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REGULAR ARTICLE

Delay in the treatment of pulmonary tuberculosis: a report from Afghanistan

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Abstract
Objectives The aim of this study was to determine the length of delays and to investigate the factors associated with patient (care-seeking) and health-system (treatment initiation following care-seeking) delays, among smear-positive tuberculosis patients in Kunar province, Afghanistan, as delay in diagnosis and treatment results in more severe disease, higher mortality, and a longer period of infectivity in the community.
Methods A cross-sectional study of 122 new smear-positive pulmonary tuberculosis patients, aged $\geq$15 years, registered at a hospital and a clinic in Kunar province, was conducted from September 2008 to February 2009 using a structured questionnaire interview.
Results Among the 122 participants, the average patient, health-system, and total delays were 205.2, 150.7, and 356.0 days, respectively. Patient delay was independently associated with an increase in the household size, social stigma linked with tuberculosis (social consequences of having tuberculosis), chest pain, longer time to reach a private health-care facility, initial seeking of alternative services (self-treatment with herbs or drugs; obtaining of drugs from pharmacy or drug store; visiting traditional health provider; and visiting community health worker), and initial consultation with a private health-care facility ($p < 0.05$). The risk of health-system delays increased with multiple visits and with time to reach private health facilities ($p < 0.05$). The risk of health-system delays decreased as social stigma increased ($p < 0.05$).
Conclusions Delays in the initiation of tuberculosis treatment in Kunar province are daunting. Efforts to reduce delays must encourage early visits, reduce tuberculosis-associated stigma, encourage a public–private health-care mix, improve health-care providers' diagnostic capabilities, and encourage active case-finding with recording of symptoms and screening of contacts.

Keywords Delay · Treatment · Pulmonary tuberculosis · Afghanistan

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Introduction

Afghanistan is among the 22 countries with the world's highest tuberculosis burden; its estimated incidence of sputum smear-positive tuberculosis is 76 cases per 100,000 population [1]. Afghanistan has adopted the directly observed treatment short-course (DOTS) strategy since 1997. In 2002, DOTS-based tuberculosis control was integrated into Afghanistan's Basic Package of Health Services, primary health-care services implemented mainly by non-governmental organizations (NGOs). International partners have mobilized funds to create a National Tuberculosis Control Program (NTP) and to expand DOTS activities. Currently, all regional, provincial, and district hospitals, Comprehensive Health Centers (CHCs), and some Basic Health Centers (BHCs) can diagnose and treat tuberculosis patients. In Afghanistan, emphasis is laid on passive case-finding and on the diagnosis of infectious cases of tuberculosis mainly through direct microscopy of

sputum specimens obtained from persons who present themselves to the health services. There is no contact-examination policy in the country. Patients with infectious tuberculosis are entitled to receive both free tuberculosis diagnosis and treatment under NTP–DOTS and to receive free food packages [1, 2].

Despite inadequate health facilities, staff shortages at all levels, and continuing insecurity, the government estimated that DOTS coverage would be at 97.0% of the population in 2007. Treatment success rates approached 85.0%, the global target, but in 2007 the estimated case detection rate of smear-positive tuberculosis was 64%, lower than the global DOTS target level of 70.0% by 2005 [1]. Many patients with infectious tuberculosis remain undetected, and therefore untreated, infecting other people in a vicious cycle of failing control.

Early diagnosis and prompt treatment are key elements in tuberculosis control. Delay in diagnosis and treatment is associated with spread of infection in the community, increased patient expenditures, and higher risk of mortality [3–6]. Diagnosis and treatment are delayed when patients wait until long after symptom onset to seek care (patient delay), or when health-care providers take too long to diagnose and treat the disease in patients who have sought care (health-system delay). These delays and their risk factors have been quantified in high- and low-income and high- and low-tuberculosis-prevalence countries (summarized by Sreeramareddy et al. [7] and Strola et al. [8]).

In both low- and high-income countries, reported median or mean patient, health-system, and total delays for tuberculosis diagnosis and treatment range from 2.0 to 87.0, 4.9 to 162.0, and 25.0 to 185.0 days, respectively [7]. To the best of our knowledge, there are no data on these delays and their causes in war-torn Afghanistan. This study of an underprivileged province of eastern Afghanistan reports the longest delays ever reported in tuberculosis treatment initiation, a major impediment to tuberculosis control.

Subjects, materials, and methods

Setting and study population

This study was conducted in two health facilities in Kunar province from September 2008 to February 2009, among new sputum-smear-positive pulmonary tuberculosis patients, aged 15 years old or more (Fig. 1). We tried to recruit as many as possible, but due to financial and time limitations and the first author's experiences in the primary healthcare and surveillance system in Afghanistan, we estimated that a sample of 100–120 subjects could be achieved in a period of 5–6 months. Such a number of subjects would allow us to investigate factors associated with the delays in the province. Kunar's population is 417,800 (4.4% urban, 95.6% rural); most residents live in relatively small settlements in mountainous or semi-mountainous terrain with poor road accessibility or none, poor access to health-care services [9], and exposure to warfare [10]. In Kunar, as of November 2009, there was only one provincial hospital, 9 CHCs, 14 BHCs, 8 sub-health centers (SHCs), 231 health posts (which are run by two volunteer community health workers), and a substantial number of private health-care providers (HCPs), clinics, and pharmacies or drug stores (personal communication with Health Management Information officer). This study was conducted in Asadabad Provincial Hospital and Asmar CHC. The hospital is located in the capital (Asadabad city) in the central part of the province and is the most popular center for tuberculosis care in the province. Because of bad security and conflict conditions in remote areas of the province, this hospital was selected, as it is in a relatively secure location and was convenient for conducting the study. Both the hospital and Asmar CHC were famous for tuberculosis care and detected more cases than other health facilities in 2008.

Patient interviews

Two trained health workers (a laboratory technician and a nurse) interviewed the patients, using a structured and pre-tested questionnaire to collect the intended data. The questionnaire was translated from English into Pashto, one of the formal and major languages of Afghanistan. The interview was done during sputum examinations or immediately after diagnosis. We also interviewed smear-positive tuberculosis patients diagnosed at study health facilities within 1 month of the study's initiation or when

Fig. 1 Location of study area in Afghanistan

they attended for follow-up treatments. The questionnaire was combined from WHO questionnaire components [11]; 15 of its 18 stigma indicators came from Weiss et al. [12], to which three items were added from a literature review, and questions were added about Afghan-specific conditions. The questions assessed sociodemographics; tuberculosis risk factors; tuberculosis symptoms; dates of onset of cough, sputum production, fever, chest pain, hemoptysis, or weight loss; dates of first visit to health-care provider, of diagnosis, and of treatment initiation; health-seeking behaviors (first health-seeking action following onset of symptoms, type of initial health facility visited, and type of HCP initially consulted); health-care system (availability, perceived quality, and affordability of health-care); tuberculosis knowledge and awareness; stigma; and concerns about tuberculosis treatment duration and anti-tuberculosis drugs' adverse effects, tuberculosis transmission, and complications. Questions measuring stigma and concerns were recorded on a 4-point Likert scale (where 0 is the lowest and 3 is the highest degree of stigma and concerns); questions measuring tuberculosis knowledge (e.g., inheritability, contagiousness, curability, vaccines, treatment duration, and drugs) were recorded on a 3-point Likert scale (0 the lowest, 2 the highest level of knowledge). Diagnosis and treatment initiation dates were abstracted from health-care facility records. Patient identity cards and tuberculosis and laboratory registers were cross-checked by the interviewer to assure the quality of the data. Dates of first visit to an HCP came from patient records (or patient recall if records were unavailable). Symptom onset dates depended on patient recall.

Definitions

Patient delay is the period from symptom onset until first visit to any HCP who gave treatment after consultation. Health-system delay is the period from first visit to an HCP until initiation of appropriate treatment. Total delay is defined here as time from symptom onset until start of appropriate treatment [11]. Explanatory variables were grouped into social, medical, and health-system factors. A "household" is defined as persons sharing income who usually live and eat together. An "urban area" has municipal services [9], including trash collection; cleaning of drainage ditches; paving of roads and streets in the cities; provision of clean water to the citizens; revenue generating and collection systems; and other public services, but these services do not exist in "rural areas". "Self-stigma (individual consequences of having tuberculosis)" refers to consequences of individuals' own attitudes toward their condition, expected reactions from others, and learning therefrom. "Social-stigma (social consequences of having tuberculosis)" refers to consequences of discrimination by society and other people's antagonistic practices or attitudes. "First health-seeking behavior before tuberculosis diagnosis" refers to the first action taken after the patient notices the symptoms of the current illness, which has two categories. The first category was initial consultation with an HCP, meaning any health worker a patient consulted about the illness and who gave or prescribed medicine for treatment. This person could be a doctor or a low-level health worker, i.e., someone who is not a doctor and whose training period ranged from 3 months to 6 years. The second category was alternative health service, which includes self-medication, using traditional (herbs) or modern (western) drugs available at home, over-the-counter drugs (from a pharmacy/drug store), traditional healers (known as Yonani doctor or Hakeem), and spiritualists (holy shrine, spiritual people). "Type of first health-care provider" refers to level of the cadre whom the patient initially sought for health-care, i.e., medical doctor or a low-level HCP.

Statistical analysis

Data were carefully entered and analyzed using STATA version 10 (STATA, Houston, TX, USA). Discrete variables were analyzed using the χ^2 test, and continuous variables were analyzed using the *t*-test or Spearman correlation. Scores for responses assessing tuberculosis knowledge and stigma were first reverse-coded to reflect increases in study variables and then the mean score of rows was calculated. For the 15 stigma items, internal consistency and reliability was checked through alpha analysis before mean score calculation. Three items that gave decreasing alphas and were not internally consistent were dropped from the scale. Principal components analysis was done on a sample of 1,398 participants (patients with tuberculosis and cough lasting for more than 2 weeks) for the remaining 12 items with and without orthogonal and oblique rotations. Self-stigma and social-stigma were identified in the analyses, self-stigma as three items (Hiding tuberculosis diagnosis from others; Thinking less of oneself; Feeling ashamed or embarrassed), and social-stigma as nine (Others think less of him; Others avoid him; Others refuse to visit him; Others think less of patient's family; Makes marriage difficult; Spouse avoids sex; Difficult for family member to marry; Stay away from work or group; Protect family/friends from shyness). Cronbach alpha for these factors was 0.90 and 0.93, respectively.

Multiple linear regression analyses—with backward stepwise selection of explanatory variables—identified sets of factors that best explained patient and health-system delays. All variables, except for ethnicity and residence, were entered into the initial models. Some ethnicities (non-Pashtun) and residential groups (urban) were too small for

valid comparison by the analysis. Due to skewed distribution, delays in days were transformed as their squared roots and used as dependent variables. A p value of <0.05 was considered statistically significant.

Ethical considerations

Ethics approval to conduct this study was granted by the Institutional Review Board Committee of the Ministry of Public Health of Afghanistan. Written informed consent was obtained from each patient.

Results

Characteristics of study participants

A total of 122 new smear-positive pulmonary tuberculosis patients were identified during the study period in the survey. Of the 122 subjects, 56 (45.9%) of the patients were men and 66 (54.1%) were women; their mean age in years was 42.2 [standard deviation (SD) 17.7]; 86 (71.1%) of the participants were unemployed or housewives; and only 2 (1.6%) out of the 122 patients were from an urban area. All patients had multiple symptoms; 116 patients (95.1%) initially consulted alternative services, which included self-medication with herbs (95 cases, 77.9%) or with modern medicine (18, 14.8%), traditional medicine (1, 0.8%), or non-prescription medications from pharmacies (2, 1.6%). Remarkably, only 6 (4.9%) of the patients in Kunar province initially visited HCPs. Further details on the distribution of variables are available in Tables 1, 2, and 3.

Delays in the initiation of tuberculosis treatment

The mean total delay was 356.0 days (SD 174.4). The median (25th percentile, 75th percentile) was 366.5 days (274.0, 444.0 days). The mean patient delay was 205.2 days (SD 127.5). The median (25th percentile, 75th percentile) was 199.0 days (104.0, 303.0 days). The mean health-system delay was 150.7 days (SD 111.0). The median (25th percentile, 75th percentile) was 128.5 days (78.0, 183.0 days).

Factors associated with patient and health-system delays

Bivariate associations of several factors (social, medical, and health-system) with delays (patient and health-system) were observed (Tables 1, 2, 3). However, no associations with any of the delays were observed for other variables, including age, sex, ethnicity, residence, occupation, education, knowledge of tuberculosis, correct reporting of tuberculosis suspicion period, self-stigma, need for others' permission to spend household money on medical care, exposure to tuberculosis, weight loss, or borrowing money for either transportation or treatment or both. Multiple linear regression analysis identified the combinations of variables that best explained patient and health-system delays. Factors independently associated with patient delays were an increase in the household size, social stigma linked with tuberculosis, chest pain, longer time to reach a private health-care facility, initial seeking of alternative services, and initial consultation at a private health-care facility ($p < 0.05$). Factors independently associated with health-system delays were multiple visits and time to reach private health-care facilities ($p < 0.05$). However, social stigma was negatively associated with health-system delays ($p < 0.05$) (Table 4).

Discussion

Delays in the initiation of tuberculosis treatment

This is the first study that explores delays in the initiation of tuberculosis treatment and identifies factors associated with patient and health-system delays in an underprivileged province of Afghanistan where DOTS has been expanded and integrated into primary health-care services. Afghanistan's NTP, whose purpose is the early diagnosis and treatment of tuberculosis, recommends that a person with a cough lasting for more than 2 weeks with expectoration should have a sputum test (National Tuberculosis Control Program guideline). In the present study, we found that the mean total delay (356.0 days, SD 174.4), patient delay (205.2 days, SD 127.5), and health-system delay (150.7 days, SD 111.0) were far longer than the respective averages (67.8, 31.7, and 28.4 days) observed in other developing countries [7]. The total delay reported here is nearly twice as long as the longest recorded delays in Tanzania (185.0 days) [13] and Cambodia (232.0 days) [14]; both patient and total delays are the longest ever recorded globally. However, the health-system delay is slightly shorter than the longest reported, from rural districts of Cambodia (191.0 days), where DOTS was provided only by hospitals [14]. Our findings indicate that despite the expansion of tuberculosis control services as an integral part of the package of health services delivered through the primary health care system at district and provincial levels, which covered 97.0% of the country population, existing tuberculosis control services cannot substantially reduce the transmission of tuberculosis in the communities [1]. Other context-specific interventions targeting the health system, society, and individuals should be combined with the current passive-case-finding approach to

Table 1 Social factors associated with delays in tuberculosis treatment

Variable	*N* (%)	Patient delay Days, mean (SD)	Health-system delay Days, mean (SD)
Gender			
Male	56 (45.9)	209.4 (129.3)	161.9 (135.7)
Female	66 (54.1)	201.6 (126.7)	141.2 (84.7)
Literate			
No	111 (91.0)	203.7 (128.8)	155.3 (114.1)*
Yes	11 (9.0)	219.9 (117.7)	104.4 (58.6)*
Household main earner			
Patient him/herself	14 (11.5)	139.9 (158.1)*	193.1 (182.8)
Other household member	108 (88.5)	213.6 (121.3)*	145.3 (98.1)
Level of social stigma			
Low	18 (15.0)	121.3 (98.5)**	205.3 (131.1)*
High >2.3	102 (85.0)	223.2 (125.4)**	143.6 (104.7)*
Site of exposure to tuberculosis patients			
Elsewhere or unknown	93 (78.2)	204.1 (128.2)	160.4 (120.1)*
Tuberculosis patient at home	26 (21.8)	218.4 (127.8)	117.1 (63.9)*
	Mean (SD)	Correlation coefficients	
Household size			
Number of persons	15.5 (4.6)	0.31***	0.1
Age			
Number of years	42.2 (17.7)	0.06	0.1

Literate: people who had attended formal school(s) and were able to read and write

Social-stigma: rows mean score of 9-item scale (high: score higher than median (2.3); low: score lower than the median). High score for social stigma indicates patients' perceptions regarding bad consequences of the diagnosis and stigma associated with tuberculosis in their society

Only the variables significantly associated with either delay, except for age and sex, are shown in the Table. Significance of difference by two-sample *t*-tests, or significance of Spearman's correlation coefficients; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

SD standard deviation

reduce tuberculosis transmission. One of the options would be contact examinations for symptoms suggestive of tuberculosis. This might be feasible, despite the many other obstacles, due to the presence of a large number of community health posts where two volunteer health workers provide basic primary health-care services to local residents.

Factors associated with patient delays

Our study showed that patient delay was associated with several factors. The high level of social stigma was an independent explanatory factor for increased risk of patient delay. The stigma attached to tuberculosis often deters patients from seeking early treatment [15, 16]. The association was consistent with patients' explanations of perceived causes of delay in visiting their first HCP: 87.7% reported having fears about the diagnosis and 48.4% reported fear of ostracism. It is of importance to develop health information and educational materials and present them carefully so that they address key aspects of all social interactions, to minimize both the spread of the disease and its social and emotional costs.

Household size, on average 15.5 persons, was also independently associated with patient delay. The characteristic of larger household sizes in a patriarchal, conservative society with limited socioeconomic resources, where many people tend to seek medical care from expensive private HCPs (if any are available), may have resulted in longer patient delays in Kunar province. This accords with other studies finding associations of large family sizes with patient delays [17].

The main symptoms that prompted patients to seek health-care were cough (100%), sputum production (98.3%), fever (89.1%), chest pain (84.0%), weight loss (70.6%), and hemoptysis (46.6%). These findings are consistent with a report from the Eastern Mediterranean region [11]. Chest pain was independently associated with

Table 2 Medical factors associated with delays in tuberculosis treatment

Variable	*N* (%)	Patient delay Days, mean (SD)	Health-system delay Days, mean (SD)
Sputum production			
No	3 (2.5)	83 (138.6)	264.3 (285.3)
Yes	119 (97.5)	208.3 (126.3)	147.9 (104.5)
Fever			
No	14 (11.5)	71.9 (62.9)***	178.2 (149.7)
Yes	108 (88.5)	222.5 (123.6)***	147.2 (105.4)
Hemoptysis			
No	66 (54.6)	184.9 (139.3)*	154.4 (133.6)
Yes	55 (45.4)	230.8 (108.6)*	144.2 (76.3)
Chest pain			
No	21 (17.2)	86.0 (107.5)***	177.6 (172.0)
Yes	101 (82.8)	230.0 (117.2)***	145.2 (93.9)
Weight loss			
No	37 (30.3)	173.0 (155.5)	162.4 (140.4)
Yes	85 (69.7)	219.2 (111.3)	145.6 (96.0)
Coexistence of chronic conditions[a]			
No	113 (92.6)	198.3 (128.1)*	150.1 (114.4)
Yes	9 (7.4)	291.1 (84.7)*	158.2 (55.8)

Significance of difference by two-sample *t*-tests; *$p < 0.05$; ***$p < 0.001$

[a] Chronic conditions include acquired immunodeficiency syndrome (AIDS), diabetes, chronic obstructive pulmonary disease (COPD), disability, and others

prolonged patient delay, thus underscoring how delay in seeking treatment can result in more serious illness [18].

The use of alternative health services was associated with prolonged patient delay. This finding is similar to that in studies conducted in Ethiopia and Ghana that observed an association between self-treatment and patient delay [19, 20]. In our study, patients' reliance on the use of alternative services, especially self-medication (92.6%), mainly with herbs, and taking non-prescription medications from pharmacies (1.6%) resulted in significant delay in seeking medical advice. The use of alternative services may be related to poor knowledge of tuberculosis in the population and lack of money to visit an HCP. Health-education programs on health-seeking choices may help to reduce the prolonged patient delays.

As observed elsewhere, longer times to reach a private health facility (PrHF) were independently associated with patient delays [11, 13, 19, 21]. In the present study, the mean times taken to reach private and public health facilities (in minutes) were 55.7 and 104.5 min, respectively. This indicates that some people in this underprivileged province have poor access to quality health services. It is necessary to ensure access to appropriate diagnostic services or to start active case-finding campaigns that incorporate the recording of symptoms and screening of contacts in the case-finding protocol.

The use of a PrHF was independently associated with patient delay ($p < 0.05$). The findings of this study parallel those from other studies in which associations were found between longer patient delays and recourse to private or unqualified HCPs [11, 22, 23]. In Kunar, during the study period, even though the private health sector was frequently used, the tuberculosis control program was not extended to that sector. Of the 107 patients whose first visit was to a PrHF, only 35 (32.7%) visited a general practitioner and 1 (1.0%) visited a chest specialist, but 70 (65.4%) visited a low-level HCP (meaning health workers with a training period ranging from 3 months to 6 years of medical training).

There are several reasons for the selection of private health-care facilities. Of the 107 patients who visited private health-care facilities initially following the onset of symptoms, 79 (73.8%) reported that private HCPs are available anytime and 104 (97.2%) reported access to the providers as reasons for visiting them. However, the vast majority of the patients reported the quality of health services (accurate check ups, having complete diagnostic equipment, and thoroughness) of the providers to be poor. Moreover, they also explored reasons for not visiting public health-care facilities. Their reasons were: being far from their residence (84.1%), long waiting times (93.5%), prescribed fewer drugs (82.2%), not getting cured (bad experiences) (52.3%). Also due to people's knowing less about illnesses, the health services provided by HCPs, and the adverse effects of drugs, some people prefer to consult closer private HCPs. Moreover, the first author found that some private health-care providers make loans to their patients (consumers). The patients pay the cost of care and drugs when they later earn enough money, or they pay the cost of care at a higher earning time of the year such as during harvesting seasons.

Even though the private HCPs, particularly private low-level HCPs,are more accessible geographically and more flexible with regard to working hours, they are unregulated, lack diagnostic facilities, and lack sufficient knowledge about tuberculosis [24]. On the other hand, health-care services provided by public health-care providers are also poor, but these providers can perform sputum microscopy for tuberculosis diagnosis.

In general, based on our findings, access to the majority of available health services, private or public ones, does not mean effective access to quality health services. Improving the quality of their health services (private and public) and the involvement of private HCPs in either referral and/or treatment will be crucial in addressing the prolonged patient delay in Kunar province.

Table 3 Health-system factors associated with delays in tuberculosis treatment

Variable	*N* (%)	Patient delay (days) Mean (SD)	Health-system delay (days) Mean (SD)
First health-seeking behavior before diagnosis			
HCPs	6 (4.9)	9.7 (6.8)***	NA
Alternative health services	116 (95.1)	215.3 (122.4)***	NA
First consulted health facility			
Public health facility	14 (11.6)	91.7 (82.9)***	121.2 (175.4)
Private health facility	107 (88.4)	221.6 (124.4)***	155.6 (100.3)
Type of first HCP			
Doctor	51 (42.2)	165.7 (127.9)**	122.6 (120.4)*
Low-level HCP	70 (57.8)	236.4 (118.5)**	168.2 (97.8)*
Time (min) to reach nearest private health facility			
≤30	62 (53.9)	186.7 (112.4)*	135.6 (91.5)
≥30	53 (46.1)	245.1 (134.2)*	172.2 (112.9)
Time (min) to reach nearest public health facility			
≤60	43 (35.3)	189.5 (115.0)	113.1 (60.0)**
≥60	79 (64.7)	213.7 (133.7)	171.2 (126.4)**
Borrowed money for either transportation or treatment or both			
No	8 (6.6)	163.6 (160.7)	207.6 (178.0)
Yes	114 (93.4)	208.1 (125.2)	146.8 (104.8)

Number of visits to HCP before tuberculosis diagnosis	Mean (SD)	Correlation coefficients	
Number of visits	5.3 (2.3)[a]	NA	0.38***

Significance of difference by two-sample *t*-tests, or significance of Spearman's correlation coefficients; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

HCP health-care provider, *NA* not applicable

[a] Data on number of visits were missing for 4 subjects

Table 4 Factors associated with delays in tuberculosis treatment (multiple linear regression analyses)

	Patient delay		Health-system delay	
Variable	Coefficient	SD	Coefficient	SD
Number of household members	0.22*	0.09		
Social stigma (>2.3)[a]	3.19**	1.06	−2.06*	0.93
Chest pain	4.48***	1.11		
Initially sought alternative[b] services	5.93**	1.95		
Visited private health facility first time	7.16***	1.72		
Longer time to reach private health facility[c]	2.30**	0.72	1.65*	0.63
Number of visits to HCPs before tuberculosis diagnosis			0.97***	0.15
N (model *p* value, adjusted R^2)	90 (<0.001, 0.54)		88 (<0.001, 0.38)	

All variables except for ethnicity and residence were included in the models. Household size, age, and tuberculosis knowledge were treated as continuous variables. Square root transformation was performed for patient- and health-system- delays

HCP health-care provider, *N* number of study subjects

* $p < 0.05$; **$p < 0.01$; ***$p < 0.001$

[a] Social-stigma: rows mean score of 9-item scale (high: score higher than median (2.3); low: score lower than the median)

[b] Alternative services include: self-treatment with herbs or drugs; obtaining of drugs from pharmacy or drug store; visiting traditional health provider; and visiting community health worker

[c] Longer than 30 min time to reach the nearest private health facility

Factors associated with health-system delays

Social stigma was independently associated with shorter health-system delays rather than with longer delays. This reciprocal association implies that patients in Kunar let more time pass before seeking medical care from any HCP and present to the HCPs with more severe forms (multiple symptoms) of the disease. In severe cases of the disease, patients might visit health-care facilities sooner or might pay less attention to the tuberculosis-related social stigma and take immediate action to restore their health. It is also possible that, after contacts with HCPs, in particular public providers, patient perceptions and attitudes toward illness might change substantially.

Another factor affecting health-system delays was multiple visits to HCPs. Multiple visits influence health-system delays in several ways: receiving inappropriate antibiotic treatment, for example, can worsen or otherwise modify the clinical picture; patients might believe that they will be cured; and in the long term, patients or their family members may choose alternative services [25]. Others have also found that repeated visits cause delays if they do not lead to the correct diagnosis [20, 26]. There is no clear line of demarcation between private and public HCPs, and either private HCPs or public HCPs may be consulted subsequently; improving the quality of both private and public health services could help reduce the delays [25].

As observed for patient delay, longer times to reach a PrHF caused prolonged health-system delays, which indicate that limited access to health services influences not only early stages of health-seeking (patient delays) but also the appropriateness of the health-seeking process following the initial visit. This finding further highlights the importance of the public–private health-care mix in Kunar and other underprivileged settings.

In addition to the factors associated with patient and health-system delays, the selection of site, i.e., a hospital and CHC, was also associated with both patient and health-system delays. Both patient and health-system delays were significantly shorter in patients who were diagnosed at the Asmar CHCs than in those diagnosed at the hospital. The longer delays observed in patients diagnosed at the hospital are explainable, because the hospital is the sole referral center for the majority of the residents of the province who live in remote areas. Hence, 84.0% of the patients diagnosed at this hospital were residents of other districts, where health-care providers might have poor capacity to diagnose tuberculosis. Moreover, seeking medical care from the hospital as the last resort may have been avoided because of the prevailing poverty among the residents, need to travel long distances to reach the hospital, high transportation costs, bad roads, mountainous geography, and excessive conflict conditions. However, the CHC is relatively closer to the residents of Asmar district compared with the distance that the overall residents of the province must travel to the hospital. These findings suggest that increasing the capacity of relatively closer health facilities, establishing tuberculosis diagnostic health centers, or involving private HCPs who are closer to patients' places of residence could help reduce the delays.

Limitations of the study

There are several limitations of this study. The first is that participating health facilities comprised a convenience sample; similar patients who visited other health facilities or stayed at their homes during the study were not included, thus making it difficult to generalize our findings to all smear-positive tuberculosis patients in the province. However, the study population was, nonetheless, representative of smear-positive tuberculosis cases managed within the tuberculosis control program, for several reasons: the popularity of the health centers for tuberculosis care due to the long history of the vertical tuberculosis control program, which detected 62.0% (253/408) of all reported new smear-positive tuberculosis cases during the 1387 Afghan Solar year (April 2008 to March 2009); the coverage of a substantial number of patients from rural districts, where most Afghans live; and the almost complete lack of diagnostic facilities at private HCPs.

A second potential limitation arises from patients' inability to recall the exact date of onset of symptoms and/or the dates of visits to HCPs; measures were taken, however, to minimize the recall bias (e.g., review of medical records and transaction forms, using dates of local calendars, national holidays, religious days, and dates of war events). The third limitation of this study is the potential misclassification of health-system delay as patient delay; for example, some patients who lacked or lost the medical records of first visits during interview might have reported the time of the second or third visits to the health-care provider instead of the first visit, thus causing an overestimation of patient delays.

Conclusion

The delay in commencement of tuberculosis treatment in the population in the present study was extremely long and the delays reported here are the highest ever recorded globally. The use of alternative services, distance from health-care facilities, social stigma, initial visits to private health-care facilities unequipped for tuberculosis diagnosis, and large household size appear to be the main causes of patient delays. The main causes of health-system delays appear to be multiple visits to and distance from health-

care facilities. Interventions that encourage early visits, improve the quality of health services, incorporate private HCPs in tuberculosis control, and additionally incorporate active case-finding approaches will minimize the delays.

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Conflicts of interest We declare that we have no conflict of interest.

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