

# Factors Associated with Health-Seeking Preference Among People Who Were Supposed to Cough for More Than 2 Weeks: A Cross-Sectional Study in Southeast China

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**Background:** The health-seeking preference of people with a cough >2 weeks had not been extensively researched in southeast China. The study aimed to explore factors associated with health-seeking preference, which could provide more evidence to improve individuals' appropriate health-seeking behavior.

**Materials and Methods:** From October 2018 to December 2018, this cross-sectional study was conducted in Zhejiang, China. A questionnaire was used to collect information on sociodemographic characteristics, knowledge of tuberculosis (TB), and health-seeking preference. The chi-square test and multivariable logistic regression were performed to evaluate factors associated with health-seeking preference.

**Results:** Of the 7174 participants, 3321 (46.3%) were men, 6148 (85.7%) were married, and 6013 (83.8%) knew about TB. Appropriate health-seeking preference was reported by 6229 (86.8%) participants. Respondents knowing about TB were more likely to seek appropriate care than those did not (89.6% vs 72.4%,  $p < 0.001$ ). Of the 6013 participants knowing about TB, respondents with higher scores on five key items of TB knowledge were more likely to get appropriate health-seeking preference. About 805 (96.6%) participants with 5 scores on TB knowledge had appropriate care preference. Only 97 (72.4%) participants with a score of 0 reported an appropriate preference. Multivariable logistic regression showed residence, marital status, education level, occupation, and awareness of TB knowledge were predictors of appropriate health-seeking preference. Compared to participants with a score of 0 on five TB key knowledge, participants with a score of 5 were 8.57 times more likely to have appropriate health-seeking preference (95% confidence interval [CI]: 4.97–14.78), followed by a score of 4 (odds ratio [OR]=5.99, 95% CI, 3.23–8.03); 3 (OR=3.74, 95% CI, 2.44–5.74); 2 (OR=1.99, 95% CI, 1.30–3.02) and 1 (OR=1.17, 95% CI, 0.76–1.80).

**Conclusion:** Participants with little knowledge of TB had a low level of appropriate health-seeking preference. Appropriate health-seeking preference of the participants improved with increased key knowledge level of TB.

**Keywords:** tuberculosis, health care-seeking behavior, cough

## Introduction

The global tuberculosis (TB)<sup>1</sup> report revealed that TB remained the top infectious killer worldwide. The disease can affect anyone anywhere, and approximately 10 million people become ill with TB each year globally.<sup>1</sup> To date, most TB patients

can be cured with a 6-month regimen of four first-line drugs and further transmission of infection is curtailed when patients are detected and treated in a timely manner. No new vaccine is licensed to prevent TB disease effectively, except for the Bacillus Calmette-Guérin vaccine. The preventive efficiency of this vaccine in adults is limited. The early detection of people with suspected symptoms and the standardized treatment of TB patients is crucial for the control and prevention of TB.

Previous studies demonstrated that the early detection of TB cases is affected by health-seeking delay and diagnosis delay.<sup>2,4</sup> Rapid molecular detection technology has been endorsed by the World Health Organization (WHO) for TB detection.<sup>5</sup> Compared to conventional methods, rapid molecular detection technology can greatly shorten the diagnosis delay time<sup>6,7</sup> (ie, the duration from the first visit to a healthcare facility to when TB is bacteriologically confirmed). Thus, measures are also necessary to conduct to promote people with suspected TB symptoms to seek appropriate health care in a timely manner. Compared to other symptoms, the relative importance of a cough persisting >14 days as a predominant symptom of TB has been demonstrated in previous studies.<sup>8,9</sup> The WHO refer to TB suspects as individuals with a cough persisting >2 weeks, if they are uninfected with the human immunodeficiency virus.<sup>10</sup> However, the time from symptom onset to the first visit to a doctor was reported as 2–5 weeks in many districts.<sup>11,14</sup> The health-seeking delay was affected by an individual's awareness of TB knowledge, the national TB control policy, health-seeking factors such as the first health-seeking facilities, and socio-demographic features.<sup>15,18</sup>

China is in the WHO's list of 30 countries with a high TB burden, and accounts for 9% of the global total new TB cases. Drug-resistant TB is also a public health threat in China with 14% share of the global burden of new cases of rifampicin-resistant TB in 2018.<sup>1</sup> However, new TB case detection in the National Tuberculosis Protocol in China follows the WHO recommended passive case-finding guidelines. People with TB-related symptoms are identified when they seek care at a general health facility and are referred to a local TB dispensary for diagnosis and treatment.<sup>19</sup> This passive case-finding strategy primarily depends on the individual's health-seeking behavior,<sup>20</sup> which is influenced by a multitude of factors, including socio-demographic characteristics and knowledge about the disease.<sup>21,22</sup> Zhejiang Province is a relatively developed district in southeast China. The TB incidence in

Zhejiang is in the low level in the country. However, based on the results of an investigation conducted in Zhejiang, 2018, the awareness rate of key knowledge on TB was only 48%.<sup>23</sup> The median of health-seeking delay of primary TB patients in Zhejiang Province is approximately 17 days, which is significantly longer than the diagnosis delay time.<sup>24</sup> Moreover, the health-seeking preference of people with suspected symptoms had not been extensively researched in southeast China. This study aimed to investigate health-seeking preference in the scenario of a cough lasting >2 weeks and associated factors that might provide evidence-based recommendation to promote people with suspected TB symptoms to seek appropriate health care in a timely manner.

## Materials and Methods

### Study Setting

From October 2018 to December 2018, a cross-sectional study was conducted in Zhejiang Province. Zhejiang Province is a relatively developed province in southeast China and consists of 11 prefectures. In 2018, it had a population of approximately 57 million residents and had an estimated landmass area of 105,500 square kilometers. The registered incident rate was reported to be 45.3/100,000 in 2018 by the Health Commission of Zhejiang Province.

### Design and Sampling

The study included all 11 prefectures of Zhejiang Province. The sample size was calculated, based on the following formula:  $n = \frac{(Z\alpha/2)^2 p(1-p)}{\delta^2}$  in which  $n$  is the required sample size in one prefecture and  $p$  is the estimated awareness rate of key knowledge about TB. The symbol  $\delta$  is the allowed margin of error. Previous study showed the awareness rate of key knowledge about TB was 44.5% in Zhejiang, 2014.<sup>25</sup> We regarded 50% as the knowledge level of TB among participants in study area, which could get larger sample size. With an estimated awareness rate of 50% at a 95% confidence level, a sample size of 600 individuals was needed to achieve a 5% margin of error at one prefecture. The total estimated sample size was 6600 individuals among all 11 cities. Stratified cluster sampling method was applied to choose the survey objects. First, one county was randomly selected from one prefecture. Second, two townships were selected based on the socioeconomic status of the sampled county. In each selected township, three villages or communities

were randomly selected. Thus, at least 100 participants from each sampled villages or communities needed to be investigated. If a selected respondent did not agree to participate in the study, another nonsampled neighborhood resident was selected.

## Eligibility

Eligible participants needed to meet all of the following inclusion criteria: (1) was 12–75 years old, (2) was a resident or had lived locally for >6 months at the time of the investigation, and (3) had no communication barriers or mental disorders.

## Questionnaire Survey and Quality Control

All investigators got provincial unified training. Qualified field investigators visited the participants face to face and conducted the survey. Electronic questionnaire, administered in the study, was developed based on previous research.<sup>25</sup> The electronic questionnaire could control the quality of the responses, prevent the occurrence of missing items and logistical problems. The information collected by the e-questionnaire included socio-demographic characteristics, whether knew of TB or not, and health-seeking behavior. If respondents knew of TB, key information about TB was interviewed further, otherwise not. Socio-demographic characteristics information included gender, age, education level, marital status, occupation and type of residence. There were five items on key information about TB based on the National Guideline for TB Prevention and Control: “Do you believe TB is infectious?” “Should we suspect TB if we have coughed for more than two weeks?” “Did you know whether TB should be treated in designated TB hospital?” “Do you know about the free policy about TB diagnosis and first-line drugs?” “Do you believe TB can be cured?”. The information collected by the e-questionnaire was exported into Microsoft Excel, in which the database was set up.

## Data Analysis

Statistical analysis was conducted by using IBM SPSS Statistics for Windows, version 19.0 (2010; IBM Corporation, Armonk, NY, USA). Participants' TB key knowledge score, ranging 0–5 points, was calculated, based on the number of correct answers to five items on key information about TB. One point was awarded for each correctly answered item of key TB information.<sup>25</sup>

Among individuals who were supposed to have a cough for at least 2 weeks, those who sought help from doctor in hospitals or other community medical institutions were categorized as having “appropriate” health-seeking preference, and those who did nothing or visited a pharmacy themselves were categorized as having “inappropriate” health-seeking preference.

Frequency and percentages were used to describe characteristics and knowledge about TB. The Chi-square test was used to assess differences in health-seeking preference between different social demographic characteristics, awareness of knowledge on TB. Multivariable logistic regression was conducted to evaluate the predictors of appropriate health-seeking preference, for which the adjusted odds ratios and their corresponding 95% confidence intervals were calculated. Another multivariable logistic regression was conducted to evaluate the effect of participants' TB key knowledge scores on health-seeking preference for which demographic characteristics were adjusted (eg, marital status, occupation, education level and type of residence). Stepwise logistic regression analysis was conducted in the multivariable logistic regression model. Analysis with a  $p$ -value < 0.05 (two-tailed test) was statistically significant.

## Ethical Consideration

Respondents were informed of the study procedure and that their participation was voluntary. Informed consent was acquired at the beginning of the interview and recorded digitally. Informed consent from one of parents or legal guardians was also acquired for any participant under the age of 18 years. The study was approved by the Ethics Committee of the Zhejiang Provincial Center for Disease Prevention and Control (Hangzhou, China; approval number: 2018–035).

## Results

### Social-Demographic Characteristics of the Participants

A total of 7260 respondents were invited to participate in the study and 7174 agreed to participate. The response rate was 98.8%. Among the 7174 participants, 3323 (46.3%) were male, 4077 (56.8%) lived in rural areas, 6151 (85.7%) were married. Two thousand three hundred twenty-eight (32.5%) individuals were educated at the junior middle school level, followed by 1786 (24.9%) at primary school, 999 (13.9%) at high school, and 817

(11.4%) illiterate individuals. More than one-half of the participants were over 50 years old. With respect to occupation, 2679 (37.3%) individuals were farmers, 2679 (37.3%) individuals were farmers, followed by 998 (13.8%) unemployed individuals, 960 (13.4%) industrial workers, and 933 (12.9%) business/service personnel (Table 1).

## Differences in the Health-Seeking Preference of Participants

Of the 7174 participants, appropriate health-seeking preference was reported by 6229 (86.8%) of them if they had a cough for at least 2 weeks. Significant statistical differences in health-seeking preference were observed for different marital statuses, age groups, education levels, and occupations. Divorced and widowed participants had a higher rate (20.2%) of inappropriate health-seeking preference.

More participants aged 60–75 years, 50–60 years, and 20–30 years, reported inappropriate health-seeking preference, compared to other age groups. Approximately 73.1% illiterate respondents expressed an appropriate health-seeking preference, which was a lower rate than that of participants in primary school (84%), junior middle school (88.7%), high school (90%), junior college (94.3%), and university and higher (93.4%). A higher proportion of farmers (16.9%) and unemployed respondents (15.6%) reported inappropriate preference than did individuals in other occupations. A significant statistical difference in health-seeking preference also existed between participants who did and did not know about TB (89.6% vs 72.4%,  $p < 0.001$ ) (Table 1).

## The Association Between Knowledge of TB and Health-Seeking Preference Among Participants Who Knew of TB

Table 2 shows the association between knowledge of TB and health-seeking preference among 6013 participants who knew of TB. Approximately 90% of participants had appropriate health-seeking preference if they believed TB was infectious. In addition, 94% believed TB should be suspected if cough persists for more than 2 weeks, 93.6% knew TB should be treated in a designated hospital, 93% knew of the free policy on TB diagnosis and first-line drugs, and 91.9% believed TB could be cured. A significant statistical difference in health-seeking preference existed between participants who had knowledge of TB

and participants who did not. The TB key knowledge scores of the 6013 participants who knew of TB was calculated, based on correct answers on five items of key information. The number of participants who had a score of 3 or a score of 4 was 1654 (for both), followed by 1127 participants with a score of 2; 611 participants with a score of 1; 833 participants with a score of 5; and 134 participants with a score of 0. More participants with higher scores had appropriate health-seeking preference: 96.6% of participants had a score of 5; 94%, a score of 4; 91.6%, a score of 3; 84.7%, a score of 2; and 75.6%, a score of 1. Only 72.4% of participants who had a score of 0 reported an appropriate preference, which was the same rate as that of participants who did not know about TB.

## Predictors of Health-Seeking Preference Among Participants Who Knew of TB

As presented in Table 3, multivariable logistic regression was conducted to detect the predictors of appropriate health-seeking preference if participants had a cough for >2 weeks. Participants who resided in a rural area were 1.54 times more likely (95% CI, 1.26–1.88) to have appropriate health-seeking preference than were urban residents. Unmarried participants were less likely than married participants to get appropriate health-seeking preference. Compared to illiterate participants, participants with an education level of primary school (OR=1.60; 95% CI, 1.21–2.11), junior middle school (OR=1.66; 95% CI, 1.26–2.20), high school (OR=1.92; 95% CI, 1.35–2.74), junior college (OR=4.02; 95% CI, 2.36–2.45), university and higher (OR=2.45; 95% CI, 1.49–4.02) were more likely to have appropriate health-seeking preference. No significant statistical difference existed in administrative staff (OR=1.04; 95% CI, 0.62–1.75) or professional technicians (OR=1.27; 95% CI, 0.86–1.86) versus farmers. Participants who believed TB should be suspected if a cough persisted for >2 weeks (OR=1.52; 95% CI, 1.23–1.88), had knowledge that TB should be treated in a designated hospital (OR=2.24; 95% CI, 1.85–2.70), had knowledge of the free policy on TB diagnosis and first-line drugs (OR=1.23; 95% CI, 1.01–1.51), and believed TB could be cured (OR=1.84; 95% CI, 1.53–2.22) were more likely to have an appropriate health-seeking preference.

In addition, when residence, education, marriage, and occupation were adjusted for (Figure 1), participants with higher scores based on correct answers on five items of key information were more likely to get appropriate

**Table 1** Sociodemographic Characteristics and Differences in Health-Seeking Preference of Participants in Zhejiang, China (n=7174)

| Item                                     | Total | Health-Seeking Preference in the Scenario of Having a Cough Persisting for at Least 2 Weeks |              |  | $\chi^2$ | p      |
|--|-------|---|--------------|--|----------|--------|
|  |       | Inappropriate   | Appropriate  |  |          |        |
|  | N     | n (%)   | m (%)        |  |          |        |
| <b>Sex</b>                               |       |   |              |  | 0.86     | 0.353  |
| Male                                     | 3323  | 451 (13.60)   | 2872 (86.40) |  |          |        |
| Female                                   | 3851  | 494 (12.80)   | 3357 (87.20) |  |          |        |
| <b>Residence</b>                         |       |   |              |  | 0.85     | 0.358  |
| Urban                                    | 3097  | 421 (13.60)   | 2676 (86.40) |  |          |        |
| Rural                                    | 4077  | 524 (12.90)   | 3553 (87.10) |  |          |        |
| <b>Marital status</b>                    |       |   |              |  | 15.05    | 0.001  |
| Married                                  | 6151  | 792 (12.90)   | 5359 (87.10) |  |          |        |
| Unmarried                                | 691   | 86 (12.40)  | 605 (87.60)  |  |          |        |
| Divorced or widowed                      | 332   | 67 (20.20)  | 265 (79.80)  |  |          |        |
| <b>Age group (y)</b>                     |       |   |              |  | 111.22   | <0.001 |
| 12–20                                    | 287   | 26 (9.10)   | 261 (90.90)  |  |          |        |
| 20–30                                    | 635   | 81 (12.80)  | 554 (87.20)  |  |          |        |
| 30–40                                    | 1052  | 84 (8.00)   | 968 (92.00)  |  |          |        |
| 40–50                                    | 1443  | 132 (9.10)  | 1311 (90.90) |  |          |        |
| 50–60                                    | 1805  | 248 (13.70)   | 1557 (86.30) |  |          |        |
| 60–75                                    | 1952  | 374 (19.20)   | 1578 (80.80) |  |          |        |
| <b>Education</b>                         |       |   |              |  | 216.40   | <0.001 |
| Illiterate                               | 817   | 220 (26.90)   | 597 (73.10)  |  |          |        |
| Primary school                           | 1786  | 285 (16.00)   | 1501 (84.00) |  |          |        |
| Junior middle school                     | 2328  | 263 (11.30)   | 2065 (88.70) |  |          |        |
| High school                              | 999   | 100 (10.00)   | 899 (90.00)  |  |          |        |
| Junior college                           | 561   | 32 (5.70)   | 529 (94.30)  |  |          |        |
| University and higher                    | 683   | 45 (6.60)   | 638 (93.40)  |  |          |        |
| <b>Occupation</b>                        |       |   |              |  | 93.07    | <0.001 |
| Administrative staff                     | 323   | 30 (9.30)   | 293 (90.70)  |  |          |        |
| Health care workers                      | 153   | 3 (2.00)  | 150 (98.00)  |  |          |        |
| Teachers                                 | 223   | 10 (4.50)   | 213 (95.50)  |  |          |        |
| Professional technicians                 | 585   | 58 (9.90)   | 527 (90.10)  |  |          |        |
| Business/service personnel               | 933   | 104 (11.10)   | 829 (88.90)  |  |          |        |
| Industrial workers                       | 960   | 106 (11.00)   | 854 (89.00)  |  |          |        |
| Farmers                                  | 2679  | 453 (16.90)   | 2226 (83.10) |  |          |        |
| Student                                  | 320   | 26 (8.10)   | 294 (91.90)  |  |          |        |
| Unemployed                               | 998   | 155 (15.50)   | 843 (84.50)  |  |          |        |
| <b>“Do you know about Tuberculosis?”</b> |       |   |              |  | 253.79   | <0.001 |
| No                                       | 1161  | 321 (27.60)   | 840 (72.40)  |  |          |        |
| Yes                                      | 6013  | 624 (10.40)   | 5389 (89.60) |  |          |        |

health-seeking preference. Compared to participants with a score of 0, participants with a score of 5 were 8.57 times more likely (95% CI, 4.97–14.78) to have appropriate

health-seeking preference, followed by participants with a score of 4 (OR=5.99; 95% CI, 3.23–8.03), a score of 3 (OR=3.74; 95% CI, 2.44–5.74); a score of 2 (OR=1.99;

**Table 2** The Association Between Knowledge of TB and Health-Seeking Preference Among Participants Who Knew About TB in Zhejiang, China (n=6013)

| Item  | Total | Health-Seeking Preference in the Scenario of Having a Cough Persisting for at Least 2 Weeks |         |             |         | $\chi^2$ | p      |
|---|-------|---|---------|-------------|---------|----------|--------|
|   |       | Inappropriate   |         | Appropriate |         |          |        |
|   | N     | n   | %       | N-n         | %       |          |        |
| <b>“Do you believe TB is infectious?”</b>   |       |   |         |             |         | 40.26    | <0.001 |
| No/unknown  | 591   | 106   | (17.90) | 485         | (82.10) |          |        |
| Yes   | 5422  | 518   | (9.60)  | 4904        | (90.40) |          |        |
| <b>“Should we suspect TB if we have coughed for more than two weeks?”</b>           |       |   |         |             |         | 69.97    | <0.001 |
| No  | 3845  | 494   | (12.80) | 3351        | (87.20) |          |        |
| Yes   | 2168  | 130   | (6.00)  | 2038        | (94.00) |          |        |
| <b>“Did you know whether TB should be treated in designated TB hospital?”</b>       |       |   |         |             |         | 203.8    | <0.001 |
| No  | 1987  | 365   | (18.40) | 1622        | (81.60) |          |        |
| Yes   | 4026  | 259   | (6.40)  | 3767        | (93.60) |          |        |
| <b>“Do you know about the free policy about TB diagnosis and first-line drugs?”</b> |       |   |         |             |         | 45.03    | <0.001 |
| No  | 3729  | 464   | (12.40) | 3265        | (87.60) |          |        |
| Yes   | 2284  | 160   | (7.00)  | 2124        | (93.00) |          |        |
| <b>“Do you believe TB can be cured?”</b>  |       |   |         |             |         | 126.34   | <0.001 |
| No  | 1305  | 245   | (18.80) | 1060        | (81.20) |          |        |
| Yes   | 4708  | 379   | (8.10)  | 4329        | (91.90) |          |        |
| <b>Numbers correctly answered for 5 items of TB key information</b>                 |       |   |         |             |         | 285.95   | <0.001 |
| 0   | 134   | 37  | (27.60) | 97          | (72.40) |          |        |
| 1   | 611   | 149   | (24.40) | 462         | (75.60) |          |        |
| 2   | 1127  | 172   | (15.30) | 955         | (84.70) |          |        |
| 3   | 1654  | 139   | (8.40)  | 1515        | (91.60) |          |        |
| 4   | 1654  | 99  | (6.00)  | 1555        | (94.00) |          |        |
| 5   | 833   | 28  | (3.40)  | 805         | (96.60) |          |        |

Abbreviation: TB, tuberculosis.

95% CI, 1.30–3.02); and a score of 1 (OR=1.17; 95% CI, 0.76–1.80).

## Discussion

This study investigated the health-seeking preference and associated factors of people in Zhejiang Province. We found that participants with little knowledge of TB had a low level of appropriate health-seeking preference. At present, a pulmonary TB detection strategy is primarily based on passive case-finding in health facilities in China. The appropriate health care-seeking choice of people with TB symptoms could improve access to TB diagnostic services and contribute to the early detection of cases.<sup>26</sup> The study results also indicated that participants with higher knowledge scores about TB were

more likely to report an appropriate health-seeking preference.

The proportion of participants with appropriate health-seeking preference was 86.8% if having a cough for at least two weeks in Zhejiang province, which was higher than that in the Western Cape of South Africa,<sup>27</sup> Ethiopia,<sup>28</sup> India,<sup>29</sup> and Vietnam.<sup>30</sup> A relatively low proportion of appropriate health-seeking preference was observed in two types of participants in our study: (1) participants who did not know about TB and (2) participants who knew of TB but had a score of 1 or less in five key areas of information about TB. Several studies have demonstrated that a delay in health-seeking behavior is influenced by the lack of knowledge of TB.<sup>31,33</sup> Similar reasons such as wrong concepts were also mentioned in

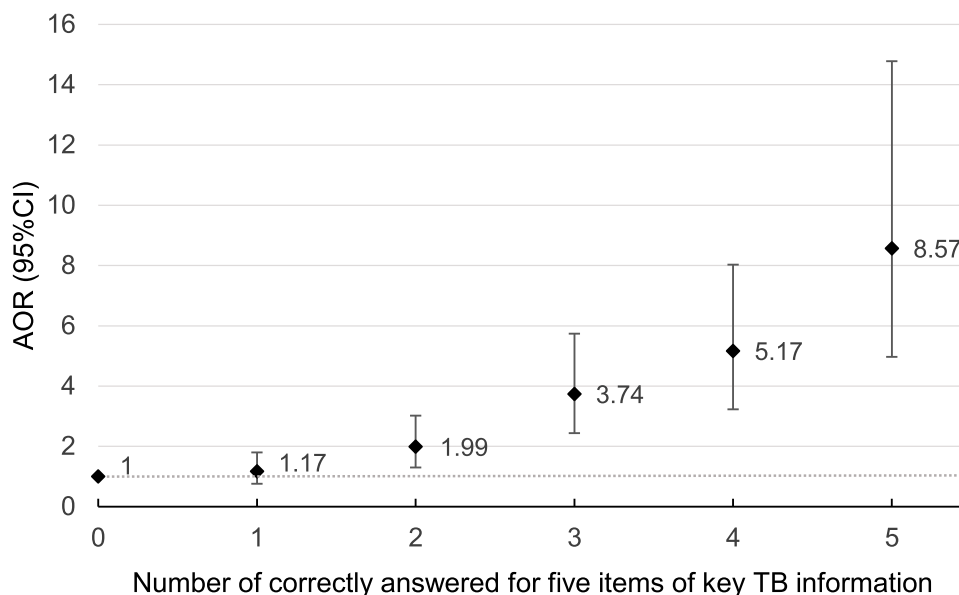
**Table 3** Predictors of Health-Seeking Preference Among Participants Who Knew About TB in Zhejiang, China (n=6013)

| Item   | Health-Seeking Preference in the Scenario of Having a Cough for at Least 2 Weeks |                    |        |
|--|--|--------------------|--------|
|  | Appropriate/Total  | AOR (95% CI)       | P      |
| <b>Residence</b>   |  |                    |        |
| Urban  | 2384/2672  | 1                  |        |
| Rural  | 3005/3341  | 1.54 (1.26–1.88)   | <0.001 |
| <b>Marriage status</b>   |  |                    |        |
| Married  | 4682/5214  | 1                  |        |
| Unmarried  | 499/560  | 0.52 (0.36–0.76)   | 0.001  |
| Divorced or widowed  | 208/239  | 1.10 (0.73–1.65)   | 0.65   |
| <b>Education level</b>   |  |                    |        |
| Illiterate   | 441/550  | 1                  |        |
| Primary school   | 1230/1403  | 1.60 (1.21–2.11)   | 0.001  |
| Junior middle school   | 1773/1970  | 1.66 (1.26–2.20)   | <0.001 |
| High school  | 830/907  | 1.92 (1.35–2.74)   | <0.001 |
| Junior college   | 503/527  | 4.02 (2.36–6.83)   | <0.001 |
| ≥University  | 612/656  | 2.45 (1.49–4.02)   | <0.001 |
| <b>Occupation</b>  |  |                    |        |
| Farmer   | 1825/2102  | 1                  |        |
| Administrative staff   | 281/308  | 1.04 (0.62–1.75)   | 0.878  |
| Health care worker   | 147/148  | 10.68 (1.44–79.13) | 0.02   |
| Teacher  | 206/216  | 2.09 (0.99–4.40)   | 0.052  |
| Professional technician  | 490/538  | 1.27 (0.86–1.86)   | 0.232  |
| Business/service personnel   | 745/821  | 1.45 (1.06–1.98)   | 0.02   |
| Industrial worker  | 771/847  | 1.55 (1.16–2.06)   | 0.003  |
| Student  | 221/240  | 3.79 (2.04–7.06)   | <0.001 |
| Unemployed   | 703/709  | 1.72 (1.29–2.29)   | <0.001 |
| <b>“Should TB be suspected if a cough and expectoration persists for &gt;2 weeks?”</b> |  |                    |        |
| No   | 3351/3845  | 1                  |        |
| Yes  | 2038/2168  | 1.52 (1.23–1.88)   | <0.001 |
| <b>“Do you know TB should be treated in designated TB hospital?”</b>                   |  |                    |        |
| No   | 1622/1987  | 1                  |        |
| Yes  | 3767/4026  | 2.24 (1.85–2.70)   | <0.001 |
| <b>“Do you know about the free policy about TB diagnosis and first-line drugs?”</b>    |  |                    |        |
| No   | 3265/3729  | 1                  |        |
| Yes  | 2124/2284  | 1.23 (1.01–1.51)   | 0.044  |
| <b>“Do you believe TB can be cured?”</b>   |  |                    |        |
| No   | 1060/1305  | 1                  |        |
| Yes  | 4329/4708  | 1.84 (1.53–2.22)   | <0.001 |

**Abbreviations:** AOR, adjusted odds ratio; CI, confidence interval; TB, tuberculosis.

Vietnam<sup>34</sup> and China.<sup>35</sup> The inappropriate health-seeking behavior like self-medication could also contribute to the delay in the diagnosis and treatment by tuberculosis

patients.<sup>36</sup> Compared to participants with a score of 0 on TB knowledge, participants with a score of 2 or more were more likely to have appropriate health-seeking preference.



**Figure 1** The association between knowledge of TB and health-seeking behavior among participants who knew about TB in Zhejiang, China (n=6013).  
**Notes:** 1) When residence, education, marriage, and occupation were adjusted for, participants with higher scores based on correct answers on five items of key information were more likely to get appropriate health-seeking preference. 2) Compared to participants with a score of 0, participants with a score of 5 were 8.57 times more likely (95% CI, 4.97–14.78) to have appropriate health-seeking preference, followed by participants with a score of 4 (OR=5.99; 95% CI, 3.23–8.03), a score of 3 (OR=3.74; 95% CI, 2.44–5.74); a score of 2 (OR=1.99; 95% CI, 1.30–3.02); and a score of 1 (OR=1.17; 95% CI, 0.76–1.80). 3) Appropriate health-seeking preference of the participants increased as the key knowledge scores increased.

However, the awareness rate of key information on TB was only about 50% in Zhejiang Province.<sup>25</sup> Thus, more effective efforts such as community-based interventions,<sup>37</sup> educational programs in schools,<sup>38</sup> or multiple sources of information<sup>39</sup> are necessary to conduct to convey more specific knowledge. These efforts could contribute to appropriate health-seeking behavior by people with suspected TB symptoms.

As stated in several studies,<sup>22,40</sup> women are less likely than men to visit a medical health provider. A similar finding was also reported in a western province of China.<sup>32</sup> This finding was associated with their poor knowledge of TB, and affected by their relatively lower position in a family and heavy housework, which led to their having fewer opportunities to learn information about TB. However, our findings suggested that no significant difference in appropriate health-seeking preference existed between women and men. Two kinds of factors may contribute to the result. First, no significant difference was reported between women and men on their awareness of TB and key information on TB in Zhejiang Province.<sup>23</sup> Second, Zhejiang is a relatively prosperous and developed province in China. It has a more convenient transportation network, higher per-capita income levels. Thus, both women and men having more accessibility to health care facilities when they do not feel well. Despite these factors,

their knowledge of TB and appropriate health-seeking preference were not very high. Measures should be taken to promote earlier appropriate health-seeking choice of people with symptoms of suspected TB.

The appropriate health-seeking choice was affected by knowledge level, and determined by education level, occupation, economic factors, social support, availability of adequate health services, and so on.<sup>41,42</sup> More participants with a higher education level reported appropriate health-seeking choices than did illiterate individuals, which was confirmed in our study and other research studies.<sup>43</sup> Compared to the married, the unmarried were less likely to have an appropriate health-seeking preference among participants who knew about TB, which might not only associate with their low awareness of TB knowledge, but also associate with their less social support from family. In our study, no significant difference was observed between rural and urban residents. However, when they knew about TB, rural residents were more likely than urban citizens to acquire an appropriate health-seeking choice. In Zhejiang Province, the detection, diagnosis, and treatment of TB was primarily based on a hierarchical medical system. Community health service institutions are convenient. Patients could get a higher reimbursement ratio of the national basic medical insurance in community health services. Patients with suspected TB identified by



community health service workers would be transferred to the local TB-designated hospital. Some urban citizens with mild symptoms but without sufficient knowledge of TB may first select inappropriate health-seeking. In addition, the sensitivity of only the symptom of a cough persisting >2 weeks for detecting individuals with TB was not very high.<sup>8</sup> This fact could also confuse people with other respiratory diseases. This may also affect the choice of farmers, whose knowledge about TB was relatively poorer than other occupation participants. However, although students' knowledge on TB was also in low, their health-seeking choice was more likely to be appropriate than farmers. Students could get more support from school and family when they did not feel well. Thus, different policies based on different population groups should be considered to strengthen accurate information dissemination on TB. Education program on promoting awareness of TB and appropriate health-seeking choice was conducted, especially for farmers.

Some limitations of our research exist. First, all information obtained in the survey depended on the participants' recalled history. Second, the health-seeking preference reported by participants, which was based on what they usually did, assumed that they had experienced a cough for 2 weeks or longer. The results reported may have a bias with their actual behavior. Third, causal conclusions cannot be drawn because of the nature of the cross-sectional study method employed in the study. In addition, the survey results reflected the present situation in Zhejiang Province, and could only apply to areas with similar demographic characteristics and economical status.

## Conclusion

Our study results indicated participants with little knowledge of TB had a low level of appropriate health-seeking choice. An inappropriate health-seeking choice occurred more frequently among farmers, individuals with a low education level. Appropriate health-seeking preference of the participants increased as the key knowledge scores increased. Hence, public health education on the knowledge of TB and appropriate health-seeking choice would be important. A change in policy to focus on high-risk group of inappropriate health-seeking behavior should also be necessary. In the future research, it is necessary to evaluate the role of health interventions and policy in improving health-seeking behavior and the prevention and control of TB.

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## Author Contributions

W.W., B.C., X.W., C.C involved in the design of the study. W.W., B.C., F.W., Y.P., K.L., X.C. involved in data collection and analysis. W.W., B.C. wrote the initial draft and reviewed the manuscript. All authors read and approved the final manuscript.

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## Disclosure

The authors report no conflicts of interest in this work.

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