

ORIGINAL ARTICLE

Enhancing Acceptance of Tuberculosis Preventive Treatment Among Healthcare Workers in Hospital Betong

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ABSTRACT

Introduction: Latent tuberculosis infection (LTBI) presents an occupational risk to healthcare workers (HCWs), with potential progression to active tuberculosis if untreated. Tuberculosis preventive treatment (TPT) is central to national TB control efforts, yet acceptance among HCWs remains variable, particularly in district hospitals. This study assessed HCWs' knowledge, attitude, and practice (KAP) toward LTBI and TPT at Hospital Betong, Sarawak, and examined willingness to accept preventive therapy. **Materials and Methods:** A cross-sectional study was conducted among HCWs at Hospital Betong involved 147 respondents. Data were collected using a structured questionnaire comprising demographics, knowledge, attitude, and practice. Knowledge was scored dichotomously (Yes = 1, No = 0), while attitude and practice were measured using a five-point Likert scale. Composite KAP scores were converted into percentages and categorised using Bloom's cut-off criteria. The association between KAP level and TPT acceptance was analysed using the chi-square test. **Results:** Moderate overall KAP was observed in 64.6% of respondents, 34.0% demonstrated high KAP, and 1.4% low KAP. Overall TPT acceptance was 80.3%. Acceptance increased significantly with higher KAP levels ($x = 12.47$, $df = 2$, $p = 0.002$), reaching 96.0% among those with high KAP compared to 72.6% among those with moderate KAP. Reported barriers included fear of side effects, stigma, limited awareness, doubts about effectiveness, and time constraints. **Conclusion:** Higher KAP levels were associated with greater TPT acceptance. Addressing behavioural and workplace barriers through targeted education and institutional support may improve preventive treatment uptake in district hospital settings.

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INTRODUCTION

TB remains a global public health threat and poses a significant occupational risk to HCWs due to their frequent exposure to infected patients (1). A primary concern is LTBI, an asymptomatic state that can progress to active TB disease in 5-10% of cases if left untreated (2). HCWs are at a heightened risk of LTBI due to their repeated exposure to TB patients, both diagnosed and undiagnosed (1). Previous Malaysian studies have demonstrated the presence of latent tuberculosis infection among healthcare-related populations, including medical students, indicating ongoing occupational exposure risk (3).

Preventing this progression through TPT is a cornerstone of infection control. In line with global efforts, Malaysia's National Strategic Plan to End TB 2021–2030 advocates for routine HCW screening and TPT (4). Despite national guidelines and the introduction of shorter treatment regimens, TPT uptake among HCWs remains inconsistent, particularly in district hospitals with limited resources (5).

Complex behavioural and systemic factors influence acceptance of TPT. Common barriers include knowledge gaps, fear of side effects, perceived stigma, and doubts about treatment efficacy (5, 6). These are often compounded by institutional hurdles like limited access to diagnostics and inadequate workplace support (2). Theoretical frameworks like the HBM and the TPB suggest that perceived risk, beliefs about treatment, and workplace norms are crucial in shaping HCWs' decisions (7,8).

Although studies on HCWs' KAP toward LTBI and TPT have been reported in Malaysia and internationally, there is limited research addressing the unique challenges faced in smaller district hospitals such as Hospital Betong, Sarawak. These hospitals play a critical role in TB control, yet often encounter constraints in staffing, training, and preventive health resources. This study, therefore, aimed to assess the KAP of HCWs at Hospital Betong toward LTBI and TPT, and to identify specific barriers affecting their acceptance of preventive therapy. By addressing this gap, the findings are expected to inform targeted interventions to improve TPT uptake in district hospitals, thereby strengthening Malaysia's national TB elimination efforts.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional study was conducted at Hospital Betong, a district hospital in Sarawak, Malaysia. The study population consisted of HCWs with direct or indirect exposure to TB within the clinical environment. A total of 233 HCWs were invited to participate. After applying eligibility criteria, 147 valid responses were included in the final analysis, yielding a response rate of 63.1%. Respondents with a prior history of TB were excluded to avoid bias in perceptions and treatment decisions. A simple random sampling method was employed to ensure representation across different professional categories.

Data Collection

Data were collected using a structured, self-administered online questionnaire distributed via Google Forms to maintain anonymity and encourage honest responses. The instrument was developed based on constructs derived from the HBM and the TPB. Items reflected key theoretical domains including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, attitudes, and behavioural intention toward TPT. However, while theoretical constructs informed item development, the analytical approach focused on composite KAP scores rather than separate modelling of individual HBM or TPB domains. The Knowledge items were measured using dichotomous response options (Yes/No), The Attitude and Practice sections utilised a five-point Likert scale ranging from 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, to 5 = strongly agree. Content validity was established through expert review by two subject matter specialists in occupational health and infectious disease control. A pilot test involving ten healthcare workers was conducted to assess clarity and reliability. Internal consistency reliability was confirmed using Cronbach's alpha, with values exceeding the acceptable threshold of 0.70 across the attitude and practice sections.

Data Analysis

The questionnaire consisted of four sections: Section 1

assessed demographic characteristics (5 items), Section 2 assessed knowledge (6 items), Section 3 assessed attitude (4 items), and Section 4 assessed practice (3 items). The primary explanatory variable was the composite KAP score. For the knowledge section, responses were scored as Yes = 1 and No = 0, giving a total possible knowledge score ranging from 0 to 6. For the attitude and practice sections, responses were measured using a five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). The total possible attitude score ranged from 4 to 20, and the total possible practice score ranged from 3 to 15, with higher scores reflecting more positive attitudes and better practices. Responses to all KAP items were summed to generate an overall score for each respondent. The total composite KAP score ranged from 7 to 41 before conversion into percentage form. The total score was converted into a percentage of the maximum attainable value. Categorisation was based on percentage score thresholds commonly applied in KAP studies ($\leq 50\%$ low, 51–75% moderate, $>75\%$ high), as reported in previous empirical research (9, 10, 11). The primary outcome variable was willingness to accept TPT if diagnosed with LTBI. This variable was treated as dichotomous (accept vs decline). Data were analysed using the Statistical Package for Social Sciences (SPSS) version 25.0. Descriptive statistics, including frequencies and percentages, were used to summarise demographic characteristics, individual KAP items, composite KAP levels, and reported barriers to TPT acceptance. Although questionnaire items were informed by HBM and TPB constructs, inferential analysis was conducted at the composite KAP level rather than at individual theoretical domains. The association between KAP level and TPT acceptance was examined using the chi-square (χ^2) test. Statistical significance was set at $p < 0.05$. Barriers to TPT acceptance were analysed using frequency distributions to identify the most commonly reported concerns among respondents who declined treatment.

ETHICAL CLEARANCE

The Centre for Research and Innovation (CRI), Open University Malaysia, Ethical Review Reference Number: CRI-RK-750-07-01.

RESULTS

A total of 233 HCWs from Hospital Betong were invited to participate in this study. After applying inclusion and exclusion criteria, 147 valid responses were analysed, yielding a response rate of 63.1%. The majority of respondents were female (74.1%), and the largest age group was 30–39 years (44.9%). Nurses (24.5%) and medical assistants (23.1%) formed the largest professional groups. The most common length of service was 11–20 years (37.4%). **Table 1** presents the demographic characteristics of the study participants.

Table I: Demographic of the study population

Variables		Freq	Percentage %
Age	20-29	29	19.7
	30-39	66	44.9
	40-49	34	23.1
	50-59	18	12.2
Gender	Male	38	25.9
	Female	109	74.1
Position	Pharmacist	10	6.8
	Allied Health	19	12.9
	Medical Practitioner	8	5.4
	Medical Assistant	34	23.1
	Nurse	36	24.5
Duration of working in Hospital Betong	Healthcare Assistant	40	27.2
	< 5 years	31	21.1
	6 – 10 years	26	17.7
	11 – 20 years	55	37.4
	>20 years	35	23.8

Knowledge, Attitude and Practice

Among the 147 respondents, knowledge levels were generally high. At the item level, more than 90% correctly recognised that LTBI can progress to active TB if untreated (93.2%), that healthcare workers are at increased occupational risk (95.9%), and that untreated LTBI poses a health risk to others (92.5%). A large proportion acknowledged the severity of LTBI progression (92.5%) and the effectiveness of TPT in preventing active TB (96.6%) (**Table II**). The total knowledge score ranged from 0 to 6. Based on the cut-off criteria (0–3 = low, 4 = moderate, 5–6 = high), the majority of respondents demonstrated high knowledge levels (n = 135, 91.8%), while 8 (5.4%) had moderate knowledge and 4 (2.7%) had low knowledge.

Table II: Knowledge on LTBI (n=147)

Knowledge	Frequency (%)
Know LTBI can develop into active TB if left untreated	137 (93.2%)
Know HCWs at higher risk of contracting LTBI	141 (95.9%)
Know untreated LTBI poses health risk others	138 (92.5%)
Know the consequences of LTBI progressing to active TB are severe	136 (92.5%)
Know TPT is effective in preventing progression of LTBI to TB	142 (96.6%)
Know benefits of TPT outweigh potential side effects of TPT	144 (97.9%)

Attitudinal responses were generally favourable. A total of 69.4% agreed or strongly agreed that TPT improves long-term health outcomes, and 78.9% agreed or strongly agreed that TPT reduces the risk of TB transmission. Regarding concerns about potential side effects, 12.9% agreed or strongly agreed that side effects contribute to low treatment acceptance, while the majority disagreed. A majority of respondents (60.5%) agreed or strongly agreed that accepting TPT reflects professionalism and

professional responsibility (**Table III**). The total attitude score ranged from 4 to 20. Based on the cut-off criteria (4–10 = low, 11–15 = moderate, 16–20 = high), most respondents demonstrated a moderate attitude level (n = 108, 73.5%), followed by high attitude (n = 34, 23.1%), and low attitude (n = 5, 3.4%).

Table III: Attitude on LTBI (n=147)

Statement	Likert Category	Frequency (n)	Percentage (%)
TPT improves long-term health outcomes	Strongly disagree (1)	0	0.0
	Disagree (2)	8	5.4
	Neutral (3)	37	25.2
	Agree (4)	55	37.4
	Strongly agree (5)	47	32.0
TPT reduces the risk of TB transmission	Strongly disagree (1)	1	0.7
	Disagree (2)	6	4.1
	Neutral (3)	24	16.3
	Agree (4)	62	42.2
	Strongly agree (5)	54	36.7
Potential side effects of TPT contribute to low treatment acceptance	Strongly disagree (1)	20	13.6
	Disagree (2)	66	44.9
	Neutral (3)	42	28.6
	Agree (4)	13	8.8
	Strongly agree (5)	6	4.1
Accepting TPT reflects professionalism and professional responsibility	Strongly disagree (1)	8	5.4
	Disagree (2)	11	7.5
	Neutral (3)	39	26.5
	Agree (4)	61	41.5
	Strongly agree (5)	28	19.0

Regarding practice-related items, 80.3% indicated willingness to start TPT if diagnosed with LTBI, and 89.1% reported confidence in completing the full treatment course (**Table IV**). **Table IV** presents the distribution of responses for each practice item across all Likert categories, including frequency and percentage. The total practice score ranged from 3 to 15. Based on the cut-off criteria (3–7 = low, 8–11 = moderate, 12–15 = high), 38 respondents (25.9%) demonstrated high practice levels, 96 (65.3%) moderate practice, and 13 (8.8%) low practice. Items reflecting barriers (e.g., fear of side effects, stigma, and time constraints) were analysed separately and are not included under practice items.

Table IV: Practice on LTBI and TPT (n=147)

Practice		Frequency (%)
Willing to start TPT if tested positive LTBI		118 (80.3%)
Confident to complete the full course of TPT		131 (89.1%)
Barriers of TPT acceptance	Fear of side effects	39 (26.8%)
	Lack of awareness	35 (24.1%)
	Treatment effective-ness	34 (22.8%)
	Time Constraint-Stigma	31 (21.1%)
		39 (26.8%)

Overall Composite KAP Level

The total composite KAP score ranged from 7 to 41. The score was converted into percentage form and categorised according to Bloom's cut-off criteria: scores of 7–20 ($\leq 50\%$) were classified as low KAP, 21–30 ($51\text{--}75\%$) as moderate KAP, and 31–41 ($>75\%$) as high KAP.

Acceptance of Tuberculosis Preventive Treatment (TPT) Out of 147 respondents, 80.3% ($n = 118$) indicated willingness to accept TPT if diagnosed with LTBI, while 19.7% ($n = 29$) declined treatment. TPT acceptance varied across KAP levels. Among respondents with high KAP, 48 respondents (96.0%) accepted treatment. In comparison, 69 of those with moderate KAP accepted treatment, whereas 1 of the respondents with low KAP indicated willingness to initiate treatment. A Pearson chi-square test demonstrated a statistically significant association between KAP level and TPT acceptance ($\chi^2 = 12.47$, $df = 2$, $p = 0.002$). Acceptance was highest among respondents with high KAP (96.0%), followed by those with moderate KAP (72.6%), while acceptance was lowest among those with low KAP (50.0%).

Barriers to TPT Acceptance

Among the 29 respondents who declined treatment, the most frequently reported barriers were fear of side effects (26.8%) and stigma (26.8%), followed by lack of awareness (24.1%), concerns regarding treatment effectiveness (22.8%), and time constraints (21.1%).

DISCUSSION

This study aimed to evaluate the KAP of HCWs toward LTBI and to determine their acceptance of TPT at Hospital Betong. The findings showed that most respondents demonstrated moderate to high KAP levels, and overall TPT acceptance was 80.3%. However, treatment acceptance varied significantly according to KAP level, highlighting behavioural and contextual influences on preventive therapy uptake.

In this study, 34.0% of respondents demonstrated high KAP, 64.6% moderate KAP, and 1.4% low KAP. A statistically significant association was observed between KAP level and TPT acceptance ($\chi^2 = 12.47$, $df = 2$, $p = 0.002$). Acceptance was highest among respondents with high KAP (96.0%), followed by those with moderate KAP (72.6%), while acceptance was lowest among those with low KAP (50.0%). This finding supports the relevance of KAP constructs in shaping preventive health behaviour among healthcare workers. Previous research among healthcare workers has reported adequate knowledge of TB and LTBI alongside variability in preventive practices (12). Similar findings have shown that although awareness levels may be satisfactory, preventive treatment decisions are influenced by perceived risks and medication-related concerns (12). These observations support the present finding that knowledge alone does not automatically

translate into preventive action.

Local evidence has likewise demonstrated moderate to high KAP levels among Malaysian healthcare providers, yet attitudinal concerns and stigma remain present (12). In the present study, acceptance among respondents with moderate KAP was lower than among those with high KAP, indicating that incremental differences in knowledge and attitude may significantly influence behaviour.

The overall TPT acceptance rate of 80.3% in this study is comparable to rates reported among healthcare worker populations in other settings, where acceptance and adherence were influenced by perception of risk, beliefs regarding treatment safety, and occupational considerations (12). Similar associations between knowledge, perception, and intention to initiate LTBI treatment have been reported among Malaysian healthcare workers (12). The present findings therefore reinforce the role of combined cognitive and attitudinal factors in shaping preventive therapy decisions.

The main barriers identified in this study were fear of side effects and stigma. Concerns regarding adverse effects have been widely documented as influencing LTBI treatment acceptance among healthcare workers (13,14). Stigma has also been identified as a persistent factor affecting TB-related preventive behaviour in Malaysian healthcare settings (12). These findings suggest that psychosocial influences continue to affect preventive treatment decisions despite adequate awareness.

Systemic barriers such as time constraints further reflect institutional challenges within district hospital settings. Workload pressures and limited staffing may reduce healthcare workers' capacity to prioritise preventive care. Organisational factors have similarly been shown to influence acceptance and adherence to LTBI treatment (12). The presence of these barriers despite moderate to high KAP levels indicates that behavioural readiness must be supported by institutional facilitation.

Taken together, the findings suggest that while healthcare workers at Hospital Betong demonstrate generally satisfactory awareness of LTBI prevention, TPT uptake is shaped by an interaction between knowledge, attitudes, perceived risks, stigma, and workplace conditions. Interventions should therefore combine educational reinforcement with organisational support to improve preventive therapy implementation and strengthen occupational TB control.

Several limitations should be considered when interpreting these findings. The cross-sectional design precludes the determination of causal relationships between KAP levels and TPT acceptance. As data were collected from a single district hospital, the

findings may not be generalisable to other healthcare institutions with different organisational structures or resource availability. The use of self-administered questionnaires may introduce social desirability bias, potentially leading respondents to overreport positive attitudes or willingness to accept preventive treatment. In addition, the reliance on composite KAP scores may not fully capture the influence of specific attitudinal or contextual factors operating independently. Despite these limitations, the study provides meaningful insight into behavioural and institutional determinants of LTBI preventive treatment uptake among healthcare workers.

CONCLUSION

This study assessed healthcare workers' knowledge, attitude, and practice (KAP) toward LTBI and TPT at Hospital Betong and examined their willingness to accept tuberculosis preventive treatment. Most respondents demonstrated moderate to high KAP levels, and a statistically significant association was observed between KAP level and TPT acceptance ($\chi^2 = 12.47$, $df = 2$, $p = 0.002$).

Despite this positive trend, barriers such as fear of side effects, stigma, lack of awareness, doubts about treatment effectiveness, and time constraints were identified among those unwilling to accept treatment. These findings address the objective of identifying factors influencing TPT acceptance and indicate that while healthcare workers generally recognise the importance of LTBI prevention, both individual concerns and workplace challenges continue to limit full uptake of TPT.

To enhance preventive treatment uptake and align with Malaysia's NSPTB 2021–2030, hospital management should adopt a comprehensive and structured approach. Addressing these identified barriers through structured educational programmes, stigma-reduction strategies, and workplace support mechanisms is essential to improving preventive treatment acceptance. Educational initiatives should focus not only on increasing knowledge but also on addressing misconceptions regarding treatment safety and effectiveness. Strengthening these areas will not only protect healthcare workers but also contribute to national efforts to reduce tuberculosis transmission in Malaysia (12). Institutional commitment is required to foster a supportive occupational health culture, where LTBI screening and TPT are normalised as routine preventive practices. To address the significant barrier of time constraints, the institution should implement practical solutions. Offering flexible clinic hours and workplace-based support may improve adherence among staff with demanding schedules (15).

Strengthening LTBI prevention in district hospital settings requires a comprehensive strategy that combines educational reinforcement with organisational support.

Addressing misconceptions regarding treatment safety, reducing stigma, and improving service accessibility within the workplace may enhance TPT acceptance, as suggested in previous research (12,15). Institutional commitment to integrating LTBI screening and preventive treatment into routine occupational health practices will contribute to protecting healthcare workers and advancing Malaysia's national tuberculosis elimination agenda in line with global recommendations (14).

Recommendations for Future Research

Future studies should consider longitudinal designs to better assess causal relationships between KAP and TPT acceptance. Multi-centre research involving different healthcare settings would improve generalisability. Further analysis of individual KAP components using multivariate methods may help identify the strongest predictors of treatment uptake. In addition, qualitative and intervention-based studies are recommended to explore contextual barriers and evaluate strategies aimed at improving TPT acceptance and adherence among healthcare workers.

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