

Original Article

## An exploration of disease awareness among tuberculosis patients: The empirical link between attitude and self-preventive care

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### Abstract

**Introduction:** The prevalence of tuberculosis (TB) remains alarmingly high in developing countries, including Malaysia. Recognised as the leading global infectious disease, untreated TB can be fatal. TB is easily spread through the air, and any close contact with a TB patient can put others at risk. This study therefore aimed to investigate the level of awareness of TB among TB patients and how their attitudes affect self-preventive healthcare.

**Methodology:** This cross-sectional study was conducted using a validated self-administered questionnaire at 18 hospitals in six states of Malaysia, namely, Selangor, Kuala Lumpur, Penang, Kelantan, Sabah, and Sarawak in 2015. The study sample comprised 1600 TB patients who were randomly selected using data obtained from the Disease Control Division, Ministry of Health Malaysia. A total of 1368 of the completed questionnaires were considered usable and included in the statistical analysis.

**Results:** Overall, the level of TB awareness was found to be high, and the respondents possessed positive attitudes towards TB and health-seeking behaviours. Self-preventive care among the TB patients was determined as being at a moderate level. With regard to contact with others, the patients were more comfortable around their families than their friends and neighbours.

**Conclusions:** More health education programmes are recommended to cultivate positive attitudes towards TB, to encourage communities to have a better understanding of TB, and to create awareness among patients of the proper ways to practice self-preventive care.

**Key words:** attitude; self-preventive healthcare; tuberculosis; Malaysia; TB patients.

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### Introduction

According to the World Health Organization (2018), more than 95% of tuberculosis (TB) cases and mortality due to TB occur in developing countries [1]. As a developing country, Malaysia is no stranger to this disease. Despite its booming economic growth, the spread of infectious diseases, especially TB, remains prevalent. TB is an ancient disease caused by the presence of *Mycobacterium tuberculosis* bacillus. Previously, TB was well-contained, and Malaysia was no longer considered a country with a high TB burden. However, TB cases have gradually increased since 1995 [2-4]. In 2017, the mortality rate for TB was 6.8 per 100,000 populations. There has been an 8% increase in recorded TB cases from 2015 to 2017, with 24,220 and 26,168 cases, respectively [5]. Owing to the substantial influx of immigrants from neighbouring countries with high TB prevalence as well as the increasing number of people with diseases with

compromised immunity, this resurgent disease has again become a significant public health concern in Malaysia [6,7].

TB is an infectious disease that mainly affects the lungs and is easily spread through the air. The route of transmission includes the acts of coughing, sneezing, and talking, which spread the bacteria to others. Spending prolonged periods in close contact with an infected TB patient increases the risk of infection. Scholars have also emphasised that most patients seek treatment late and thus pose a contagion threat to the people around them [8,9]. Some TB patients may conceal their TB status and practice low preventive actions in terms of personal hygiene thereby contributing to the escalating number of TB cases and related deaths [7,10,11].

Despite the highly contagious nature of TB, a lack of knowledge as well as negative attitudes towards TB are still common in developing countries [9,11,12].

Government strategies are therefore viewed as crucial in controlling TB outbreaks until TB no longer poses a threat to public health. Infection control practices are geared towards the prevention of TB transmission through the use of many disease control methods, including early detection and regular screening programmes, especially among immigrants. Among the various government programmes used to combat TB, the most significant tactics to guide patients on the importance of preventive measures are those that help patients develop the right mindset and a positive attitude towards TB [13]. School activities that aim to educate children from a young age about good personal hygiene practices are vital. In particular, these activities contribute to the creation of infection awareness and help children develop a sense of responsibility regarding self-care practices and thus avoid transmitting infections to others. If not contained, TB will cause Malaysia to be burdened with excessive medical expenses and economic losses. Indeed, changing health behaviours is a more practical and feasible policy approach than bearing the high cost of treatment.

Previous studies have identified the importance of possessing good knowledge when moulding a positive attitude towards infectious diseases. Having adequate knowledge about a specific disease, its causes, modes of transmissions as well as preventive practices can help a person by informing them about what to expect and what to do next [9,14]. Patients with negative attitudes towards infectious diseases have been associated with communities where there are high levels of disease stigma, which can affect early diagnosis, medication, coping mechanisms, and treatment [12,15,16]. Conducting health education is recommended to address the stigma of TB by taking into consideration several aspects, such as cultural beliefs, health knowledge, and the societal norms of the target population [12]. Patients with a positive attitude towards the disease portray a good self-image, establish an optimistic mind-set about the future, show eagerness to recover, and develop a high sense of empathy towards others [17]. While knowledge reinforces attitudes and beliefs, attitudes are the driving force of behaviour change [14]. Accordingly, patients with a positive attitude tend to practice good self-preventive care and protect others from infection [9,18].

The present study therefore aimed to determine the level of disease awareness among TB patients, such as its symptoms, causes, how it spreads, and its treatment. Adequate TB knowledge among patients is important

because high levels of knowledge positively influence patients' attitudes towards TB.

## **Methodology**

### *Study design and setting*

This cross-sectional study was conducted using a validated self-administered questionnaire at 18 hospitals in six selected states of Malaysia, namely, Penang, Selangor, Kuala Lumpur, Kelantan, Sabah, and Sarawak. These states were chosen because they had had the highest number of TB cases in recent years [19]. The study sample was randomly selected using the data of TB patients obtained from the Disease Control Division, Ministry of Health Malaysia. The data collection was carried out from May 2014 to March 2015, and the inclusion criteria required that the patients (1) had been diagnosed with TB, (2) had received treatment in government hospitals, (3) were aged 18 years or older, (4) were registered with the Ministry of Health Malaysia, and (5) had been residing in Malaysia for at least five years. The questionnaires were distributed by enumerators and health inspectors at district health offices and government health clinics. Prior to the data collection process, they were trained by the research team regarding the ethics and procedures that should be used to approach patients, the sensitivities patients may have, and the need to respect patients' decisions. Participation in this study was voluntary.

The TB patients who met the inclusion criteria were enrolled in the study to determine their understanding of TB as this is crucial in ensuring that they practice proper self-preventive healthcare. Their level of understanding can manifest as positive or negative attitudes towards TB. Based on this, their levels of self-preventive healthcare can be observed. Accordingly, and in line with the objective of this study, the spread of TB can possibly be controlled by inculcating a positive attitude towards TB among patients as this may reduce the chances of them transmitting the infection to others.

### *Study instrument*

The questionnaire was designed in English and translated into the local language, Malay, which is Malaysia's national language. The questionnaire was developed using previous literature reviews and by consulting with experts in the relevant fields [7,15,20]. The final version of the questionnaire consisted of 35 items categorised into five sections: Part A: Demographic Profile (14 items), Part B: General Health (11 items), Part C: Attitude towards TB (5 questions

with 26 statements), Part D: Self-Preventive Healthcare (1 question with 19 statements), and Part E: Suggestions (4 items). All the items were assessed using a five-point Likert scale (1: strongly disagree, 2: disagree, 3: neutral, 4: agree, and 5: strongly agree) except for two items from Section E, which were open-ended questions.

A pilot study was conducted among 150 respondents, and their feedback was incorporated into the final version of the questionnaire. Nunnally (1978) asserted that an alpha value ( $\alpha$ ) equal to or greater than 0.70 indicates sufficient reliability ( $\alpha \geq 0.70$ ) [21]. The purpose of establishing reliability and validity is to assure the quality of the instrument and that the collected data are sound and replicable with the aim of obtaining accurate results [22]. The reliability and consistency of the questionnaire were tested using Cronbach's alpha, which denoted an acceptable coefficient ( $\alpha = 0.754$ ).

#### Statistical analysis

Missing response data, which exceeded 33%, were withdrawn from the analysis, and monotone responses were also excluded to prevent statistical bias. IBM Statistical Package for the Social Sciences version 24 was used to analyse all the data, and descriptive statistics were used to report frequencies and proportions. Based on the Kolmogorov–Smirnov normality results, the data distribution of this study was considered non-normal. A chi-square test of independence was therefore employed to determine whether an association existed between two variables. A *p*-value of less than 0.05 was considered statistically significant. To evaluate the predictors of a good attitude towards TB, a positive (agree) response to Part C (Attitude towards TB) was scored as 1, while a negative (disagree/not sure) response was scored as 0. The responses to these questions were then added together to generate an attitude score from 0 to 9. Providing more than five positive answers in each category was interpreted as possessing a positive attitude towards TB, and providing less than five positive answers indicated a negative attitude towards TB [23,24].

There are two main stages in data analysis: data preparation and data examination [25]. Data entry, coding, handling missing values, and categorising data according to the purpose of the study are crucial for identifying errors and maintaining data accuracy. In this study, the missing values were treated using expectation maximisation (EM). If more than 25% of a questionnaire was not completed, the questionnaire was not included for further analysis. Based on the EM

results, there were two questions with missing values higher than 33%: (a) How long have you been smoking? and (b) How many cigarettes do you smoke per day? According to Hair, Black, Babin, Anderson, and Tatham (2006), missing values exceeding 20% of the upper limit should be considered for deletion because they could create bias in the final analysis [26]. However, these questions were retained as they were considered sensitive questions that needed to be asked. Al Sadi and Basit (2017) highlighted that it is acceptable if respondents refuse to answer personal questions since the questions could raise concerns about disapproval or other consequences [27]. Additionally, the questions themselves may be deemed as an invasion of privacy and should instead be asked in a focus group session [28,29].

**Table 1.** Socio-demographic characteristics.

Characteristics	n (%)
<b>Gender</b>	
Male	823 (60.2)
Female	534 (39.0)
No answer	11 (0.80)
<b>Age</b>	
< 20	106 (7.70)
21 – 30	328 (24.0)
31 – 40	256 (18.7)
41 – 50	229 (16.7)
51 and above	426 (31.1)
No answer	2 (1.70)
<b>Education</b>	
Primary	313 (22.9)
Secondary	642 (46.9)
College	114 (8.30)
University	126 (9.20)
Illiterate	132 (9.60)
No answer	41 (3.00)
<b>Locality</b>	
Urban	698 (51.0)
Suburban	217 (15.9)
Rural	406 (29.7)
No answer	47 (3.40)
<b>Monthly Income</b>	
< RM 2,000 (< USD 458.93)	997 (72.9)
RM 2,001 – RM 4,000 (USD 459.16 - USD 917.85)	211 (15.4)
>RM 4,001 (> USD 918.08)	21 (1.50)
No answer	139 (10.2)
<b>Marital Status</b>	
Bachelor	407 (29.8)
Married	802 (58.6)
No answer	159 (11.6)

\*Total of respondent is 1368 but some respondents refused to disclose gender, age, and marital status; RM refers to Ringgit Malaysia, Malaysian currency.

### Ethical considerations

This research was approved by the Ministry of Health Malaysia (NMRR-11-658-9825). All the respondents who agreed to participate in the study signed a consent form. The right to refuse participation was respected, and ethical principles were adhered to. The confidentiality of the respondents was well-maintained through the use of specific ID codes such as P001, P002, and P003 instead of personal details. All the respondents who participated in this study did so on a voluntary basis and were given rewards as tokens of appreciation for their contributions.

## Results

### Demographics

A total of 1600 patients participated in the study. After removal because of incomplete responses, 1368 questionnaires were included in the final analysis, indicating a high response rate (85.5%). The male respondents (60.2%) outnumbered the female respondents, and the age group with the highest participation (31.1%) was 51 years and above (see Table 1). The majority of the respondents (69.8%) had a high school (primary and secondary) education level, while 17.5% had college or university education.

Among the respondents, 9.6% were illiterate and needed help answering the questionnaire. Most of the patients (72.9%) were from lower-income households (< \*RM 2000 or < USD 458.93), and 58.6% were married (\*RM refers to Ringgit Malaysia, currency used in Malaysia). In general, the respondents in this study mirrored the actual representation of global TB patients since most of them were male, aged 51 years and above, married, and belonged to low-income households [30-32].

### General knowledge of TB

The level of general knowledge of TB among the patients was considerably high. Most of the respondents (74.3%) had heard about TB before being infected with TB and admitted (72.9%) to having basic knowledge about TB, for example, that it is an infectious disease, its symptoms, and its causes. In response to questions about the ways TB is spread (see Table 2), the majority of the patients gave accurate answers, namely, coughing (95.0%), sneezing (76.4%), talking (57.2%), and spitting (53.1%). Similarly, most of the respondents (82.1%) answered correctly when asked about the cause of TB.

**Table 2.** General knowledge on TB.

Knowledge on TB	Total (N)	Yes n (%)	No n (%)	Not sure n (%)
<b>How TB spread?</b>				
Cough	1359	1299 (95.0)	13 (1.00)	47 (3.40)
Contaminated food/drink/water	1319	423 (30.9)	343 (25.1)	553 (40.4)
Sneezing	1335	1045 (76.4)	61 (4.5)	229 (16.7)
Talking	1323	782 (57.2)	116 (8.5)	425 (31.1)
Sexual intercourse with TB patient.	1314	276 (20.2)	459 (33.6)	579 (42.3)
Ancestry	1318	423 (30.9)	333 (69.4)	562 (41.1)
Spitting	1320	726 (53.1)	118 (8.6)	476 (34.8)
<b>What caused of TB?</b>				
Virus	1317	785 (57.4)	185 (13.5)	347 (25.4)
Contaminated food/drink/water	1309	330 (24.1)	362 (26.5)	617 (45.1)
Germ / bacteria	1341	1123 (82.1)	36 (2.6)	182 (13.3)
Ancestry	1311	394 (28.8)	349 (25.5)	568 (41.5)
Sexual intercourse with TB patient	1309	228 (16.7)	450 (32.9)	631 (46.1)
<b>General information on TB</b>				
Is TB infectious?	1364	1242 (90.8)	12 (0.90)	110 (8.00)
Is TB can be cured?	1360	1246 (91.1)	7 (0.05)	107 (7.80)
Is TB can be avoided?	1367	1118 (81.7)	27 (2.00)	222 (16.2)
<b>How long is TB treatment?</b>				
1 month	1367	7 (0.50)	-	-
2 months	1367	1 (0.10)	-	-
3 months	1367	50 (3.70)	-	-
6 months	1367	971 (71.0)	-	-
9 months	1367	146 (10.7)	-	-
Not sure / do not know	1367	192 (14.0)	-	-

\* Total of respondents is 1368 but some of the questions were left unanswered.

**Table 3.** Attitude towards TB.

Attitude items	Total (N)	Yes n (%)	Not sure n (%)	No n (%)
<b>What I will do if I experience TB symptoms?</b>				
Consult a doctor	1359	1331 (97.3)	19 (1.40)	9 (0.70)
Visit a clinic	1287	940 (68.7)	169 (12.4)	178 (13.0)
Buy medicine from pharmacy	1296	891 (65.1)	218 (15.9)	187 (13.7)
Seek alternative treatment	1279	510 (37.3)	339 (24.8)	430 (31.4)
Do nothing	1271	175 (12.8)	247 (18.1)	849 (62.1)
<b>I will get treatment if I experience the following symptom:</b>				
A bad cough that lasts 3 weeks or longer	1357	1275 (93.2)	66 (4.80)	16 (1.20)
Cough up blood and mucus	1354	1188 (86.8)	115 (8.40)	51 (3.70)
Fever that lasts 3 weeks or longer	1346	1104 (80.7)	195 (14.3)	47 (3.40)
Chest pain	1349	1026 (75.0)	250 (18.3)	73 (5.30)
No appetite	1346	1043 (76.2)	236 (17.3)	67 (4.90)
Sweating at night	1342	931 (68.1)	315 (23.0)	96 (7.00)
Extreme tiredness or fatigue	1343	1005 (73.5)	288 (21.1)	50 (3.70)
Weight Loss	1349	1059 (77.4)	234 (17.1)	56 (4.10)

\* Total of respondents is 1368 but some of the questions were left unanswered.

**Table 4.** Attitude towards contacts.

Attitude towards contacts	Total (N)	Agree n (%)	Not sure n (%)	Disagree n (%)
<b>Attitudes towards family members:</b>				
I do not mind eating with my family	1364	1070 (78.2)	135 (9.90)	159 (11.6)
I do not mind drinking with my family	1362	1063 (77.7)	172 (12.6)	127 (9.30)
I do not mind communicating with my family	1360	1094 (80.0)	141 (10.3)	126 (9.20)
I do not feel ashamed with my family due to TB	1361	1094 (80.0)	181 (13.2)	86 (6.30)
I will not stay away from my family due to TB	1360	1101 (80.5)	171 (12.5)	88 (6.40)
I do not mind if my relatives visit me at home	1356	1045 (76.4)	212 (15.5)	99 (7.20)
I feel comfortable if my family members be near me	1358	1049 (76.7)	196 (14.3)	113 (8.30)
I feel comfortable live in the same house with my family members	1357	1058 (77.3)	191 (14.0)	108 (7.90)
I feel comfortable being taking care by my family members even though I infected with TB	1364	1045 (76.4)	193 (14.1)	126 (9.20)
I am not concealing about TB disease from family	1362	1164 (85.1)	139 (10.2)	59 (4.30)
<b>Attitudes towards friends:</b>				
I do not mind eating with my friends	1361	919 (67.2)	239 (17.5)	203 (14.8)
I do not mind drinking with my friends	1360	915 (66.9)	222 (16.2)	223 (16.3)
I do not mind if my friends visit me at home	1362	930 (68.0)	251 (18.3)	181 (13.2)
I do not mind if my friends be near me	1362	906 (66.2)	282 (20.6)	174 (12.7)
I do not feel ashamed with my friends due to TB	1053	709 (51.8)	171 (12.5)	173 (12.6)
I do not mind communicating with my friends	1359	913 (66.7)	263 (19.2)	183 (13.4)
I will not stay away from my friends due to TB	1363	910 (66.5)	255 (18.6)	198 (14.5)
I am not concealing about TB disease from friends	1364	899 (65.7)	266 (19.4)	199 (14.5)
<b>Attitudes towards neighbour</b>				
I do not mind eating with my neighbours	1362	846 (61.8)	264 (19.3)	252 (18.4)
I do not mind drinking with my neighbours	1363	842 (61.5)	276 (20.2)	245 (17.9)
I do not mind if my neighbours visit me at home	1360	885 (64.7)	266 (19.4)	209 (15.3)
I do not mind if my neighbours be near me	1357	860 (62.9)	266 (19.4)	231 (16.9)
I do not feel ashamed with neighbours due to TB	1356	875 (64.0)	257 (18.8)	224 (16.4)
I do not mind communicating with my neighbours	1356	878 (64.2)	271 (19.8)	207 (15.1)
I will not stay away from my neighbours due to TB	1364	856 (62.6)	280 (20.5)	228 (16.7)
I do not conceal about TB disease from neighbours	1363	837 (61.2)	308 (22.5)	218 (15.9)

\* Total of respondents is 1368 but some of the questions were left unanswered.

Almost all the patients agreed that TB is infectious (90.8%), can be cured (91.1%), and can be avoided (81.7%). Additionally, they possessed good knowledge of the duration of TB treatment, with 71% of the respondents answering correctly that the standard treatment lasts six months.

#### *Attitudes towards TB and contacts*

The respondents were asked what they would do if they experienced TB symptoms and which TB symptoms would require them to seek treatment. From the answers, it was concluded that they had positive attitudes towards TB and health seeking because the majority of the respondents opted to consult a doctor (97.3%), visit a clinic (68.7%), and buy medicine from a pharmacy (65.1%). The rest preferred to seek alternative treatments (37.3%) or do nothing (12.8%). Furthermore, most of the respondents believed that if they had a persistent cough for more than three weeks (93.2%), coughed up blood and mucus (86.8%), had a fever for more than three weeks (80.7%), experienced chest pain (75%), or had no appetite (76.2%), they should seek treatment immediately (Table 3).

The family members of TB patients, their friends, and neighbours were regarded as contacts. Three questions with 26 statements related to contacts. For instance, the patients were asked to select the extent to which they agreed or disagreed with statements

querying (1) whether they were comfortable with their family, friends, and neighbours, (2) whether they were open about their disease, and (3) whether they chose to hide the fact that they had TB (see Table 4). Following a comparison of the answers, the TB patients were found to be more comfortable with their family members than their friends and neighbours. Most of the respondents did not mind eating (78.2%), drinking (77.7%), communicating (80%), and living comfortably in the same house as their family members (77.3%). Slightly lower percentages were documented when it came to friends (67.2%) and neighbours (61.8%).

#### *Attitudes towards TB preventive practices*

Most of the patients admitted that they had changed their lifestyles and were more cautious about how they acted in public, especially with regard to cleanliness, health-seeking behaviours, and personal hygiene (refer Table 5). Precisely 94.2% of the TB patients agreed that they maintained the cleanliness of their home, accepted advice from family members (91.2%) and friends (88.6%) about seeing a doctor if they were feeling unwell, and made sure to eat at clean places (90.7%). In fact, the TB patients were documented as being voluntarily sent to the clinic by their family members (90.2%) or friends (83.1%) if they were feeling unwell. A number of respondents also indicated that they washed their hands before eating (85%) and threw away

**Table 5.** Attitude towards TB preventive practice.

Attitude towards TB preventive practice	Total (N)	Yes n (%)	Not sure n (%)	No n (%)
I maintain the cleanliness of my house	1366	1289 (94.2)	53 (3.90)	24 (1.80)
I take care the cleanliness of my house area	1366	1269 (92.8)	78 (5.70)	19 (1.40)
I will advise my family members to see doctor if they are feeling unwell	1367	1248 (91.2)	93 (6.80)	26 (1.90)
I will make sure eat and drink at a clean place	1366	1241 (90.7)	109 (8.00)	16 (1.20)
I will take my family members who are feeling unwell to the clinic	1366	1234 (90.2)	105 (7.70)	27 (2.00)
I will take my family members who are feeling unwell to the hospital	1365	1222 (89.3)	110 (8.00)	33 (2.40)
I will advise my friends to see doctor if they are feeling unwell	1363	1212 (88.6)	124 (9.10)	27 (1.00)
I will immediately get a treatment if I have fever more than three weeks	1364	1211 (88.5)	118 (8.60)	35 (2.60)
I will try to avoid crowded places	1364	1170 (85.5)	135 (9.90)	59 (4.30)
I take care cleanliness at places that I spend most of my time	1364	1161 (84.9)	134 (9.80)	69 (5.00)
I will take my friends who are feeling unwell to the clinic	1366	1137 (83.1)	183 (13.4)	46 (3.40)
I will wash my hands before eating	1365	1163 (85.0)	160 (11.7)	42 (3.1)
I throw used tissue after cough or sneeze in the dustbins	1366	1134 (82.9)	152 (11.1)	80 (5.80)
I will not share food containers with others	1364	1034 (75.6)	229 (16.7)	101 (7.40)
I will not share beverage containers with others	1366	1023 (74.8)	230 (16.8)	113 (8.30)
I will separate my food containers with others	1364	1002 (73.2)	238 (17.4)	124 (9.10)
I am wearing nose and mouth cover every time I go to public places	1368	800 (58.5)	279 (20.4)	289 (21.1)
I wash my hands after cough or sneeze	1368	820 (59.9)	220 (16.1)	328 (24.0)
I cover my nose/mouth if I cough or sneeze	1368	760 (55.6)	215 (15.7)	393 (28.7)

\* Total of respondents is 1368 but some of the questions were left unanswered.

used tissues in dustbins after coughing or sneezing (82.9%). On the other hand, the practice of personal hygiene was quite low despite the fact that TB is easily spread to others through the air. TB patients are expected to wear facemasks in public to reduce the transmission of bacteria to others. However, only 58.5% of the respondents in this study practiced wearing nose and mouth covers in public places and washing their hands after coughing or sneezing (59.9%). Furthermore, only 55.6% covered their nose and mouth when coughing or sneezing. Accordingly, the attitudes towards TB preventive practices were considered moderate among the TB patients in this study.

#### *Association between attitude towards TB and sociodemographic variables*

A chi-square test for independence of two attributes, such as between attitude and gender and attitude and age, was used in this study to determine whether one variable was independent of the other and whether a statistically significant relationship existed between the independent and dependent variable [33,34]. In particular, a chi-square test was used to determine the association between TB attitude and sociodemographic variables such as gender, age,

locality, occupation, education, and income level. A p-value less than 0.05 was considered statistically significant. As shown in Table 6, there were significant relationships between a positive attitude towards TB and locality (Chi Square analysis = 23.924,  $p < 0.001$ ), occupation (Chi Square analysis = 22.139,  $p < 0.001$ ), and education level (Chi Square analysis = 11.501,  $p = 0.021$ ). The value of Chi Square analysis reflects the association between two variables which means, the higher the value, the more significant relationship can be predicted. Also, looking at the p-value, the lower the value (less than 0.05) indicates that there is a greater statistically significant association between TB attitude and sociodemographic variables. In particular, patients from urban areas who were self-employed and possessed high school qualifications were found to have a higher percentage of positive attitudes towards TB compared to others.

#### **Discussion**

This study revealed gaps in the attitudes and practices towards TB self-preventive healthcare among TB patients in Malaysia. In terms of attitude, most of the respondents portrayed a positive attitude towards TB. Over 90% of the respondents in this study were aware of TB symptoms and how TB spread. The

**Table 6.** Association between attitude towards TB and socio-demographic variables.

	Positive attitude n (%)	Negative attitude n (%)	$\chi^2$	p-value
<b>Gender</b>				
Male	681 (49.7)	142 (10.4)	0.847	0.358
Female	452 (33.0)	82 (6.00)		
<b>Age</b>				
< 30 years	368 (26.9)	66 (4.82)	7.380	0.117
31-40 years	212 (15.5)	44 (3.22)		
41-50 years	186 (13.6)	43 (3.14)		
> 51 years	355 (26.0)	71 (5.20)		
<b>Locality</b>				
Urban	575 (42.0)	123 (9.00)	23.924	< 0.001*
Suburban	162 (11.8)	55 (4.02)		
Rural	364 (26.6)	42 (3.07)		
<b>Occupation</b>				
Government sector	130 (9.50)	20 (1.46)	22.139	< 0.001*
Private sector	288 (21.1)	65 (4.75)		
Self-employed	308 (22.5)	81 (5.92)		
Housewives	121 (8.85)	29 (2.12)		
Others (students, retiree)	229 (16.7)	19 (1.39)		
<b>Education</b>				
High School	778 (56.9)	177 (13.0)	11.501	0.021*
College	102 (7.46)	12 (0.88)		
University	115 (8.41)	11 (0.80)		
Illiterate	112 (8.19)	20 (1.46)		
<b>Income</b>				
< RM 2,000	827 (60.5)	170 (12.4)	6.919	0.140
RM 2,001-RM 4,000	184 (13.5)	27 (1.97)		
> RM 4,001	18 (1.32)	3 (0.22)		

\*Significance level at  $\alpha = 0.05$ ;  $\chi^2$  = Chi Square analysis; RM refers to Ringgit Malaysia, Malaysian currency.

severity and risk of TB was also known to them, and they took preventive measures by opting to consult a doctor if they experienced TB symptoms, become more cautious in public places, and avoid going to crowded spaces.

Similar to the study by Al-Dubai *et al.* (2013), this study discovered a significant association between a favourable attitude towards infectious disease and education level and type of occupation [35]. However, Al-Dubai *et al.* revealed that higher educated patients, especially those who had obtained tertiary qualifications, showed higher attitude scores, while the present study offered different results: patients who had acquired high school qualifications possessed higher attitude scores. The majority of the TB patients in this study were high school leavers, so this possibly influenced the statistical results. Future studies that categorise TB patients according to various levels of education are recommended to avoid similar contrasting results.

Likewise, previous studies have found that patients from lower income groups who reside in urban areas and have lower education levels have negative attitudes towards TB [36,37]; however, this study produced contradictory results as the patients living in urban areas were more likely to manifest a positive attitude towards TB because they were more open-minded and had better access to health institutions. For that reason, they had a better understanding of TB, which positively influenced their attitude towards the disease [15].

With regard to attitudes towards contacts, the TB patients in this study were more comfortable with their families compared to their friends and neighbours. Even though the TB patients had disclosed that they had TB, they preferred to put barriers between themselves and the people around them. This finding is similar to a study by Marangu *et al.* (2017) related to TB stigma in Africa [38]. The authors noted that the patients in their study were more reserved when it came to talking about their illness with people other than their families because of stigma and a fear of discrimination. Further, the patients indicated that it was difficult for them to disclose their TB status because they felt embarrassed and were afraid that their friends and communities would avoid them.

In fact, misconceptions about TB transmission among the public are high in Africa [38]. Some communities believe that sharing utensils and cigarettes could spread TB, while others assume that TB patients are cursed and that TB is associated with Aids. Nevertheless, Henderson, Evans-Lacko, and Thornicroft (2013) highlighted that having a strong

positive attitude towards TB helps patients be more open about their TB status, more prepared to disclose their illness, more comfortable about sharing information regarding the treatment they have received, and more willing to update others on their health progress [39]. In Thailand, a country with a heavy TB burden, the stigma against TB is generally high [17]. However, people who have experienced less stigma but high levels of empathy tend to have a positive attitude towards TB. In fact, a study found that patients were inclined to be more open-minded and willing to declare their TB status to friends, colleagues, and the people around them to prevent transmission [17].

Since TB is easily spread, efforts to change a patient's behaviour are crucial. The act of invoking cognitive or emotional responses is among the more sensible ways to facilitate effective behavioural change [40]. Based on the results of this study, some strategies for TB control are recommended: (1) timely and thorough TB screening should be provided for patients and their contacts with TB symptoms, (2) counselling and emotional support should be arranged for TB patients and their contacts, (3) suspected TB patients should be strongly advised to attend TB health awareness programmes, (4) mobile doctors or medical practitioners should engage frequently with high-risk groups such as immigrants, homeless people, and the elderly, especially those staying in care institutions, and (5) visual posters in TB campaigns should indicate the proper cough etiquette as part of the preventive measures messaging to avoid disease transmission to others.

This study offers valuable insights for policymakers and health practitioners through the lens of TB patients. Even though they were found to have good knowledge of TB and could accurately identify the symptoms and causes of TB and how TB spreads, the patients in our study were seen as incapable of practicing the knowledge gained as expected. In some cases, the patients admitted that they were in a state of disbelief regarding why they had been infected with TB and were therefore unable to implement the TB knowledge that they had obtained. Nevertheless, the patients agreed that, among all the measures, counselling sessions involving their contacts (family members, friends, and neighbours) are necessary to cultivate a positive attitude towards TB and are deemed important to them. The patients indicated that, if their contacts knew their physical, mental, and emotional condition, they would feel more motivated to continue treatment, and social isolation could thus be avoided. For that reason, it is imperative that policymakers provide practical ways to

change TB patients' attitudes by, for example, triggering emotional concern for the patients' loved ones.

When patients are aware of the method used to prevent the spread of TB, such as the importance of self-preventive care to avoid transmitting infection to others, their barriers to change are lowered. This can help them associate the disease with positive emotions, strengthen their intentions to achieve new behaviours, and exercise proper self-preventive healthcare. From another perspective, health campaigns aimed at all levels of society are equally important in cultivating community participation and enhancing quality of life [41,42]. In England, the Minister for Public Health introduced the *Change4Life* social marketing campaign to encourage healthy lifestyles through behavioural change. With a focus on change in the home, this programme successfully educated parents to oversee their children's health by providing support and materials to nurture health-related changes [43,44]. Wakefield *et al.* (2010) stated that behavioural change may also be achieved via indirect routes [40]. For instance, a campaign on the second-hand effects of smoking on non-smokers could increase public support for health policies aimed at, for example, restricting smoking in public places. This may indirectly motivate smokers to gradually quit smoking due to societal pressure.

Given the upward trend of TB infection in Malaysia, more public health programmes are needed to educate the public about TB and ways to prevent TB infection. The government plays a major role in promoting healthy lifestyles and creating public awareness about the risk of infectious diseases. Other than investing in printed and electronic health advertisements, the government is encouraged to promote healthy living through celebrity endorsements to achieve more effective and impactful results [44,45]. Banerjee and Dash (2013) proposed the use of celebrity endorsements to increase the power of persuasive messaging and make messages more appealing to larger sections of society [45]. Notwithstanding, new or digital media such as the internet, social media, and online streaming, can also be used to achieve this. Seymour (2018) affirmed that, in some circumstances, traditional mass media, including leaflets, newspapers, magazines, radio, and television, may be more effective [46]. For instance, in the Republic of Ireland, radio has the greatest reach and those reached through radio had better awareness of a national health campaign [46].

In contrast, Patel, Chang, Greysen, and Chopra (2015) had a different opinion. Their study aimed to evaluate the influence of social media [47], so they

conducted a systematic review on social media use in chronic diseases. Social media use was measured in terms of acquisition and the exchange of information. The authors found that, out of 42 studies, 48% showed the positive impact of social media, of which 85% was via Facebook. Accordingly, the selection of media that can reach the appropriate target groups to create awareness of specific public health issues is crucial.

## Conclusion

This study has shown that a positive attitude towards TB is important for educating patients on what to expect following a TB diagnosis, as well as how to engage with family, friends, and neighbours. Most importantly, a positive attitude can help these patients cope better with their TB and show greater consideration for others by practicing proper self-preventive healthcare. It is recommended that larger-scale research across different levels of society (e.g. prisoners, migrants, and Aborigines) be carried out to compare changes in patients' attitudes before and after TB diagnosis. Furthermore, it would be interesting to integrate a qualitative and quantitative modelling approach to analyse patients' attitudes towards TB and to evaluate the extent to which sociodemographic factors influence attitude. To the best of the authors' knowledge, there is a limited pool of research focused on the association between patients' attitudes and TB self-preventive care, particularly relating to the Malaysian context. More evidence and understanding about TB patients' attitudes may help guide TB prevention strategies and possibly save lives. In short, this study found that a favourable attitude towards TB as well as proper self-preventive care may reduce the chances of TB transmission and help control TB on a national level. If the recommendations proposed in this paper are implemented, Malaysia's aspiration to end the TB pandemic by the year 2035 will be realised.

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