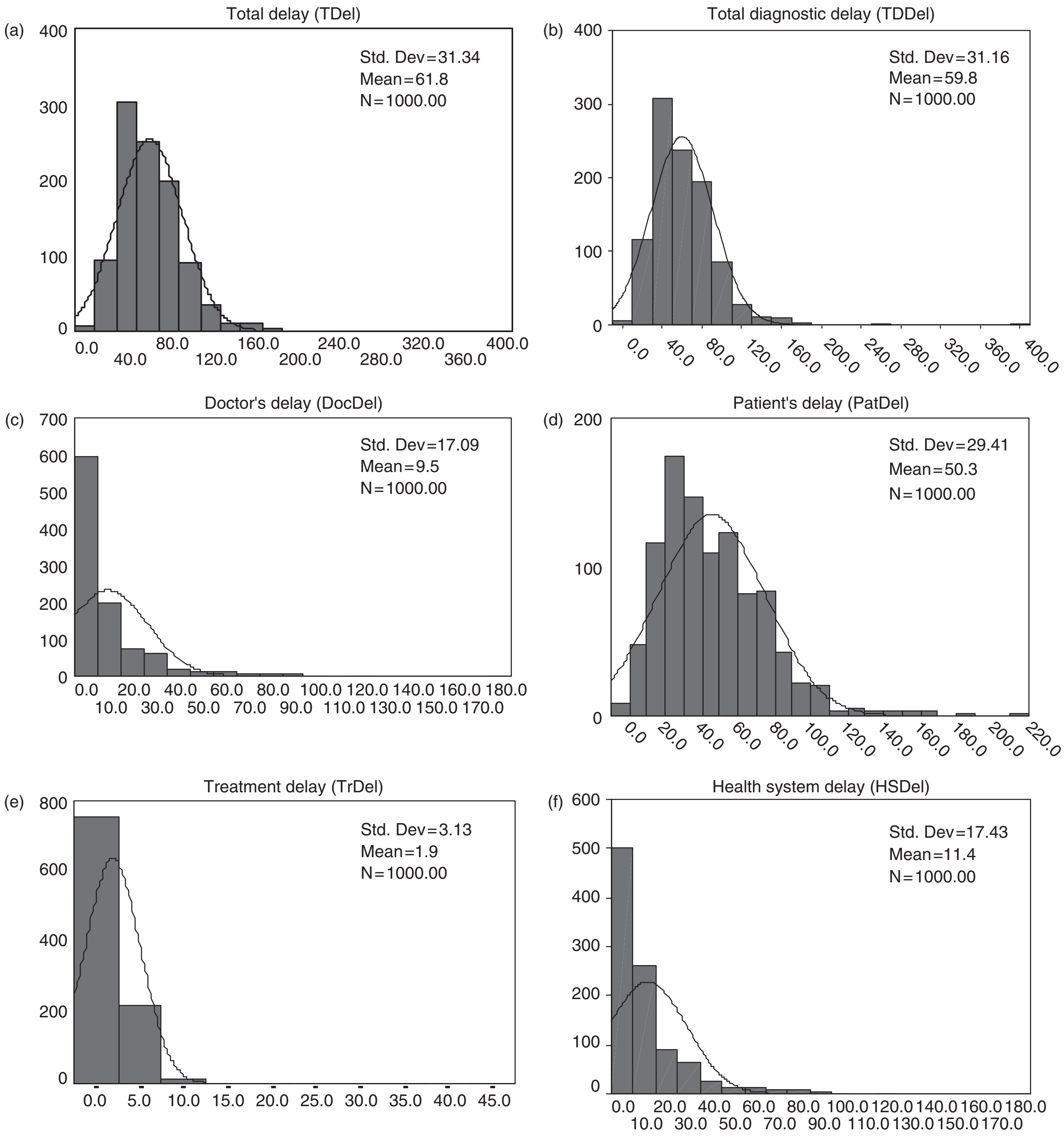

Figure 1 Histograms showing distribution of various delays in clinical process of TB treatment

Shebikas ought to gear up and sustain their social mobilization activities through repeated interactive contacts with the community, and thereby dispel people's mistaken beliefs and the myths associated with TB. The programme should also mobilize social support, especially for women patients.

Both the bivariate and multivariate analyses revealed significantly longer delays for women than for men in total delay, total diagnostic delay and patient's delay, raising grave concern about the DOTS strategy. However, the mean total diagnostic and patient's delays of about 49 and 39 days, respectively, were more than the 21 days threshold for sputum test. The differences between women and men are about 3 days only, which may not be fatal for the patients, but there is a risk of transmission of the disease where population density is extremely high—for example, in Bangladesh it is over 976 persons/km^2 (Bangladesh Bureau of Statistics 2004)—and the intervention is community-based (i.e. patients are treated at home). Further, the small mean delay between diagnosis and treatment, as evident in this study, may have a modest impact on disease transmission.

Table 1 Delays in help seeking among 1000 new smear-positive cases (500 women and 500 men) in different stages of clinical process, by sex (mean and median days)

Parameters	Different delays (days)											
	Total delay		Total diagnostic delay		Doctor's delay		Patient's delay		Treatment delay		Health system delay	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Female	63.2	61.0	61.2	60.0	9.3	2.0	51.9	50.0	2.0	1.0	11.3	4.0
CI (95%)	60.6, 65.8	57.8, 64.2	58.7, 63.8	56.8, 63.2	7.9, 10.8	0.02, 4.0	49.4, 54.4	46.9, 53.1	1.7, 2.2	0.7, 1.3	9.8, 12.7	2.0, 6.0
Min-Max	6–174		6–171		0–94		2–165		0–35		0–97	
Male	60.3	53.0	58.5	52.0	9.7	3.0	48.7	42.0	1.9	1.0	11.6	5.0
CI (95%)	57.4, 63.2	49.3, 56.7	55.6, 61.4	48.3, 55.7	8.2, 11.3	0.9, 5.1	46.1, 51.4	38.6, 45.4	1.5, 2.2	0.6, 1.4	10.0, 13.2	2.9, 7.1
Min-Max	3–406		3–402		0–180		1–222		0–43		0–184	
value	0.025	0.004	0.024	0.004	0.220	0.411	0.015	0.002	0.008	0.026	0.880	0.880

Notes: Wilcoxon test for mean and Kruskal-Wallis test for median. Confidence interval (CI) for median is computed using Kendall and Stuart's formula for the standard error of a normal distribution quintile.

Table 2 Multiple linear regression analysis to predict differences in help seeking for TB

Explanatory variables	Delays											
	Total delay		Total diagnostic delay		Doctor's delay		Patient's delay		Treatment delay		Health system delay	
	β	value	β	value	β	*P*-value	β	*P*-value	β	*P*-value	β	*P*-value
Constant	3.767	0.000	3.714	0.000	1.312	0.000	3.441	0.000	0.891	0.000	1.725	0.000
Age	0.002	0.064	0.002	0.054	0.000	0.935	0.002	0.073	−0.001	0.653	0.001	0.784
Sex	0.071	0.033	0.072	0.034	−0.088	0.332	0.097	0.023	0.082	0.054	0.030	0.699
Residence	0.073	0.385	0.081	0.342	0.211	0.355	0.080	0.435	−0.163	0.130	0.033	0.863
Model R-sq.	0.002		0.002		0.000		0.001		0.001		0.000	
Interaction age x sex	0.002	0.064	0.002	0.071	−0.002	0.400	0.002	0.031	0.002	0.029	0.001	0.585
Model R-sq.	0.003		0.003		0.001		0.005		0.005		0.000	

Our study found longer delays on the part of the patients than of the health system, and though modest in absolute number (only 3 days) this was significantly higher for women than for men. The shorter health system delay might have resulted from the professionals' high commitment and motivation to achieve BRAC's overall pro-poor development goals. The BRAC health programme tries hard to uphold the professionals' motivation through effective supervision, providing due credit, higher professional training, and arranging routine interactive meetings and refresher courses at various levels.

Although the multi-linear regression analyses did not show any significant association between age and delays, the analysis of the sex by age interaction revealed a strong association of women's age with patient's delay and treatment delay, i.e. being a woman of older age was significantly associated with longer delays, requiring special programmatic inputs at all levels. However, any delay among women may have a more adverse impact, as the health and welfare of children and other family members are directly connected with that of the mothers. The heavy workload of women, combined with their restricted mobility, lack of independence, powerlessness in decision making and inaccessibility to financial resources, may provide other potential explanations for women's vulnerability in timely help seeking. Moreover, women often ignore or hide the disease for fear of divorce or abandonment. Given this context, the TB control programme must consider the special needs and circumstances of women in order to maximize patients' access to services. It is imperative to develop and implement appropriate health education on TB symptoms, diagnosis, curability and social stigma for the entire population, as well as providers, in order to reduce diagnostic delay and fear. Training regarding symptoms and signs of TB, directed at private providers, may accelerate case finding and minimize diagnostic delays. Better integration of the private sector into the TB control programme may also help in this regard. Further, this sector should be allowed to access the central laboratory sputum microscopy and culture services of the TB control programme, and patient registration and referral for free treatment.

This study had a limited scope to assess the impact of socio-economic and cultural factors including illness-related stigma on different delays. Do these variables reduce or increase delays at various clinical steps for TB control? Further research is crucial to explore the relationships between these variables and delays.

Often studies of delay confront difficulties in estimating the date of onset of symptoms and to a lesser degree the date of first contact with health services. During data collection the field researchers carefully probed the dates, especially on the first onset of the problem and first help seeking outside the home before coming to BHCs, using local, family and individual level memorable events that occurred in the very recent past, such as religious/cultural festivals, marriage, death, flood, etc. Thus, the estimation errors were minimized. To avoid selection bias, we used the same inclusion criteria for selecting new women and men patients; those who were diagnosed within 4 weeks of the interviews. Patients were diagnosed using the same clinical methods (sputum smear and test for Acid Fast Bacilli) and gender comparison was done between the women and men patients only, not between patients and the general population from where they originated.

Conclusion

Delays in most stages of help seeking and diagnosis were unacceptably long for both women and men patients, but patient's delay was even longer than the health system's delay. Patient's sex was significantly associated with different delays, i.e. women had longer delays at most steps of the clinical process for TB control. Elderly women patients, in particular, encountered longer patient's and treatment delays. TB control programmes need to consider the special circumstances of women, including the elderly, to maximize their access to services, and strengthen the frontline service providers to effectively carry out semi-active case finding. Further research is crucial to explore the relationship between different delays and socio-economic and cultural factors, including illness-related stigma.

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