

Tuberculosis Screening Perception of Household Contact of Tuberculosis Patients in Nakhon Si Thammarat Province[†]

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Abstract

Introduction: Tuberculosis (TB) screening constitutes a crucial element in TB management, particularly among populations at heightened risk, such as household contacts (HHCs) of TB patients. **Methods:** This cross-sectional analytical study, conducted in the significant context of Nakhon Si Thammarat province, examined the perceptions of TB screening and associated factors among HHCs. A random sampling of 310 volunteers was from 4 districts of Nakhon Si Thammarat province. Data were gathered through a questionnaire and analyzed using descriptive statistics and Pearson correlation. **Results:** Most respondents were female (70 %), with an average age of 43 (SD = 13.23). Chest X-ray screening had been undergone by 41.03 % of household contacts. Notably, a significant proportion (58.06 %) demonstrated a heightened perception regarding the importance of TB screening for health. Analysis revealed significant associations between TB screening and various factors, including perceived susceptibility ($r = 0.40$), severity ($r = 0.22$), threat ($r = 0.15$), benefits ($r = 0.33$), barriers ($r = -0.03$), and cues to action ($r = 0.30$) at $p < 0.05$. **Conclusion:** This study's findings underscore the critical role of health perception in influencing TB screening uptake among HHCs and provide clear recommendations for TB control organizations to address the identified perception gaps.

Keywords: TB screening, Perception, Household contact, TB patients, Related factors

Introduction

In 2022, the global burden of Tuberculosis (TB) remained significant, with 133 cases per 100,000 population and a death rate of 15 %, surpassing the targets set forth by the World Health Organization (WHO). Within this context, Thailand was classified as a high-burden country for TB, reporting an estimated incidence of 155 cases per 100,000 population and a death rate of 11 % in the same year, both exceeding global averages (World Health Organization, 2022). Household contacts (HHCs) of TB patients are identified as a particularly vulnerable group, given their increased risk of TB infection ranging from 30 to 42.7 % and progression to active disease from 4 to 7.8 % (World Health Organization, 2022).

TB screening plays a pivotal role in managing the disease, especially among high-risk populations like household contacts (HHCs), as it facilitates early detection and treatment initiation, thereby improving treatment outcomes and reducing associated costs. Moreover, effective TB screening initiatives can potentially lower disease prevalence and forestall future community transmission. However, despite its benefits, TB screening and registration rates in Thailand and Nakhon Si Thammarat Province stood at 70 and 67 %, respectively, according to TB passive screening, falling short of the Public Health Ministry's target of 90 % (Department of TB Thailand, 2022). This shortfall underscores the urgent need to identify

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TB cases, considering the profound impact of TB on both individuals and communities, spanning physical, mental, and social dimensions.

From a physical perspective, TB inflicts lasting damage to the lungs, resulting in respiratory symptoms and an increased risk of obstructive respiratory diseases, with up to 60.7 % of individuals experiencing a decline in lung function post-TB (Meghji et al., 2020; Silva et al., 2021). These physical ramifications not only diminish the quality of life but also engender mental health challenges, with TB patients experiencing high levels of stress (63 %) and a substantial risk of depression (23 %), often compounded by feelings of stigma and self-reproach (Ayana et al., 2019; Agbeko et al., 2022). Additionally, the economic burden of TB, including indirect costs such as income loss and expenses for nutritional supplements and transportation, can impose catastrophic financial strain on affected families (Kilale et al., 2022).

Literature indicates that demographic factors significantly influence TB screening behaviors. Older individuals tend to undergo screening more frequently, driven by a heightened awareness of aging-related health-related concerns (Ahmadi & Hakim, 2019; Yoshitake et al., 2019). Moreover, higher levels of education are positively associated with increased TB screening uptake, indicative of enhanced health literacy and awareness (Putra et al., 2018; Wang et al., 2019). Similarly, individuals co-infected with HIV exhibit a greater propensity for TB screening, often due to concurrent HIV care and convenient access to screening services (Shiferaw et al., 2019). Thailand's health policies have also played a pivotal role in promoting TB screening, particularly among at-risk groups, such as individuals aged 35 years and older with chronic diseases like diabetes and hypertension, entitled to free screening services (Department of TB Thailand, 2020). However, family size and socioeconomic status also influence screening behaviors, with smaller families and higher incomes correlating with increased screening rates (Putra et al., 2018). Nonetheless, logistical barriers such as work commitments and transportation challenges may impede screening access for some households (Khaji et al., 2021).

According to the Health Belief Model, perception factors, including perceived susceptibility, severity, benefits, barriers, and cues to action, also shape TB screening decisions among HHCs. (Khaji et al., 2021; Shiferaw et al., 2019; Yoshitake et al., 2019). Individuals who perceive themselves as susceptible to TB are more inclined to undergo screening, driven by concerns for their health (Nababan et al., 2019; Yoshitake et al., 2019). Similarly, awareness of TB severity and associated threats, such as work absenteeism and financial losses, 2021 can motivate screening uptake (Khaji et al., 2021). Moreover, the HHCs that believe the benefits of TB screening could protect their health tended to be screened (Yoshitake et al., 2019; Shiferaw et al., 2019; Biermann et al., 2021). Conversely, perceived barriers such as transportation difficulties may hinder screening participation, while cues to action from healthcare providers, relatives, and social media can facilitate screening engagement (Shaynaputri et al., 2021).

Despite the extensive international literature on TB screening perceptions, scant attention has been directed toward understanding HHCs' perspectives in Nakhon Si Thammarat province, Thailand. While a few studies in Thailand have explored demographic and select perception-related factors influencing TB screening, comprehensive investigations are lacking (Pathan et al., 2020; Maseng, 2020). Therefore, this study aims to assess HHCs' TB screening rates and elucidate their health-related perceptions concerning TB screening in Nakhon Si Thammarat Province.

Methodology

Research design and setting

This cross-sectional analytic study explored the perception of TB screening and related factors among HHCs in Nakhon Si Thammarat province.

Population and samples

The HHCs of TB patients diagnosed with new pulmonary TB with bacteriological confirmed TB case (B+) at Nakhon Si Thammarat province were registered in the National TB Information Program in the 2022 fiscal year. The sample size was calculated using Taro Yamane (1973). The estimated sample size was 280, and 10 % for dropouts, up to 310. We adopted stratified purposive sampling in the 4 areas that have the highest burden of TB, including Chawang District (38), Thungsong District (67), Cha-aud District

(48), Sichon District (40), Muang District (117). Inclusion criteria were 1) living with a TB patient for 3 months before the patient manifested the symptoms or before diagnosis until the treatment started, 2) being the most contact or caregiver, and 4) having no history of intellectual disability. Exclusion criteria were HHCs that were not present during data collection.

Data collection

Data were collected using demographics and the health perception of tuberculosis screening in a household contact of tuberculosis patients at Nakhon Si Thammarat province questionnaire. The demographics questionnaire includes gender, age, education level, underlying disease, family member, family income, respondent TB screening, and family member TB screening. In the perception part, they have assessed perceived susceptibility (10 items), perceived severity (5 items), perceived threat (5 items), perceived benefits (5 items), perceived barriers (5 items), and perceived cues to action (5 items) totally 35 items. The questionnaire was a rating scale with 3 levels. The total score of perceptions was 105 points divided into 5 levels: 35 - 49 points (very low level), 50 - 64 points (low level), 65 - 79 points (moderate level), 80 - 94 (high level), and 95 - 105 (very high level)

The questionnaire was validated by 5 experts and tested for content validity. Scale - Level Content Validity Index: S - CVI was 0.80. The questionnaire was then tested for reliability with thirty HHCs in 2022 and showed good internal consistency reliability with Cronbach's alpha of each perception component as 0.70 - 0.80 and 0.8 for all perceptions. To collect data, participants' records were collected from the National Tuberculosis Information Program. In addition, the researcher visited a TB patient's home who had been cured since 2022 in April - December 2023, and participants were interviewed for 30 - 45 min.

Ethical consideration

The study received ethical approval from Walailak University's Ethics Review Committee (WUEC-23-122-01). Prior to data collection, participants were provided with comprehensive information regarding the research objectives, data collection procedures, potential risks, anticipated benefits, rights to withdraw from the study, and confidentiality measures. Participants were required to provide informed consent, and permission to access their medical records was obtained.

Data analysis

Demographic data and TB perception scores were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation. Additionally, Pearson correlation analysis explored relationships between perceptual factors and TB screening behaviors.

Results and discussion

Demographic Characteristics: The study population was predominantly female, accounting for 70 % of participants, with an average age of 42.62 years (SD = 13.23). Regarding education level, 40.97 % of participants had completed high school or vocational training. Furthermore, a significant majority (74.19 %) reported no underlying diseases, as summarized in **Table 1**.

Perceptions of TB Screening: Analysis of participants' perceptions regarding TB screening revealed noteworthy findings. The majority of participants demonstrated high and very high levels of perception regarding TB screening, constituting 58.06 and 34.52 % of the sample, respectively, as depicted in **Table 2**.

TB Screening Rates: Despite the favorable perceptions observed among participants, TB screening rates remained suboptimal. Only 61.61 % of participants and 41.03 % of household contacts (HHCs) underwent TB screening. Notably, within HHCs where all family members were screened, this proportion slightly increased to 41.29 %.

Table 1 Participants' demographics (n = 310).

Demographics	Frequency	Percentage
Age Min - Max = 20 - 78 , Mean = 42.62 (SD = 13.23)		
< 30	76	24.52
30 - 59	204	65.81
≥ 60	30	9.67
Gender		
Male	94	30.30
Female	216	69.70
Education level		
Primary school/lower	70	22.58
high school/vocational training	127	40.97
Bachelor's degree/higher	113	36.45
Underlying disease		
No	230	74.19
Yes	80	25.81
Family income		
< 10,000	144	46.45
10,000 - 20,000	102	32.90
> 20,000	64	20.65
Family member		
≤ 4	223	71.94
> 4	87	28.06

Table 2 TB screening perception.

Perception	Total	M(SD)	n	%
Lower	35 - 49	48 (0.71)	1	0.32
Low	50 - 64	50 (9.90)	1	0.32
Moderate	65 - 79	73.67 (16.43)	21	6.77
High	80 - 94	88.88 (4.06)	180	58.07
Very high	95 - 105	97.99 (2.91)	107	34.52

Correlation between Perceptual Factors and TB Screening: Pearson correlation analysis revealed significant associations between all perceptual factors and TB screening behaviors. Perceived susceptibility exhibited a moderately positive correlation with TB screening ($r = 0.39, p < 0.01$), indicating that individuals who perceived themselves as more susceptible to TB were more likely to undergo screening. Similarly, perceived severity ($r = 0.23, p < 0.01$), perceived threat ($r = 0.20, p < 0.01$), and perceived benefits ($r = 0.29, p < 0.01$) demonstrated positive correlations with TB screening, albeit of varying strengths. Conversely, perceived barriers displayed a negligible negative correlation ($r = -0.03, p < 0.01$) with TB screening, suggesting that perceived obstacles may marginally deter screening participation. Notably, perceived cues to action exhibited a moderately positive correlation ($r = 0.30, p < 0.01$) with TB screening, indicating that external stimuli and recommendations significantly influenced

screening uptake. The study found that Perceived susceptibility was the most correlated. These findings underscore the multifaceted influence of perceptual factors on individuals' decisions regarding TB screening, as summarized in **Table 3**.

Table 3 The relationship between TB screening perception and TB screening.

Factors	1	2	3	4	5	6	7
1) Perceived susceptibility	1	0.48**	0.42**	0.60**	-1.6**	0.29**	0.40**
2) Perceived severity		1	0.42**	0.50**	-0.2**	0.41**	0.22**
3) Perceived threat			1	0.36**	-0.29**	0.24**	0.15**
4) Perceived benefits				1	-0.0	0.41**	0.33**
5) Perceived barriers					1	0.05	-0.03**
6) Perceived cue to action						1	0.30**
7)TB screening							1

** $p < 0.01$

Discussion

The TB screening rate among household contacts (HHCs) in Nakhon Si Thammarat province, standing at 41.03%, falls significantly below the Ministry of Public Health's target of 90%. Despite this shortfall, it is noteworthy that the TB screening rate in Nakhon Si Thammarat province surpasses that of other regions within Thailand, such as Maharakam province in the Northeast, which reported a substantially lower rate of 27% (Patan et al., 2020). Moreover, comparisons with international counterparts reveal that Thailand, including Nakhon Si Thammarat province, exhibits higher TB screening rates than countries like Indonesia (13.1%) and Southern Ethiopia (26.5%), all of which are classified as high-burden TB countries (Shaynaputri et al., 2021; Tesfaye et al., 2020). Nevertheless, the persistently low TB screening rates pose significant challenges, as early detection and intervention are pivotal in interrupting the cycle of TB transmission (Department of TB Thailand, 2020). The high and very high levels of health perception regarding TB screening observed among HHCs in Nakhon Si Thammarat province, encompassing 58.0 and 34.5 % of participants, respectively, underscore the importance and impact of disease awareness initiatives. Notably, Nakhon Si Thammarat province served as a pilot location for the "Nakhon Si Zero TB Project", which likely contributed to the elevated levels of TB screening perception among HHCs (Thai-Siam, 2022).

Analysis of the relationship between TB screening perception and actual screening behaviors reveals the complex interplay between disease perception and screening perception. HHCs who perceived themselves as being at high risk of TB infection and recognized TB's severity and potential consequences were more inclined to undergo screening (Nababan & Jael, 2019; Yoshitake et al., 2019). Intimate exposure to TB patients provided HHCs with firsthand insights into the disease's progression, treatment regimen, and associated challenges, fostering a heightened sense of perceived threat and the importance of screening (Maseng, 2020; Khaji et al., 2021). Conversely, perceived barriers such as work commitments and transportation issues posed significant obstacles to screening participation, particularly among working-age individuals (Shaynaputri et al., 2021; Khaji et al., 2021). Notably, external influences and recommendations from healthcare workers, family members, and social media platforms were pivotal in motivating HHCs to undergo TB screening. Additionally, family support, including financial assistance and emotional encouragement, mitigated the stigma and anxiety associated with TB, thereby serving as effective cues to action for screening uptake (Shaynaputri et al., 2021). Despite the positive associations between perceptual factors and TB screening, the overall screening rate remains suboptimal, with 61.61 % of participants undergoing screening. This discrepancy underscores the need for targeted education and awareness campaigns to address misconceptions and enhance understanding among HHCs. For instance,

many respondents held misconceptions regarding TB transmission, severity, and isolation protocols, highlighting the necessity for comprehensive education initiatives (Wanchaitanawong et al., 2020; MacPherson et al., 2020; Department of TB Thailand, 2020).

Conclusions

The findings highlight the complex interplay between demographic characteristics, perceptions, and TB screening behaviors among Nakhon Si Thammarat province HHCs. Despite favorable perceptions of TB screening, the discrepancy between perception and actual screening rates underscores the need for targeted interventions to bridge this gap. The positive correlations observed between perceived susceptibility, severity, benefits, and cues to action with TB screening emphasize the importance of addressing individual beliefs and external influences in promoting screening uptake. However, the marginal correlation between perceived barriers and TB screening suggests that additional factors beyond perceived obstacles may influence screening behaviors, warranting further exploration. Overall, these results provide valuable insights for developing tailored strategies to enhance TB screening among high-risk populations and mitigate the burden of TB in the community.

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