



## RESEARCH ARTICLE

# Health Care System Delay of Tuberculosis Treatment and Its Correlates among Pulmonary Tuberculosis Patients in Hadiya Zone Public Health Facilities, Southern Ethiopia

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## Abstract

**Background:** Delay in TB treatment is significant to both disease prognoses at the individual level and within the community. Even though studies conducted in TB treatment delay there is result inconsistencies due to differences in culture, environment and infrastructure.

**Objective:** The aim of the study was to assess health care system tuberculosis treatment Delay and associated factor among pulmonary tuberculosis patients.

**Method:** Facility based cross sectional study triangulated by Qualitative data collection method. A total 340 PTB patients in Hadiya zone public health facilities included in the study. Health facilities were selected by Simple random sampling method from three woredas. DOTS user at the beginning of data collection was consecutively recruited in to the study until the intended sample size was fulfilled. Multivariable binary Logistic regression was used. A P-value < 0.05 at 95% CI was considered statistical significance between dependent and predictor variables.

**Result:** 340 PTB patients participated in this the study. 30% of the PTB patients faced health system delay. Visiting two or more health care providers (AOR: 3.40, 95% CI (1.910, 6.07), every trying other drug than TB drug (AOR: 4.0, 95% CI (2.144, 7.465) and prolonged referral (AOR: 3.004, 95% CI (1.59, 5.67) were independent predictors of delay.

**Conclusion:** Prolonged referral, several visit of health care providers of two or more and ever used other drugs rather than Anti-TB drugs were found to have association with patient delay and health system delay.

## Keywords

Health care system, Diagnosis and treatment delay, PTB

## Acronyms and Abbreviation

CI: Confidence Interval; DOTS: Directly Observed Treatment Short-course; EPTB: Extra Pulmonary TB; HIV/AIDS: Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome; HF: Health facility; NGOs: Non-Governmental Organizations; PTB: Pulmonary Tuberculosis; TB: Tuberculosis, UN: United Nations; WHO: World Health Organization

## Introduction

Tuberculosis (TB) is an infectious bacterial disease caused by Mycobacterium TB which commonly affects the lungs but can affect other parts of the body. Though it affects peoples of all ages and sexes and poverty, malnutrition, overcrowding and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) have been known for decades to make some groups more vulnerable to develop the disease [1,2].

Health system delay in our context was the time ranging from patient's first contact to any modern health facility to date of initiations of Anti TB treatment. This comprises time spent during referrals between facilities, diagnosis and time between diagnosis and start of treatment and time spent on treatment of patients with drugs other than that for TB [3].

With over 2 million of the total global TB cases and between 250 to 400 thousand TB deaths, Africa is burdened with about 25% of total Global TB cases. The region is home to nine of the 22 high TB burdened countries. The incidence of TB in Africa remain the highest worldwide, the 2012 rate of new infections TB/HIV burden, a major risk factor the progression of the disease, thus a huge challenge to fighting the disease Was 275 per 100,000 populations with total prevalence at 373 per 100,000 populations. These figures far outnumber the global figures that indicate total incidence and prevalence at 127 and 190 per 100,000 populations [1,4].

## Methods and Materials

### Study area and period

The study was conducted in Hadiya zone public health facilities, which has 10 rural Woreda and two administrative towns. Currently, health care provision within the zone is carried out through 61 health centers, 309 health posts, and 3 public hospitals. There were 131 different privately-owned clinics provide health services to the community. The study was conducted from March 1, 2017 to April 1, 2017.

A Facility based cross sectional study triangulated by Qualitative data collection method was employed.

### Population

All pulmonary tuberculosis patients who were on DOTS treatment and attending government health facilities in the study period were source population.

All sampled PTB patients registered in selected health facilities that were on DOTS, during their intensive phase of treatment was considered as the study population.

Patients with proven PTB cases who were on DOTS program and PTB patients aged 18 years and above were included in the study.

Patients who were severely ill and cannot communicate during data collection excluded from this study.

### Sample size determination

The required sample size was calculated using single population proportions. Three variables (patient delay, Health system delay and treatment delay) was compared, to take representative sample. Therefore,

$$n = (z \alpha/2)^2 * p(1-p)/d^2$$

Where, n = is sample size,

z = 95% confidence level

d = is desired level of precision

$\alpha$  = critical value at 95% confidence interval of certainty (1.96).

Study conducted in Oromia region, Arsi 49.7% of patients experiences health system delay [3] n = 383. Final sample size by adding non response rate of 10% final sample calculated was 418. Then using the formula for single population calculation:

Since the expected total number of all form TB cases in the study area is less than 10,000 and n/N is > 0.05, we use correction formula. Then the final sample size was:

$$n_f = 383 / (1 + (383/1200))$$

$$n_{final} = 294 + 10\% \text{ (non-response rate)}$$

$$n_{final} = 347$$

### Sampling techniques

Three rural woredas were selected by simple random sampling from the ten districts and one town administration was included randomly from two urban. Simple random sampling technique was used to identify study health facilities to be enrolled for the study. All study facilities were selected proportionally based on the size of the tuberculosis cases per each facility. The sample size was proportionally allocated to each of study health facilities (Hosanna HC = 40, Bobicho HC = 30, General hospital = 80, Homacho district hospital = 60, omochora HC = 40, Shone primary hospital = 55, Korega HC = 35) based on number of tuberculosis case in each health facility. Finally, consecutive sampling was used until the intended 347 sample size fulfilled and interviewed in nearby facilities by using health professionals.

### Sampling techniques of qualitative study

Purposive sampling was used conveniently to select participants for the in-depth interview to reflect TB treatment delay. Health workers working on the area (TB clinic, laboratory room, TB patients and managers were taken for in-depth interview in Hadiya zone health facilities. A total of 16 participants, 4 health care managers (two of them were nurses and two of them were public health officers with bachelor degree holders), 6 TB patients and 6 health professionals (Two diploma in nursing, two diploma in laboratory technology, one degree in nursing and one degree in public health officer) were selected.

### Data collection tool and procedure

The questioner was initially prepared in English and two independent individuals translated into Amharic and Hadiya local language, then the final Version of the Amharic questionnaire was again translated into English by another person to check the consistency. A pre-tested structured questionnaire was administered to collect the intended data. With the permission of health workers at the DOTS clinic, patients coming to the centers for their treatment under DOTS was requested for consent and then interviewed for the required information.

Information like date treatment started was recorded from the TB registers, lab register and TB treatment cards were checked to assure quality of data.

Six Health professionals working in the study area with the qualification of diploma in nursing and three years and above experienced interviewed the subjects after five minutes following the TB treatment and two supervisors of public health officers in qualification.

**For qualitative:** Interviews with TB patients, health office and district hospitals heads and health professionals were carried out independently by using in-depth interview guides which was prepared separately for patients and health professionals. The key personnel such as, the TB focal and LAB professionals were involved in the in-depth interview. One of the investigator who was studying master of public health in health education and promotion with public health officer background conducted the in-depth interview using interview guide. The interview with managers and health professionals, different patients carried out until no newly emerging ideas emerged/saturation of idea. The interview was manually written by both the principal investigator and one other note taker. The Interview guide was similarly translated into the local language, Hadiyigna and Amharic like that of the standard and structured questionnaire.

### Data quality control

The questionnaire used pre-tested on out of study area (Fonko health center). The questionnaires were pre tested at 5% of sample before starting the actual data collection outside study area for its clarity, understandability, completeness, reliability, consistency and the necessary modification were made on the tool accordingly. Data collectors and supervisors were trained for two days on the overall procedure of data collection Data was double entered into a computer, and the two copies of the data verified using Epi data v-3. Finally, the principal investigator and supervisor checked for its completeness.

### Data processing and analysis

Data was entered into computer using Epi-data software version 3.1 and exported to SPSS software version 21 for analysis. Descriptive statistics was computed, such as frequency distributions, median, proportion and interquartile ranges (IQRs). Bivariate analysis was performed between independent and outcome variable to select candidate variables at  $p < 0.25$ . Multivariable binary logistic regression analysis was used to explore the predictors of the outcome variable to identify factors independently associated with outcome variable; a multivariable binary logistic regression analysis with delay time was dichotomized. Multivariable Logistic Regression Model for adjustment was used & model fitness was checked by Hosmer & Lemeshow at  $p$ -value  $> 0.05$ .

### Qualitative study analysis

The interviews lasted about 1 hour, each. All interviews were tape recorded, translated verbally into English and transcribed by principal investigator. The in-depth interviews were transcribed into English together with the moderators to allow for more thorough interpretations of the findings. All transcripts were cross-checked by the moderator. Interviews were regularly transcribed the same day. The interview process was finished when the team considered that data saturation had been achieved (no new emerging ideas). Finally, information was linked to its congruence with data obtained from quantitative findings.

### Operational definitions

**Healthcare system delay** defined as the time interval between Laboratories diagnose of TB to initiation of anti TB drugs. Respondents presented more than five days considered as prolonged health facility delay. In this study Health system delay includes diagnostic and TB treatment delay only [3,5].

**Alternative care providers:** These include traditional health providers, local injectors and drug retail outlets. Antibiotics drug use other than anti TB is chemotherapy which given during TB case detection before anti TB drugs.

**Multiple Healthcare contacts** defined as making more than one visit to any Public Health facility before diagnosis.

**Prolonged referral** defined as when TB patients didn't get required services within optimal time according to BPR standards. This might be either between provider or provider and health facilities. This is greater 30-60 minute during health care services.

**Accessibility distance:** It is the distance from the original residence/home of the study subjects to the current DOTS center. It was measured by asking study subjects about how many times in minute or the Distance in KM taken from home to the treatment center for the first time when they started the TB treatment. Those HF within 10 KM are accessible otherwise distant to patients (WHO).

## Chapter Five Result

### Socio-demographic characteristics of participant

Three hundred and Forty PTB patients with a response rate of 97.7% were participated from seven diagnostics and treatment centers. Seven were excluded (Five were diagnosed in other health facilities outside study facility and two severely ill) during study period. The median age was 34 years (Range = 23-42). Based on their residence 26% of the participants reside in urban, 17% semi urban and 57% rural areas and of which 87% settled within 10 km from public health facilities with a median of 3 km. With regard to education 58% were un-

**Table 1:** Socio-demographic characteristics of the respondents among pulmonary tuberculosis at Hadiya zone health facilities, SNNPR, 2017 (n = 340).

Variables	Frequency	Percent
<b>Sex of the respondents</b>		
Male	173	50.9
Female	167	49.1
<b>Age of the respondents</b>		
18-24 years	109	32.4
25-34 year	110	32
35-44 year	68	20
> = 45 years	53	15.6
<b>Marital status</b>		
Single	108	66.2
Married	225	31.8
Divorced	7	2.1
<b>Educational status</b>		
Unable to read and write	192	56.4
Primary school	47	13.8
High school	67	20.2
College and above	35	10.6
<b>Religion</b>		
Protestant	210	61.9
Orthodox	105	30.9
Muslim	25	7.4
<b>Ethnicity</b>		
Hadiya	244	71.8
Gurage	67	19.7
Amhara	12	3.5
Kembata	27	7.9
<b>Estimated Income in ETB</b>		
0-500 ETB/month	178	52.4
501-1000 ETB/month	75	22.1
> = 1000 ETB/month	87	25.5
<b>Occupation</b>		
Farmer	69	20.5
Merchant	99	29.5
Non employed	56	20.5
Employed	69	16.5
Housewife	34	10.1
Students	13	3.8

able to read and write, 11.2% were primary school and 20.2% are high school and 10.6% college and above. The respondent's income distribution showed that 61.4% had an income of below 500ETB per month. The average monthly income was 452ETB (1USD=22ETB) (summarized in Table 1).

### Health Care System Delay

The median health system delay was 5 days (range 4-85) days. 30% of participant experienced health sys-

tem delay. About 40% of patients were diagnosed only after the second or the third visit. Participant who had health system delay more than 5 days were asked for main reason for the health system delay were, ever tried drug rather than Anti-TB drugs 92 (27%), absence of health care provider 128 (37.6%), prolonged referral 97 (28.5%), prolonged waiting 128 (37.6%), absence of drug 161 (47%), distance to health facility 95 (30%). Concerning the place of TB diagnosis, 66% was confirmed at hospital level, 34% were in health centers that were closer to the community. Thirty (30%) of total delay was contributed by health system delay. The highest health system delay (87 day) was registered by one smear positive patient.

In multivariable logistic regression, patients who were treated by other drugs other than anti TB were 4 times more likely delay compared to those who start TB drugs early or don't use other drug (AOR = 4, 95% CI (2.144, 7.465)). Patients who were prolonged referred were 3 times more likely Delay compared to those who referred to health facilities timely after first consultation in timely fashion (AOR = 3.4, 95% CI (1.592, 5.671)). Patients who visit more than 2 different types of health service providers before start of anti-TB treatment were 3.5 times more likely delayed compared to those with 2 or less (AOR = 3.405, 95% CI (1.910, 6.069)) (Summarized in Table 2).

*Finding from Qualitative study revealed, a 34 years, male participant who was general hospital medical director states "patients from periphery or from non-diagnostic center visit our hospitals after 2-3 weeks of their referral, they complain being powerless and lack transportation cost to visit hospitals". Participant # 5 of Age 40 who was district hospital manger support, "The linkage between HEW and health provider seems very poor, their tracing mechanism of active case detection is poor, some provider lack commitment and patient didn't get TB health care by acceptable time". This showed that prolonged referral between providers.*

*Finding from Qualitative study of in-depth interview revealed, male participant #7 of age 32 "majority of patients were not satisfied with consultation from one health care provider and they wish to consult non informal facilities like traditional healers, local pharmacy dispensary shops, especially those patients who come from rural residence". Also, other participant expresses similar ideas, says "patient asked for their chief complaint most patients have TB symptoms and visit health facilities after 3-4 weeks of their onset, they had history of ever used other drugs rather than Anti-TB and come after illness worsened". This shows patients visit Several Health care providers' more than two types.*

*Finding from Qualitative study, a 35 years old, female provider from laboratory room states "patients who is consulted by health provider in OPD for his*

**Table 2:** Health care system factors and tuberculosis treatment delay among pulmonary TB patients in Hadiya zone health facilities, SNNPR, April 2017.

Variables	Number	Health system delay		COR (95% CI)	AOR (95% CI)	p-value
		Yes	No			
<b>Provider contact</b>						
≤ 2 types	205	43	162	1	1	1
> 2 types	135	60	75	3 (1.869, 4.860)	3.405 (1.910, 6.069)	0.001
<b>Distance to health facility</b>						
Distance ≤ 10 km	296	81	215	1	0.505 (0.410, 1.552)	0.220
> 10 km	44	22	22	2.6 (1.39, 5.05)		
<b>Prolonged referral b/n provider</b>						
YES	107	39	58	1.88 (1.145, 3.09)	3.005 (1.592, 5.671)	< 0.001
NO	263	64	179	1	1	1
<b>Ever tried other drugs and not cured</b>						
Yes	107	42	46	2.97 (1.79, 4.94)	4.0 (2.144, 7.465)	0.001
NO	233	61	172	1	1	1
<b>Long waiting during services</b>						
YES	183	57	126	1.07 (0.67, 1.22)	1.213 (0.678, 2.169)	0.515
NO	157	48	109	1	1	1

complaints and when they come lab room for sputum examination when they didn't get this services they feel disappointment, due to lack of lab reagent during services, finally patients visit alternative informal facilities and they are exposed for unnecessary mismanagement and patients took drugs from local pharmacy. Implied supply shortage and long process in OPD and ever used drugs rather than anti-TB.

## Discussion

This study highlighted the health care system Delay of tuberculosis treatment and its correlates among pulmonary tuberculosis patients.

Early diagnosis of disease and prompt initiation of treatment is essential for an effective TB control program. Delay in diagnosis and treatment may worsen the disease, increase risk of poor clinical outcome, including death and enhance transmission of TB in the community. World Health organization (WHO) classifies unexplained cough with or without other symptoms lasting 2-3 weeks as TB suspect and the patients will seek treatments within the given period [6]. However, studies added extra margin of 7 days to take 30 days as cutoff point to assess magnitude of patient delay and factors: a delay > 30 days [7-9].

The median health system and total delay were 5 days. 30% of the patients encountered the health system delays beyond the median (5 days).

The finding from this study revealed that, median Health system delay was in accordance with studies from Ethiopia [10] (6 days) and lower than reports from Oromia region [3] median delay of 9 days. The observed difference might be difference regions, study period and setup.

Visiting several health care providers was associated

with health system delay which is similar with studies from Pakistan, showed that visiting several health care providers was significantly associated with health system delay. These results are in agreement with reports from other countries. In Tanzania, a longer health care system delay was seen when patients, especially in rural areas, consulted traditional healers [11,12].

Visiting two or more health care providers, ever used drugs rather than Anti-TB, prolonged referral and were independent predictors of health system delay as reported by participants.

Treating TB patients with several doses of antibiotics before TB suspect is associated with Health system delay. This is similar with Afar Region studies [10,13]. This is might be weak supervision and poor skill of some health professionals while managing TB cases.

## Limitations of the Study

We have used religious dates as a reference to minimize recall bias among participants. The study was health facility based therefore we missed people with TB symptoms but not have attended health facilities whom might have different characteristics and might experience longer delay. This influences the underestimation of the length of delay we reported and therefore it is difficult to generalize the result to all pulmonary tuberculosis patients in the Region. Due to cross sectional study design nature it didn't provides temporal relationship of cause effect.

## Conclusion

This study found significant association between TB treatment delay and associated factors among PTB patients. There is substantial prevalence of health system delay in study area.

The health system delay is correlated associated with mismanagement (ever used other drugs rather Anti TB), Having contact more than two health provider, unnecessary prolonged referral during services and the absence of up to service deliver at outpatient department and laboratory area results in patient disappointment and the patients to look for alternative health care which further prolongs the patient and health system delays. In the general term, the median health system delay isn't in the reasonable time with regard to situations on the ground; during this time supposed to manifest major pulmonary symptoms of TB. These patients were visiting two or more health care providers before diagnosis so that they could pose a risk to the health professionals and community at large as well unless otherwise properly managed.

## Recommendation

Based on results found in this study, the following recommendations are forwarded:

There should established functional referral pathways, building the capacity of health providers skills and practice to increase the index of suspicion and availing rapid diagnostic test for TB at lowest health facilities are important first step **(for health facilities)**.

Inclusion of non-formal health sectors and private providers in the process of case detection and identification could contribute in reducing delays. In addition, the health sector managers need to pay due attention to the TB service and should regularly monitor clients about their services. Community should be sensitized on seeking appropriate health care, sensitization programs should take into consideration different groups in a society such as women, elders, illiterate and poor by using culturally convenient media of communication to ensure that the whole community is reached **(for health managers)**.

Finally, it is also recommended that a comprehensive future study that consists of strong methodologies and analysis focusing on TB diagnosis and providers delay should be conducted in order to obtain information on factors contributing to patient and health service delay to strengthen or further formulate TB prevention and control program (prompt diagnosis and early initiation of TB treatment). A community-based study should be done to capture symptomatic individuals who are not attending health facilities. Conducting a well-designed study to identify the reasons why most health centers, where larger segments of the community is closer, were not involved in the diagnosis of tuberculosis might clearly show ways of improving the services in these facilities **(for researchers)**.

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their cooperative work during data collection.

## Ethical Considerations

The clearance obtained from ethical review board of Jimma University, institute of health. Permission letter obtained from Hadiya zone health department, Hosanna health town office and district hospitals after discussion of the purpose of the study. During study verbal and written informed consent was obtained from each study subjects.

## Conflict of Interest

No conflict of interest (All authors declare no conflict of interest) Jimma University funded this study.

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