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Original Article

Delayed care-seeking and its underlying factors among patients with tuberculosis in Yangon, Myanmar

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Abstract

Introduction: Tuberculosis (TB) remains a major public health problem in Myanmar. Early care-seeking behaviors play a significant role in reducing TB transmission and speeding recovery. This study was conducted to estimate the proportion of patients with TB who delayed care-seeking and to identify underlying factors.

Methodology: The study population included patients with TB treated in a TB diagnostic center in April 2015. A total of 346 patients were chosen as eligible respondents. The data were collected using structured questionnaires and face-to-face interviews. In addition to descriptive statistics, chi-squared test and multiple logistic regression were performed to show any associations.

Results: The study revealed that 66.8% of patients delayed care-seeking, and the average duration of delay was 21 days. Using the chi-squared test, factors such as education, occupation, family income, knowledge of TB, possessing information about TB, having a family member or close friend contract TB, travel distance, and cost causing a burden were significantly associated with delayed care-seeking ($p < 0.05$). Multiple logistic regression analysis found that 4 variables exhibited significant associations: low levels of education, occupation as government staff member, possessing information about TB, and having a family member or close friend contract TB ($p < 0.05$).

Conclusion: The results from this study provide useful comprehensive information addressing underlying factors associated with delayed care-seeking behaviors. These can be used to advance health education interventions regarding TB and strengthen early diagnosis of TB within community settings.

Key words: Tuberculosis; patients; delayed; care-seeking; underlying factors; Myanmar.

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Introduction

Tuberculosis (TB) is still one of the most fatal infectious diseases and is responsible for poor health among millions of people each year [1-2]. In 2017, an estimated 6.4 million new TB cases were reported, and approximately 1.6 million people died due to TB, making the disease one of the top 10 causes of death in developing countries [2]. A significantly rising trend for all TB cases and a fairly constant proportion of smear-positive cases have been observed each year [3]. Myanmar is among the 30 highest TB-burden countries, and in 2017, the prevalence rate of TB was the fourth highest, with 358 cases per 100,000 population, when the average in most burden countries was 150-400 cases per 100,000 population. Each year, an average of 191 per 1,000 population new positive cases have been reported [2].

As a first treatment choice among patients with a persistent cough, 10%, and 29% went to public centers and medical facilities, respectively, while 26% visited drugstores as their first care-seeking action [4]. The nationwide survey in 2010 revealed that TB prevalence in Myanmar has increased two to three times over the previous report in 1994 and poses an estimated 1.5% annual risk of TB infection [4-6]. Again, the results showed active TB was more prevalent in rural regions and among men and the elderly rather than among younger populations [2,7]. Despite the existence of effective preventive methods and cost-effective TB control interventions, these activities have been interrupted by not only the HIV epidemic but also multi-drug resistance (MDR) complications [8-10].

Patient delay in care-seeking is one of the main contributors to increased TB morbidity and mortality and an important issue involving TB treatment [11]. In general, care-seeking early, obtaining a timely diagnosis and prompt and effective treatment is fundamental to cut off the transmission sequence at the source [12,13]. Awareness of patients with TB symptoms and where to seek appropriate health care

remain crucial for the early diagnosis and effective treatment [14,15].

According to WHO, a delay of more than 14 days to get a diagnosis after onset of TB symptoms was defined as patient delay. Meanwhile in Myanmar, the possibility of prolonged care-seeking behaviors, so-called patient delay, can give rise to unnecessary mortality, increase the cost for the treatment and spread TB in the community [16]. According to a 2017 survey conducted in a regional TB diagnostic center in Myanmar, 58.6% of confirmed TB patients had delayed diagnosis for an average of 9 days [16]. Some studies proved that poor awareness, geographical barriers, and economic burdens served as underlying factors for such delays [16-18]. In addition, evidence-based intervention to eliminate the potential contributors to patients' delayed diagnosis and comprehensive information addressing underlying factors for the delays remain limited. For all the above reasons, this study aimed to assess the underlying reasons for the delay in care-seeking among patients with TB in Yangon, Myanmar.

Methodology

Study Design

The study employed a cross-sectional design to explore the underlying factors towards patient's delay concerning diagnosis of TB.

Study Site

Among 17 states and regions in Myanmar, the Yangon region is the main center of the country for trade, industry and tourism, and represents about one-fifth of the national economy. The Yangon downtown area has 10% of Myanmar's population and people from other regions migrate to the region for their economic benefit; therefore, the area is crowded and prone to abundant TB transmission [19].

The Lower Myanmar TB Diagnostic Center in Yangon Region was purposely chosen as the site of the study. Every patient in the country is entitled to seek TB diagnostic and treatment services at that center and even government hospitals usually refer the patients to confirm diagnosis and receive advanced treatment there. The out-patient department (OPD) is open only on weekdays from 9:00AM to 5:00PM. New suspected cases, who either sought treatment by themselves or were referred by a community health center or private sector, were firstly registered at reception. Then, a medical officer collected the history of present illness, checked the TB symptoms and examined the TB signs of each individual. Based on the findings and provisional diagnosis, the patients were undergoing CXR as well as sputum examinations for three days. Once the TB was confirmed, the patients initiated the anti-TB treatments and received health messages regarding importance of full treatment compliance, prevention methods to interrupt the onward transmission among care-givers or contact persons, follow-up measurements and complications of the drugs. According to available country level data, around 40.0% of patients with TB were found and treated at the diagnostic center, the largest in Myanmar.

Sample size calculation

The desired samples size was calculated using the single proportion formula shown below [20].

$$n = \frac{Z^2_{1-\frac{\alpha}{2}} \mathrm{P}(1-\mathrm{P})}{d^2}$$

where n = sample size, Z = reliability coefficient with 0.05 level of confidence = 1.96, P = prevalence of delayed care-seeking, predetermined to be 0.7134 by one related study [21], d = absolute sampling error was fixed at 5% in this study. Accordingly, the minimum sample size should be 346 TB patients after adding 10% to account for loss of contact.

Study Participants

In this selected diagnostic center, the outpatient department (OPD) was open only on weekdays and about 90 to 100 patients attend to receive treatment in the OPD daily. The study population comprised patients with active TB who received confirmed diagnosis and treatment in the TB diagnostic center from 1 April to 30 April 2015. Male and female individuals, aged over 18 years, who sought treatment firstly at the Lower Myanmar TB Diagnostic Center in Yangon Region after onset of suspected TB signs and symptoms, were eligible to participate in the study. Next, only active patients with TB, starting to receive anti-TB treatment within the past three months only were chosen to avoid of any recall bias. However, any case of extrapulmonary TB or known case of MDRTB was excluded as they had to be referred to the tertiary hospitals to receive intensive treatment. Second, those with non-TB results were also excluded although they sought treatment at the center. After receiving a diagnosis confirmation of TB, all registered patients were screened according to the inclusion and exclusion criteria. During the study period, a total of 1,202 people sought treatment at the diagnostic center. Of these, 768 patients with TB were eligible after screening. Then those participants were recruited alternately using a

sequential sampling each day. Approximately 20 patients in each OPD day were enrolled and over a total of 15 days, were studied at the OPD. Hence, 346 patients with pulmonary TB were chosen to be the respondents in this study.

Study Tools and Data Collection

The instrument for data collection was a structured questionnaire. The questionnaire was first developed and revised according to the literature reviewed [22] and content validity was verified by three experts. The questionnaire was then translated to Burmese and checked using a back-translation method. Pretesting was also conducted in a 30-sample population and adjusted using Cronbach's Coefficient of Alpha. The results of reliability of knowledge and perception were 0.89 and 0.84, respectively.

The questionnaire comprised six main parts. First, socio-demographic factors included 8 questions to collect information about age, sex, educational status, occupation, family members, family income, marital status and previous history of TB. The second part consisted of knowledge on TB comprising 14 questions and with three choices for each item: yes, no and not sure. For positive statements, the score for yes was '1', and no and not sure was '0'. For negative statements, scoring was '1' for 'no' and '0' for yes and not sure. The minimum score was 0 and maximum score was 14. The total score was divided into 3 groups based on Bloom's Taxonomy Theory [23]. Third, for perception on TB, the 12 questions used a 3-point Likert scale, i.e., agree, uncertain and disagree. Minimum score was 12 and maximum score was 36. The total score was divided in 3 groups based on best rating criteria: (high: score 29-36, moderate: score 21-28 and low: score 12-20). Fourth, cues to action consisted of 5 questions focusing on who gave information about tuberculosis and where received, family members or close friends who contracted TB, and whether patients were accompanied when going to the TB diagnostic center. Fifth, availability and accessibility as well as affordability of a health care facility comprised 10 questions to collect information about availability of a TB center in their environment, distance of the TB center from their home, time taken to reach the TB center, convenience in reaching the TB center and cost of treatment. Sixth, case findings on patient delay included 6 pre-defined choices for the first symptom, and two questions to address the time of the onset of symptom and the time of first seeking treatment to differentiate delay and non-delay. A delay of >14 days to get a diagnosis after onset of TB symptoms was defined as patient delay.

Two medical doctors were recruited to conduct the interviews in April 2015. Intensive training and explanations about questionnaires were provided to the interviewers. The questionnaire data were collected using face-to-face interviews of the participants. Additional information about the participants such as the first day of coming to TB diagnostic center, their investigation results and the starting date of taking anti-TB drugs were taken from registration books and patients' treatment record books. To control any possible bias, the researcher also performed both regular and close supervision of data collection. All answers of the participants were kept confidentially and a code was used to identify the data collection form.

Data management and analysis

Data were firstly entered and cleaned using Microsoft Excel spreadsheets and then analyzed using Statistical Package for the Social Sciences (SPSS), Version 23. Descriptive statistics as well as inferential statistic by chi-squared tests were employed to test the significant differences. Next, the variables identified by the chi-squared test at p-value < 0.05 were applied to multiple logistic regression analysis to investigate significant associations after adjustment. Statistically significant associations were considered if p-value was < 0.05.

Ethical Approval

The contents of this research proposal were checked and approved by the Ethics Research Committee for Human Research, Faculty of Public Health, Mahidol University, Bangkok, Thailand (COA. No. 2015-058). The consent form was also requested and signed by each respondent.

Table 1. Time to seek care after presenting TB-like symptoms (n = 346).

The time period	n (%)
Non-delay (≤ 14 days)	115 (33.2)
Delay (>14 days)	231 (66.8)
Mean ± SD = 21.26 ± 21.089, Min = 1, Max = 180	

*SD = standard deviation; Min = minimum; Max = maximum.

Results

Time to seek care after presenting TB-like symptoms

The cut-off point of 14 days was applied according to the WHO definition of care-seeking delay and non-delay. The survey results proved that care-seeking delay totaled 66.8% among patients with TB while non-delay totaled 33.2%. The longest delay period was 180 days

and the minimum was only one day (Table 1). The average period was 21 days.

Associations between socio-demographic factors and patients' care-seeking delay

Most participants were 18 to 49 years old (64.5%), male (61%), and married (57%). Nearly 80% obtained formal education and 48% had four or fewer family members. The proportion of manual workers was 29.5% and approximately 87% of patients had no history of TB. More than one half of the respondents (58.4%) had sufficient income for their living costs. No significant association was found between duration of non-delay and delay regarding age, sex, marital status, family member, enough family income and history of TB. However, significant associations were found concerning education level, occupation, family monthly income and patients' delay at p-value < 0.05 (Table 2).

Knowledge, perception, cues to action and patients' care-seeking delay

The total knowledge score indicated that the majority of the patients (67.9%) possessed moderate level of knowledge followed by 22.6% with poor and only 9.5% with good knowledge level. In addition, the total perception score revealed 93.1% at high, 5.2% at moderate and 1.7% at low perception level. Concerning

Table 2. Association between socio-demographic factors and patients' care-seeking delay (n = 346)-

Characteristics	Non- delay		Delay		p-value
	n	%	n	%	
Age (years)					0.553
18-33	42	37.2	71	62.8	
34 – 49	34	30.9	76	69.1	
≥ 50	39	31.7	84	68.3	
Gender					0.968
Male	61	33.3	122	66.7	
Female	54	33.1	109	66.9	
Marital Status					0.073
Single	43	42.2	59	57.8	
Married	59	29.8	139	70.2	
Others (separated, widow & divorced)	13	28.3	33	71.7	
Education					< 0.001*
Illiterate or no formal education	3	12.0	22	88.0	
Primary school level	19	18.8	82	81.2	
Middle school level	26	28.0	67	72.0	
High school level	37	46.3	43	53.7	
University/ College education level	30	63.8	17	36.2	
Family Members					0.270
≤ 4	60	36.1	106	63.9	
> 4	55	30.6	125	69.4	
Occupation					< 0.001*
Government staff	4	23.5	13	76.5	
Private employee	20	54.1	17	45.9	
Self-employee	29	46.0	34	54.0	
Manual worker	20	19.6	82	80.4	
Dependent	30	28.3	76	71.7	
Retired	12	57.1	9	42.9	
Family monthly income (MMK)					0.001*
≤ 100,000	11	19.3	46	80.7	
100,001-200,000	44	28.8	109	71.2	
> 200,000	60	44.1	76	55.9	
Family income is sufficient for living cost					0.061
Not enough and being indebted	22	18.8	95	81.2	
Enough but cannot be saved	79	39.1	123	60.9	
Enough and some amount can be saved	14	51.9	13	48.1	
Previous history of TB					0.055
Yes	21	45.7	25	54.3	
No	94	31.3	206	68.7	

*significant at p-value < 0.05; 1500 MMK ~ 1 USD.

cues to action, the patients received information about TB before applying it. Among them, one third of the patients (33.5%) received information about TB 2 to 3 times monthly while 22.6% received it >3 times monthly and around one half (43.9%) were aware of information only once monthly. Moreover, the majority (85.2%) received information mainly from television followed by radio and pamphlets. For almost 75% of total respondents, no family members contracted TB. Lastly, two thirds of the respondents (67.1%) had accompanying individuals when they attended a TB diagnostic center (Table 3).

Consequently, the results from Table 3 revealed significant association between knowledge on TB and patient delay in care-seeking with p-value < 0.05. Concerning with cues to action, among patients not receiving information about TB, 83.6% were delayed and the association was significant at p-value < 0.001. A significant association was also found among patients whose family members or close friends did not have TB and those belonging to the delay group (p = 0.009). Surprisingly, there was no significant association between perception of TB and patients' delay.

Availability, accessibility and affordability to health care facility and patients' delay

Summarized results of availability revealed that nearly 93% of patients easily accessed TB treatment services and 81.5% could access laboratory services to diagnose TB. Unfortunately, two thirds (72.5%) of them had no domiciliary care for TB treatment. One half of respondents (50.6%) were located near a TB center within 3 miles with an average 6.2 miles travel distance. Concerning traveling hours, more than one half of respondents (58.3%) spent between 30 to 60 minutes to arrive at the center. Regarding affordability to take treatment, 41.1% of respondents spent not more than 1,000 MMK and one third of respondents (33.2%) used between 1,001 to 3,000 MMK. Nearly 80% thought that the cost was inexpensive for them and only 15% answered that the cost caused a burden for them and their family. In all, 43.9% of respondents lost their daily income when they came to the TB diagnostic

Table 3. Knowledge, perception, cues to action and patients' care-seeking delay (n=346).

Characteristic	Non-delay		Delay		p-value
	n	(%)	n	(%)	
Level of knowledge					0.006*
Good	18	54.5	15	45.5	
Moderate	79	33.6	156	66.4	
Low	18	23.1	60	76.9	
Perception					0.372
High	115	35.7	207	64.3	
Moderate	0	0	18	100.0	
Low	0	0	6	100.0	
Cues to action and patient delay					
Receiving information about TB					< 0.001*
No	19	16.4	97	83.6	
Yes	96	41.7	134	58.3	
Frequencies of receiving information about TB (times/month)					0.081
Often	36	69.2	16	30.8	
Sometimes	31	40.3	46	59.7	
Rarely	29	28.7	72	71.3	
Family member or close friend contracted TB					0.009*
No	75	29.3	181	70.7	
Yes	40	44.4	50	55.6	
Accompany persons when patients go to a TB diagnostic center					0.235
No	33	28.9	81	71.1	
Yes	82	35.3	150	64.7	
Source of information regarding diagnosis and treatment of TB					0.072
Radio	22	41.5	31	58.5	
Television	88	44.9	108	55.1	
Pamphlet	11	20.8	42	79.2	
Newspaper	14	56.0	11	54.0	
Magazines/ Journals	17	63.0	10	38.0	

*significant at p-value < 0.05.

center. Among them, nearly 60% lost their daily income of between 5,000 to 10,000 MMK (Table 4).

In addition, statistically insignificant association was found between patient delay and the health care services for TB treatment (p = 0.104), laboratory to diagnose TB (p = 0.611) and domiciliary care for TB treatment (p = 0.100). A relationship was however found between travel distance to arrive health care facilities and patient delay (p = 0.029). Traveling time to reach health care facilities showed no significant association, with p-value 0.843. In addition, no association was observed between expenditure for each visit to the TB diagnostic center and losing daily income from delay in care-seeking. However, cost that caused a burden for their family was significantly associated at p-value 0.045 (Table 4).

First noticed symptoms and patients' care-seeking delay

Most patients (80.9%) presented persistent cough as their first noticed symptom. More than one half of patients (58.4%) noticed fever first and one half of respondents noticed weight loss. One third of patients (32.1%) presented chest pain as their first symptom and 37.6% of patients noticed general weakness. Nevertheless, the association with patient delay was not significant for persistent cough (p = 0.091), fever (p = 0.121), bloody sputum (p = 0.073), weight loss (p =

Table 4. Availability, accessibility, affordability of health care facility and patients' care-seeking delays (n = 346).

Characteristic	Non-delay		Delay		p-value
	n	(%)	n	(%)	
Availability of health care facility					
Healthcare service for TB treatment in township					0.104
No	12	48.0	13	52.0	
Yes	103	32.1	218	67.9	
Laboratory to diagnose TB in township					0.611
No	23	35.9	41	64.1	
Yes	92	32.6	190	67.4	
Domiciliary care for TB treatment in township					0.100
No	77	30.7	174	69.3	
Yes	38	40.0	57	60.0	
Accessibility of health care facility					
Travel Distance (miles)					0.029*
≤ 3	48	27.4	127	72.6	
4 – 9	54	41.9	75	58.1	
≥ 10	13	31.0	29	69.0	
Travelling hours (minutes)					0.843
< 30	28	31.5	61	68.5	
30 to 60	69	34.5	131	65.5	
>60	18	31.6	39	68.4	
Affordability of health care facility					
Average cost for each visit (MMK)					0.220
≤ 1,000	48	33.8	94	66.2	
1,001-3,000	32	27.8	83	72.2	
> 3,000	35	39.3	54	60.7	
The cost is expensive					0.062
No	98	35.6	177	64.6	
Yes	17	23.9	54	76.1	
Cost cause a burden					0.045*
No	104	35.4	190	64.4	
Yes	11	21.2	41	78.8	
Patients lose daily income when they come to TB diagnostic center					0.299
No	69	35.6	125	64.4	
Yes	46	30.3	106	69.7	
Average amount of daily income lost when patients attend to a TB diagnostic center (MMK)					0.144
< 5,000	11	20.8	42	79.2	
5,000 – 10,000	31	34.4	59	65.6	
> 10,000	4	44.4	5	55.6	

*significant at p-value < 0.05; 1500MMK ~ 1 USD.

0.830), general weakness (p = 0.321), or chest pain (p = 0.082) (Table 5).

Multiple logistic regression

When analyzing using multiple logistic regression (Table 6), four variables still had significant associations ($p < 0.05$). Compared to university or college level education as a reference, other education levels showed higher odds and 95% CIs: illiterate or no formal education (AOR: 7.31, 95% CI: 1.530-34.889), primary school (AOR: 4.93, 95% CI: 1.792-13.568), middle school (AOR: 3.89, 95% CI: 1.565-9.646) and high school (AOR: 1.70, 95% CI: 0.715-4.055), respectively. Additionally, occupation as government staff (AOR: 5.41, 95% CI: 1.160-25.188), receiving information about TB (AOR: 2.16, 95% CI: 1.121-4.154) and a family member or close friend who acquired TB (AOR: 2.01, 95% CI: 1.117-3.606) showed significant higher odds of patients' care-seeking delay. The overall model had $R^2 = 0.18$, F = 9.01 and p-value of < 0.001.

Discussion

Patient's delay in care-seeking care boosts TB transmission and increases the burden of TB [24]. Longer delay in care-seeking and receiving diagnosis results not only increases infectivity in the community but also increases more severe disease progress at presentation, encouraging late sequelae and rising mortality. Early care-seeking behaviors, receiving diagnosis and treating with prompt effective therapy comprise the corner stones of TB control programs [25]. The survey results showed that patient care-seeking delay totaled 66.8% among patients with TB while non-delay totaled 33.2% indicating the urgent need for intensive TB control activities within the study community. The trend of the TB epidemic remains high in the world today, especially in Southeast Asia (SEA) with a huge burden of TB. To compare with similar studies in SEA countries, proportions of delayed care-seeking among patients were 34.1% in Myanmar migrant populations in Thailand, 67.4% in Nepal, 29% in South India and 75.3% in East Malaysia. These percentages of patient care-seeking delay differed because they depended on socio-economic status, awareness of the patients, receiving information on TB for prevention and treatment and availability of health care facilities [26-29]. The national TB control program should consider introducing aggressive active case-finding mechanisms among targeted high risk populations. In addition, building, developing and strengthening partnerships not only with private health care personnel (TB specialists, general practitioners, voluntary health workers and NGO staffs) but also non-health care personnel (drug sellers, traditional healers, family leaders, religious leaders and stakeholders) should be promoted to create greater awareness of every suspected patient with TB. Further, prompt referrals to the nearest TB centers should be streamlined to accelerate early diagnosis and possible treatment. Dissemination of information regarding TB diagnosis and providing treatment at government TB centers free of charge should also be expanded.

Table 5. First noticed symptom and care-seeking delays among 346 patients with TB.

Characteristic	Non-delay		Delay		p-value
	n	(%)	n	(%)	
Persistent cough					0.091
No	34	51.5	32	48.5	
Yes	81	28.9	199	71.1	
Fever					0.121
No	23	16.0	121	84.0	
Yes	92	45.5	110	54.5	
Bloody sputum					0.073
No	71	24.5	219	75.5	
Yes	44	78.6	12	21.4	
Weight loss					0.830
No	67	38.7	106	61.3	
Yes	48	27.7	125	72.3	
General weakness					0.321
No	76	35.2	140	64.8	
Yes	39	30.0	91	70.0	
Chest pain					0.082
No	71	30.2	164	69.8	
Yes	44	39.6	67	60.4	

Decision of the patients to seek a diagnosis and treatment depends on numerous factors. However, very little is recognized concerning the delay pattern of patients with TB and factors influencing delays. Improving TB controls should be geared up by recognizing the number and risk factors of such delays [26]. Firstly, in this study, high education level was positively associated with the patient delay. The association was statistically significant with low education levels and delay in care- seeking. Similar to this study, two patient care-seeking delay studies from South India and Northwest Ethiopia proved that these subjects were more likely to be illiterate, possess no formal education, or had only primary school education level [26,27]. This might be due to the vicious cycle of poverty, low education, and epidemics of TB in developing countries. Therefore, illiterate people having no formal or primary education levels should be given precedence in receiving basic knowledge on TB to make correct decisions and not delay care-seeking for TB treatment. Providing health messages through a sound channel or some mass media announcements might prove a solution for this illiterate group.

The delay in care-seeking for TB indicated a higher rate among government staff (AOR: 5.41, 95% CI: 1.160-25.188). The result was similar to a study in Shandong Province, China [30]. Generally, in Myanmar, government staff cannot leave their work without any special orders or being severely sick. Most also frequently traveled for job purposes. Additionally, outpatient departments of government TB centers usually operate only during weekdays although they offer services free-of-charge. Patients always face crowded conditions and almost one entire day is spent

Table 6. Risk factors for delayed care-seeking among patients with TB by multiple logistic regression analysis (n = 346).

Variable	AOR	(95% CI)	p-value
Education			
University/College education level	1.00		
Illiterate or no formal education	7.31	(1.530-34.889	0.013*
Primary school level	4.93	(1.792-13.568)	0.002*
Middle school level	3.89	(1.565-9.646)	0.003*
High school level	1.70	(0.715-4.055)	0.229
Occupation			
Retired	1.00		
Government staff	5.41	(1.160-25.188)	0.032*
Private employee	1.84	(0.530-6.393)	0.337
Self-employee	1.34	(0.429-4.154)	0.618
Manual worker	2.68	(0.847-8.475)	0.093
Dependent	1.68	(0.548-5.129)	0.365
Family monthly income (MMK)			
> 200,000	1.00		
≤ 100,000	2.07	(0.891-4.792)	0.091
100,001-200,000	1.15	(0.646-2.049)	0.634
Level of knowledge regarding TB			
Good	1.00		
Moderate	1.11	(0.440-2.811)	0.823
Low	1.14	(0.387-3.352)	0.813
Receiving information about Tuberculosis			
Yes	1.00		
No	2.16	(1.121-4.154)	0.021*
Family member or close friend contracted TB			
Yes	1.00		
No	2.01	(1.117-3.606)	0.020*
Travel Distance (miles)			
≥ 10	1.00		
≤ 3	1.35	(0.238-3.382)	0.538
4–9	0.72	(0.330-1.772)	0.293
Cost cause a burden			
No	1.00		
Yes	1.80	(0.752-4.277)	0.187

*significant at p-value < 0.05; 1500MMK ~ 1 USD; AOR: Adjusted odds ratio; CI: Confidence interval; Overall Model; $R^2 = 0.18$; $F = 9.01$; $p < 0.0001$.

to receive a consultation [31]. However, in the private health sector, the consultation fee together with services charges are normally too high for low and midrange income individuals, since the monthly government pay seems very low compared with other high income countries. Consequently, government staff could not manage to obtain proper TB diagnosis and treatment due to tight schedules of their work and inability to afford the high expense required at private health facilities. Regular health check-up activities among government staff using collaborative efforts among relevant ministries, i.e., health and non-health departments needs to be considered. The organogram for substituting a sick staff should be backed-up as necessary after an illness is confirmed to allow absence of individuals from their work.

Receiving health related information serves a vital role to facilitate patients to proactive early care-seeking behaviors. In this study, patients not receiving information about TB constituted 33.5% of total participants and among them, 83.6% experienced delay, an association that was statistically significant (AOR: 2.16, 95% CI: 1.121-4.154, p-value < 0.001). A study in Thailand showed that 45.2% of patients received TB information before contracting TB [21]. Undoubtedly, individuals aware of information concerning a disease would be more likely to show good care-seeking practice. Descriptive statistics revealed most patients received information about TB from health education programs on television. The national TB program also strengthened awareness by increasing activities through various channels including media announcements, newspapers, distribution of pamphlets and posters, and using behavioral change communication mechanisms [5]. Nevertheless, the effectiveness of these activities seems minimal and regular evaluations remain very limited [32]. Introduction of evidence-based interventions using the results from research is recommended.

When a family member or close friend had no TB episodes before, 70.7% of patients tended to report care-seeking delay together with higher odds ratio (AOR: 2.01, 95% CI: 1.117-3.606) than those with a family member or close friend experiencing no TB episodes. This finding suggests that patients had greater awareness and concern regarding TB when they had experience or heard about TB because their family member or close friend had a history of TB. The result was similar to the finding from another study [21]. On the other hand, as TB is transmitted through the air, a higher risk of contracting TB exists among caregivers for TB patients, so awareness of early care-seeking should be higher among those care-givers. Appropriate preventive measures should be also routinely practiced among these caregivers. Active case detection among family members or contact tracing of a TB case together with home visit health talks should be implemented whenever feasible.

Family income was one useful indicator to assess poverty as well as the ability of individuals to afford standard healthcare, especially in a country where universal health care coverage is still underway. In this study, patients with a family monthly income not more than 200,000 MMK were more likely to delay care-seeking but the results were not statistically significant. The results differed from a study in China [30]. Similarly, patients' costs created a burden for themselves and their family members showing a higher odds ratio for patients' care-seeking delay, but again the finding was not significant. The result was similar to a study conducted in Luanda, Angola which showed no association between the cost for each visit and patient care-seeking delay [33]. Nevertheless, patients might not be able to afford transportation costs or loss of income even though anti-TB drugs are free of charge in Myanmar. Therefore, in addition to cost-sharing mechanisms of the government, supporting channels should be implemented with the cooperative efforts from community development organizations, NGOs and other donors to replenish the patients' loss of daily income when they attend a TB diagnostic center.

Interestingly, this study also showed that less travel distance was negatively associated with patient care-seeking delay; 72.6% of patients with care-seeking delay had to travel not more than 3 miles. It meant patients did not pay much attention or have awareness of TB whether the TB center was near or not. Regardless of travel distance, transportation having more than one route and traffic congestion remained problematic and may be one factor affecting delayed treatment. One study in Northwest Ethiopia reported a reverse finding in that patients having to travel long distances were more likely to have care-seeking delay although the association was insignificant [27]. Nevertheless, even though some domiciliary and mobile services care services were provided by the National TB Control Program, expanding more facilities should be considered to implement them in each township so that patients could easily receive treatment from a health care facility for TB.

This study showed no significant associations between the knowledge levels of patients and the delay in care-seeking, although odds ratios were higher for lower knowledge levels. A study in China 2016,

showed similar results in that no association was found between knowledge and patient delay in care-seeking [34]. Sometimes, even though individuals' health knowledge level was high, as described above, other factors create a burden: healthcare costs, underlying low income, distance to the facility together with prolonged time consumption and providing prioritized care to other family members for TB treatment were hindering the early care seeking practice. Thus, health education about knowledge on TB that is specific, simple and complete needs to be improved not only among patients with TB but also healthy people.

The study had some limitations. As the study was conducted only in the region having high TB caseload and located in downtown Yangon, the results may not be representative of other low endemic areas nor the whole country. Some people might seek treatment soon after onset of TB-like symptoms firstly at other healthcare providers rather than a TB center. As this study aimed to explore patients' delay in care-seeking only, patients delayed to receive TB diagnosis and treatment due to prolonged referral or missed clinical diagnosis by healthcare professionals were excluded. Because of the complex pathology of extrapulmonary TB and MDR-TB and to avoid any potential confounding factors, those patients were also excluded in this study, so the results were solely representative of pulmonary TB cases.

Conclusions

This study intended to explore delay in care-seeking, estimate the proportion of patients with delay, and identify the factors contributing to delay in care-seeking among patients with TB. Managing the large TB burden remains a predicament in TB control programs because most patients seek care too late, indicating need of immediate implementing the compressive health education among this community. Active case finding through mobile teams should be established for delivering early diagnosis among government staff, tracing close contacts with active TB cases and finding delayed care-seeking patients with TB. On the healthcare provider side, appropriate engagement between the healthcare providers delivering TB diagnosis and treatment in public and private sectors should also be strengthened through public-private mixed approach. Expansion of TB diagnosis and treatment facility at each township level is encouraged.

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Authors' contribution

MCO and PLA were responsible for conceptualizing the study. MCO supervised the project. All authors were involved in data curation, formal analysis and writing (original draft), and approved the final manuscript.

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