Jurnal Ilmiah Farmako Bahari
Journal Homepage : https://journal.uniga.ac.id/index.php/JFB

Knowledge, Attitude, and Practice of Community Pharmacists in Monitoring Tuberculosis Patients from Provinces with High Prevalence of Tuberculosis in Indonesia

Cut Ainul Mardhiyyah[1,2,3*], Ahmad Azrul Zuniarto[1], Hardi Ryansyah[1], Alfitia Dwi Amanatin[1], Vonny Antonia[1], Sumari[1]

[1]Faculty of Pharmacy, Yayasan Pendidikan Imam Bonjol Majalengka University, Jl. Perjuangan, Karyamulya, Kecamatan Kesambi, Kota Cirebon, West Java 45135, Indonesia
[2]Department of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, Universitas Padjadjaran, Jl. Raya Bandung-Sumedang KM 21, Kecamatan Jatinangor, Kabupaten Sumedang, West Java, 45363, Indonesia
[3]Doctoral Program of Pharmacy, Faculty of Pharmacy, Universitas Padjadjaran, Jl. Raya Bandung-Sumedang KM 21, Kecamatan Jatinangor, Kabupaten Sumedang, West Java, 45363, Indonesia

*Corresponding author: Cut Ainul Mardhiyyah (cutainul88@gmail.com)

ARTICLE HISTORY

Received: 23 March 2025 | Revised: 16 June 2025 | Accepted: 23 July 2025

Abstract

Indonesia ranks second globally in tuberculosis (TB) cases, with West Java identified as a high-burden TB region. Community pharmacists, often the first point of patient contact, have the potential to support TB monitoring. However, their role remains underutilized and understudied. This study aimed to evaluate community pharmacists' knowledge, attitudes, and practices (KAP) in monitoring TB medication, and to examine the relationships among these variables and respondent characteristics. A cross-sectional study was conducted among 419 pharmacists across 27 districts and cities in West Java Province. Data were collected via a validated online questionnaire comprising KAP domains. Descriptive statistics, *Spearman's* correlation, and *Chi-Square* tests were used to analyze relationships between KAP scores and demographic/professional characteristics. Community pharmacists demonstrated moderate knowledge in TB treatment (14.94 ± 1.99), generally have a positive attitude towards the importance of their role and ability to monitor use of TB drug (21.6 ± 3.3). In practice, community pharmacists are low in reporting, monitoring, and providing assistance related to TB patients (10.7 ± 5.2). Significant but low correlations were observed between knowledge and attitude ($r = 0.110$, $p = 0.024$), knowledge and practice ($r = 0.116$, $p = 0.018$), and attitude and practice ($r = 0.343$, $p < 0.001$). Practice scores were significantly associated with access to patient consultation services ($p < 0.001$), while knowledge was linked to pharmacy location ($p = 0.032$), and attitude to gender ($p = 0.026$). Although community pharmacists in West Java show sufficient knowledge and positive attitudes, their involvement in TB monitoring practices remains limited. Targeted education and policy interventions are essential for their engagement in national TB control efforts.

Keywords: attitude,knowledge, pharmacist,practice, tuberculosis

Introduction

According to the 2022 World TB Report, Indonesia ranks second after India, with an estimated 969,000 TB cases, representing an 18% increase from 2020. Of these, only 443,235 cases of pulmonary TB were officially detected and reported. TB-related deaths in Indonesia have reached approximately 150,000 annually.[1] Indonesia is included in the list of 30 countries with a high TB burden.[2] West Java Province contributes the most significant TB cases nationally, with 91,368 cases reported. As of February 1, 2023, new TB cases in West Java alone were estimated at 233,334.[3]

The Public–Private Mix (PPM) strategy has been promoted to address this persistent public health issue as a collaborative framework involving governmental and private healthcare services, professional associations, and community stakeholders.[4] Within this model, the role of community pharmacists is considered essential. In Indonesia, community pharmacies—independent or part of networks—are privately managed and regulated under national policies requiring them to be supervised by licensed professional pharmacists. Pharmacies often serve as initial healthcare touchpoints for individuals with symptoms suggestive of TB.[5] However, evidence suggests that some pharmacies' suboptimal or inappropriate treatment recommendations may delay proper diagnosis and effective treatment.[6] Despite this, community pharmacists are still insufficiently integrated into formal TB care pathways.

Research in Indonesia has shown that knowledge, attitudes, and practices (KAP) among healthcare professionals are positively associated with TB care and prevention. The general population's adequate TB knowledge contributes to earlier detection and improved outcomes.[7] Similarly, a study in Peru demonstrated that pharmacists with sufficient knowledge and willingness to learn more about TB could significantly support TB prevention and care.[8] Nonetheless, there remains a lack of localized evidence assessing the KAP of pharmacists in high-burden TB provinces like West Java, particularly regarding their involvement in monitoring TB medication adherence and side effects.

This study evaluates community pharmacists' knowledge, attitudes, and practices concerning TB patient monitoring in West Java. Additionally, this study investigates how these variables relate to each other and respondent characteristics. By filling this knowledge gap, the study seeks to provide evidence that can inform the development of pharmacist-specific training programs and strengthen the integration of pharmacy services into the national TB control strategy, especially within the framework of the PPM approach.

Method

Study Design

This study used a descriptive observational design with a cross-sectional approach. Observations or measurements of variables were conducted simultaneously at a single point in time, without intervention, to determine pharmacists' level of knowledge, attitudes, and practices regarding the supervision of rational use of TB drugs in West Java.

Setting Area

The study was conducted in 9 cities and 18 regencies in West Java Province. The study population was all pharmacists working in pharmacies, with a total population of 8,584 pharmacists. The primary data used were obtained through questionnaires completed by regional pharmacists.

Study Participants

Participants in this study were pharmacists working in pharmacies in West Java who were willing to complete the research questionnaire online.

Research Instrument

The instrument used was a previously developed and validated questionnaire[9] https://pubmed.ncbi.nlm.nih.gov/37333684/. This questionnaire consists of several sections: respondent characteristics, Knowledge Questionnaire about Tuberculosis (TB), Attitude Questionnaire regarding the Monitoring of the Rational Use of TB Medication, and Practice Questionnaire regarding TB Medication Monitoring Activities in link https://bit.ly/KAP_Tb.

Data Collection

Questionnaires are distributed through communication applications such as WhatsApp groups, professional organizations of the Indonesian Pharmacists Association of West Java, and professional pharmacist organizations in each district/city. The time for distributing the questionnaire and data collection is from December 17, 2023, to February 29, 2024.

Data Analysis

Assessment Categories: Respondents' levels of knowledge, attitudes, and practices were categorized into three categories. Statistical Tests *Spearman's test* was used to analyze the relationship between knowledge and attitudes, knowledge and practices, and attitudes and practices. The *Chi-square test* was used to analyze the relationship between respondent characteristics and knowledge, attitudes, and practices. The analysis of application data processing was performed using SPSS version 21.

Ethical Issue

We conducted research according to the principles of the Declaration of Helsinki. The study protocol was approved by the ethics committee of Universitas YPIB, Indonesia (No. 036/KEPK/EC/XI/2023) and a questionnaire distribution permit from the professional organization of the Indonesian Pharmacists Association of West Java (No. B1-133/PD IAI/Jawa Barat/XI/2023). All participants consented to participate in this study using an informed consent form. Anonymous participants and data protection were also implemented during the study analysis to ensure the confidentiality of participants' information. Data were stored in a password-protected computer and were accessible only to the researcher.

Result

Characteristic Study

Table 1. Characteristics of Participants based on Demographic Data

No	Characteristics Sociodemographics	Amount (%)
1	**Gender**	
	Man	84 (20.05)
	Woman	335 (79.95)

ISSN: 2087-0337
E-ISSN:2715-9949

Table 1. (Extension)

2	**Age**	
	<25 Years	18 (4.29)
	26-35 Years	262 (62.53)
	36-45 Years	101 (24.10)
	46-55 Years	26 (6.20)
	>56 Years	12 (2.86)
3	**Marital status**	
	Marry	114 (27.20)
	Not married yet	223 (53.22)
	Widow/ widower	82 (19.57)
4	**Last education**	
	Pharmacist	400 (95.46)
	Master	18 (4.29)
	Doctor	1 (0.24)
5	**Pharmacy Locations**	
	Bogor District	28 (6.68)
	Sukabumi District	7 (1.67)
	Cianjur District	13 (3.10)
	Bandung District	29 (6.92)
	Garut District	18 (4.29)
	Tasikmalaya District	11 (2.62)
	Ciamis District	11 (2.62)
	Pangandaran District	4 (0.95)
	Kuningan District	17 (4.06)
	Cirebon District	41 (9.78)
	Majalengka District	23 (5.49)
	Sumedang District	11 (2.62)
	Indramayu District	26 (6.20)
	Subang District	1 (0.24)
	Purwakarta District	3 (0.71)
	Karawang District	22 (5.25)
	Bekasi District	13 (3.10)
	West Bandung District	12 (2.86)
	Bogor City	16 (3.82)
	Sukabumi City	9 (2.15)
	Bandung City	32 (7.64)
	Cirebon City	27 (6.44)
	Bekasi City	3 (0.72)
	Depok City	28 (6.68)
	Cimahi City	3 (0.72)
	Tasikmalaya City	11 (2.62)

ISSN: 2087-0337
E-ISSN:2715-9949

Table 1. (Extension)

No	Characteristics Sociodemographics	Amount (%)
	Background Professional	
6	**Types of Jobs in Pharmacy**	
	Pharmacist Person responsible	376 (89.74)
	Pharmacist Companion	43 (10.26)
7	**Length of service at the Pharmacy**	
	<4 Years	248 (59.19)
	4-8 Years	105 (25.06)
	>8 Years	66 (15.75)
8	**Average working hours at a pharmacy per week**	
	<25 Hours	172 (41.05)
	26-45 Hours	188 (44.87)
	46-65 Hours	51 (12.17)
	66-85 Hours	8 (1.91)
9	**Amount means pharmacy place Work**	
	1 pharmacy	381 (90.93)
	2 pharmacies	35 (8.35)
	3 pharmacies	3 (0.72)
	More from 3 pharmacies	0
10	**Get services consultation drug**	
	Yes	62 (14.80)
	No	357 (85.20)
	Characteristics Pharmacy	
11	**Types of Pharmacies**	
	Independent	360 (85.92)
	Network	59 (14.08)
12	**There is a practicing doctor at the pharmacy**	
	Yes	149 (35.56)
	No	270 (64.44)
	Characteristics Related to TB	
13	**Experience TB training**	
	< 6 months Then	35 (8.35)
	6 months – 1 year Then	62 (14.80)
	1-2 years Then	66 (15.75)
	> 2 years ago	81 (19.33)
	Never	175 (41.77)

Based on the table of sociodemographic and professional characteristics of pharmacists in several regions, most respondents were female (79.95%), while only 20.05% were male. The largest age group was 26–35 years (62.53%), followed by 36–45 years (24.10%), with the remainder spread across other age ranges, with small numbers below 10% for each age group.

Regarding marital status, the majority were single (53.22%), followed by married (27.20%) and widows/widowers (19.57%). Regarding education, almost all respondents were pharmacist graduates (95.46%), while 4.29% held master's degrees and only 0.24% had doctoral degrees.

Pharmacists' work areas are spread across regencies/cities in West Java, with the highest distribution in Cirebon Regency (9.78%), Bandung City (7.64%), Depok (6.68%), and several other regencies/cities with percentages below 7%. In general, the

ISSN: 2087-0337
E-ISSN:2715-9949

distribution of locations was relatively even across the target areas, but without a single location dominating.

Regarding profession, the majority served as a pharmacist person responsible (89.74%), with the remainder as a pharmacist companion (10.26%). The most common length of service was less than 4 years (59.19%), followed by 4–8 years (25.06%), and more than 8 years (15.75%).

Average weekly working hours were highest, ranging from 26–45 hours (44.87%) and less than 25 hours (41.05%). Most pharmacists worked at only one pharmacy (90.93%), with the remainder at two or three. Only 14.8% of pharmacies provided consultation drug services, while 85.2% did not.

The most common type of pharmacy was independent (85.92%), with the remainder being chain pharmacies (14.08%). Only about one-third of pharmacies had on-site doctors' practices.

Regarding TB training experience, a significant proportion of pharmacists had never attended TB training (41.77%). At the same time, the remainder were divided between those who had received training less than 6 months ago and those who had received training more than 2 years ago, each ranging from 8 to 19%.

Knowledge of Community Pharmacists Related to Tuberculosis

Table 2. Questionnaire Results in Knowledge of the Respondent

No	Draft	Item	Answer Correct (%)
1	Causes of TB	Tuberculosis (TB) is a disease caused by viruses	79.5
2	Place infection	Tuberculosis attacks the lungs and can also attack the eyes, ears, bones, joints, and other organs.	87.4
3	Transmission of TB	Tuberculosis can be infectious from people infected with pulmonary TB to others through the air through tiny *droplet nuclei* when the person coughs, sneezes, or talks.	100
		Splash Tiny can stay in the air for a longer time in a dark room with minimal ventilation, which increases the risk of TB transmission	93
4	Signs & and symptoms of TB	Cough > 2 weeks is one of the signs and symptoms of general pulmonary TB active	82.6
		People with pulmonary TB can experience cough, phlegm, and mixed blood	95.5
		Other symptoms that may occur in patients with pulmonary TB	100
5	TB risk factors	People who have Diabetes Mellitus have a greater risk of suffering from pulmonary TB	63.2
		People with HIV are more prone to catching TB disease	95
		Children under 5 years old, as well as older people, have a greater risk of being infected with pulmonary TB	91.2
		People who have a history of asthma are more prone to catching TB disease	20

ISSN: 2087-0337
E-ISSN:2715-9949

Table 2. (Extension)

No	Draft	Item	Answer Correct (%)
6	TB Diagnosis	BTA sputum microscopic test is necessary for supporting the diagnosis of pulmonary tuberculosis	97.1
		The WHO recommends diagnostic methods for identifying Mycobacterium tuberculosis	91.6
7	TB Treatment	Following this is a regimen of first-line Anti-Tuberculosis Drugs (OAT), the first INTENSIVE PHASE for mature	78.3
		Following this is a regimen of first-line Anti-Tuberculosis Drugs (OAT), first ADVANCED PHASE for mature	68.3
		The combination of Anti-Tuberculosis Drugs (OAT) should be taken after eating.	61.1
8	Effect OAT Side	The following are the side effects of Isoniazid	95.5
		Following this is the side effect of Rifampicin	95.7

The majority of respondents (79.5%) mistakenly believed that tuberculosis was caused by a virus, when in fact, TB was caused by the bacterium Mycobacterium tuberculosis. The majority (87.4%) understood that TB primarily attacks the lungs, but can also affect the eyes, ears, bones, joints, and other organs.

All respondents (100%) knew that pulmonary TB is transmitted through the air when an infected person coughs, sneezes, or talks. Ninety-three percent understood that small airborne particles can linger in dark, poorly ventilated rooms, increasing the risk of transmission. Eighty-two percent knew that a cough lasting more than two weeks is the main symptom of active pulmonary TB. Respondents also demonstrated a high level of understanding (95.5%) that coughing with blood-tinged sputum is a symptom, and 100% recognized other symptoms that may occur in pulmonary TB patients.

Knowledge regarding TB risk factors varied. Most were aware that people with HIV (95%), children under 5 years of age, and older people (91.2%) are at higher risk. However, only 63.2% knew that diabetes mellitus increases the risk of TB, and very few (20%) understood that a history of asthma can also increase susceptibility to TB. The vast majority (97.1%) understood that sputum smear microscopy for acid-fast bacilli (AFB) is crucial for diagnosing pulmonary TB. 91.6% also knew that WHO-recommended diagnostic methods are used to identify Mycobacterium tuberculosis.

Knowledge regarding the phases of TB treatment with first-line anti-tuberculosis drugs was uneven. 78.3% knew about the intensive phase in adults, while only 68.3% understood the continuation phase in adults. Furthermore, only 61.1% knew that the combination of ATD drugs should be taken immediately after meals. Most respondents understood the common side effects of TB drugs, with 95.5% knowing the side effects of Isoniazid and 95.7% knowing the side effects of Rifampicin.

The results of calculating the knowledge questionnaire value by calculating the standard deviation obtained a mean value of 14.94 ± 1.99, so the pharmacist's level of knowledge about TB was in the medium category.

ISSN: 2087-0337
E-ISSN:2715-9949

Attitude of Community Pharmacists in Monitoring Patients' Tuberculosis

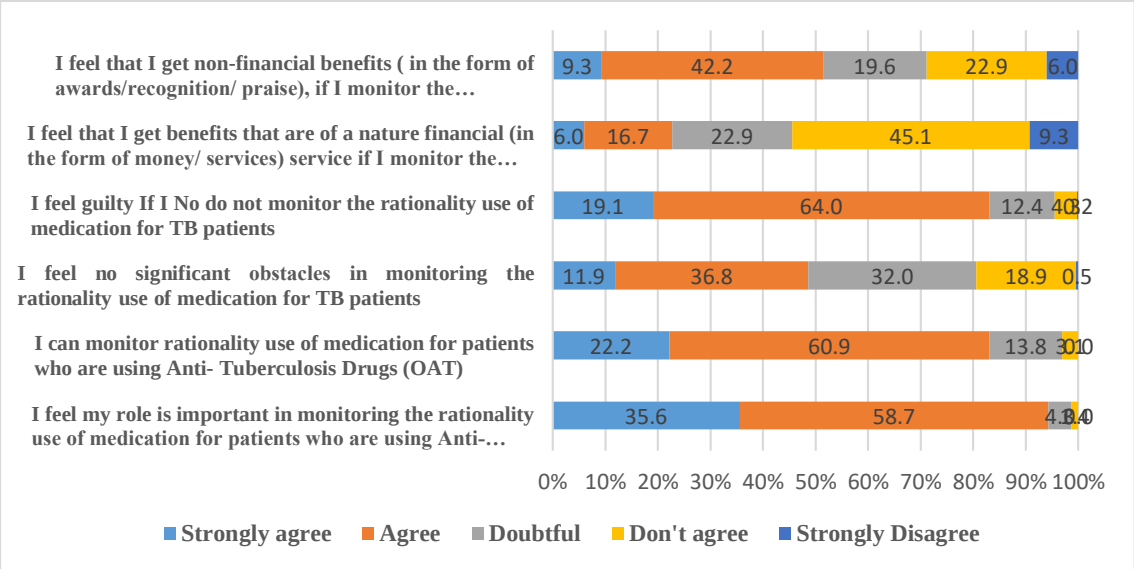

Figure 1. Attitude of community pharmacists in drug monitoring in TB patients

The figure above is a horizontal bar chart depicting community pharmacists' attitudes toward monitoring drug use in TB patients, particularly for anti-tuberculosis drugs. This perception was measured in several aspects based on the level of respondent agreement.

Most respondents agreed that they receive non-financial benefits, such as rewards or recognition, from conducting rationality monitoring (42.2%), but a significant number also doubted (19.6%) and disagreed (22.9%). Only a small number strongly agreed (9.3%) or strongly disagreed (6.0%). Most respondents disagreed that rationality monitoring would result in financial benefits (45.1%). Only 16.7% agreed, and a few were unsure (22.9%). Only a small number strongly agreed (5%) and strongly disagreed (9.3%).

A large majority strongly agreed that they would feel guilty if they did not conduct monitoring (64%), while 19.1% strongly agreed. The remainder were undecided (12.4%), disagreed (4%), and strongly disagreed (0.5%). Respondents were relatively evenly divided regarding barriers: 32% were undecided, and 18.9% disagreed that they did not face significant obstacles in monitoring TB patients. Only 11.9% strongly agreed, and 36.8% agreed they did not experience any barriers. The majority (60.9%) agreed that they could monitor drug use for TB patients, followed by 22.2% strongly agreed. A small minority were undecided (13.8%), disagreed (3%), and strongly disagreed (0%). Most respondents (58.7%) agreed that their role is essential in monitoring drug use, and 35.6% strongly agreed. Only a small minority were undecided (4.3%), and very few disagreed (1.4%).

Overall, this figure shows that community pharmacists generally have a positive attitude towards the importance of their role and ability to monitor the rational use of TB drugs based on the measurement results using standard deviation (21.6 ± 3.3). However, financial motivation is not a major motivating factor, and there is still uncertainty about the barriers to implementation.

ISSN: 2087-0337
E-ISSN:2715-9949

Practice Community Pharmacists in Monitoring Medication in Patients with Tuberculosis

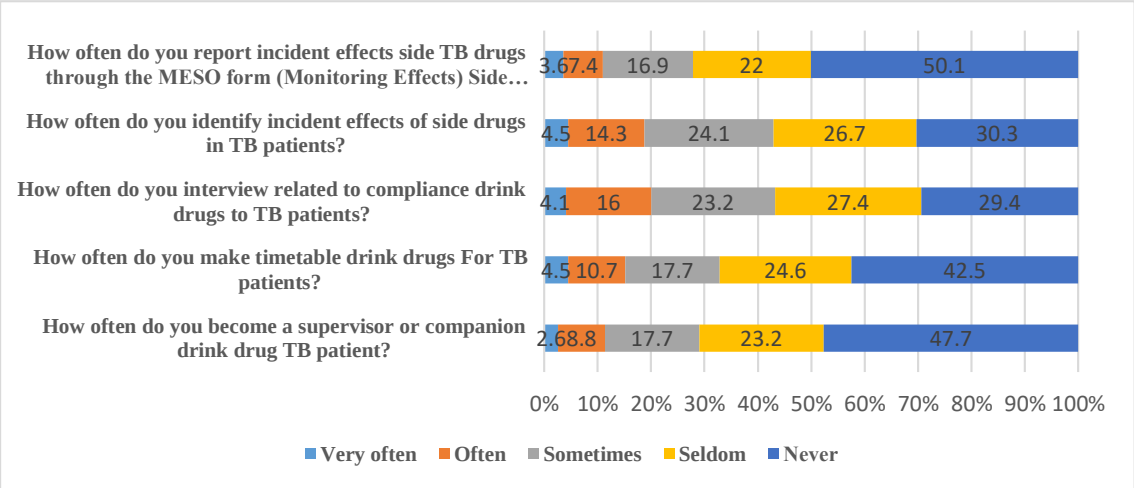

Figure 2. Attitude of community pharmacists in drug monitoring in TB patients

Five questions were evaluated in the practice domain. The majority of respondents "never" reported TB drug side effects using the MESO form (50.1%), while only 3.6% did so "very often." The remainder were spread across "often," "sometimes," and "rarely."

On the question of identifying adverse drug events in TB patients, 30.3% of respondents "never" identified them, and only 4.5% reported them "very often." Other categories included "often" (14.3%), "sometimes" (24.1%), and "rarely" (26.7%). Only 4.1% of respondents "very often" reported being interviewed regarding medication adherence in TB patients, and 29.4% "never." The categories "often" (16%), "sometimes" (23.2%), and "rarely" (27.4%) were also represented.

The percentage of respondents who "never" schedule TB patients' medication intake reached 42.5%, while only 4.5% reported "very often." The remainder were divided into "often" (10.7%), "sometimes" (17.7%), and "rarely" (24.6%). Nearly half of the respondents "never" accompany TB patients' medication intake (47.7%), with very few reporting "very often" (2.6%). The categories "often" (8.8%), "sometimes" (17.7%), and "rarely" (23.2%) also occurred.

In general, it can be concluded that the intensity of community pharmacists in reporting, monitoring, and providing assistance related to TB treatment remains low based on the results of data analysis using the Spearman test (10.7 ± 5.2). Most reported rarely or never carrying out these activities. This data demonstrates the need for increased capacity, motivation, and a more effective monitoring system within the TB program. This figure provides a clear picture of the challenges in TB program implementation, particularly in monitoring side effects and patient support, which can serve as a basis for evaluating and improving future strategies.

Only part of the respondents who routinely do TB monitoring activities, where only 8.8% of respondents became supervisors or companion drink medicine, 10.7% of respondents who made timetable drink TB drugs, 16% of respondents do interview related compliance drink medicine, 14.3% of respondents identify ESO incidents in TB patients, as well as 7.4% of respondents, report the incidence of ESO TB via the MESO form.

Community pharmacists' average practice score in TB patients' drug monitoring is 10.7 ± 5.2, demonstrating that community pharmacists are low in reporting, monitoring, and providing assistance related to TB patients. The researcher found that participating

ISSN: 2087-0337
E-ISSN:2715-9949

in TB training is significant in increasing knowledge about TB, forming a positive attitude, and carrying out activities related to TB monitoring.

Analysis of the Correlation between Knowledge, Attitudes, Practices, and Characteristics of Respondents

Based on the *Spearman* correlation test, a very low, shallow, and low relationship (0.110 - 0.343) was obtained from the data obtained in this study. Between knowledge and attitude (correlation value 0.024, *p sig* <0.05), knowledge with practice (correlation value 0.018, *p sig* <0.05), and attitude with practice (p-value 0.343, *p sig* <0.05).

Table 3. Practice Community Pharmacists in Monitoring Tuberculosis Patients

No	Variables	Knowledge	Attitude	Practice
		p-value	*p-value*	*p-value*
1	Gender	0.971	**0.026**	0.097
2	Age	0.656	0.918	0.505
3	Marital status	0.965	0.586	0.220
4	Type of work	0.817	0.786	0.611
5	Last education	0.292	0.689	0.067
6	Pharmacies location	**0.032**	0.087	0.269
7	Types of Jobs in Pharmacies	0.511	0.703	0.194
8	Length of service in Pharmacies	0.276	0.419	0.705
9	Amount means pharmacies place work	0.285	0.577	0.111
10	Average hours worked per week	0.057	0.066	0.230
11	Availability of a doctor at the pharmacy	0.012	0.767	0.159
12	Services consultation drugs	0.689	**0,000**	**0,000**
13	Experience TB training	0.630	0.051	0.473

Based on the table of analysis results of the relationship between various sociodemographic characteristics and knowledge, attitude, and practice (KAP), the p-value is used to indicate statistical significance using the *chi-square* test. A p-value of less than or equal to 0.05 indicates a statistically significant relationship, meaning that the results are unlikely to have occurred by chance if there is no real relationship between the tested variables.

Factors significantly related to knowledge include Pharmacy Location (p=0.032), indicating a significant relationship between workplace location in district/city and knowledge level. Doctor availability at the pharmacy (p=0.012), indicating a significant relationship between the presence of a doctor at the pharmacy and the knowledge level of pharmacy staff. Factors significantly related to attitude include Gender (p=0.026), where attitudes toward KAP aspects differ considerably by gender. Furthermore, a highly significant relationship exists between providing consultation services and attitude (p=0.000). The *chi-square* test showed respondent characteristics related to the knowledge variable, namely the location of the pharmacy, p = 0.032.

Discussion

The results of this study indicate that, based on sociodemographic characteristics, the pharmacist profession is predominantly occupied by women. The number of female pharmacists is significantly higher than that of male pharmacists, consistent with findings in several previous studies.[9,10,11] Generally, women tend to choose jobs involving social

ISSN: 2087-0337
E-ISSN:2715-9949

interaction, while men are more interested in jobs related to machine operation. Data showing that 82.4% of pharmacists are women also supports this.[12]

The majority of respondents are pharmacists aged between 26 and 35 years. This is likely because they fall within the productive age group, when individuals are typically active in the workforce and capable of performing professional responsibilities, including providing services in pharmacies and carrying out tuberculosis (TB) monitoring activities.[10]

Marital status was dominated by respondents who were not yet married (53.22%). This is because most respondents are of a productive age, but many of those who do not have a partner are still alive. The results differ from the research,[10,11], namely, part big pharmacist status married.

The majority of respondents are professional pharmacists (95.46%). This is because pharmacists with high education tend not to work in a pharmacy or are too busy, so they are not always settled in the pharmacy. The number of educated respondents who are professional pharmacists is much higher compared to those with master's and doctoral degrees, as in a previous study.[10,11]

Respondents in the Cirebon District (9.78%) dominate the pharmacy's location. Although many pharmacists in other areas work in pharmacies, the Cirebon District is the most likely to participate in this study.

For the background of professionals in type jobs in pharmacy, dominated by a pharmacist person responsible (89.74%). This is due to most pharmacies being pharmacy-independent.

The length of work in the pharmacy, dominated by respondents who worked for less than 4 years (59.19%), is due to the pharmacy place where they work tends to be new, or they are still fresh graduates. The same result is in the study.[13] Pharmacists with a working period of 1-5 years dominate because the longer the work, the greater their ability to do it.

Average working hours per week at the pharmacy are dominated by groups with 26-45 hours (51.5%). Average weekly working hours can determine the chance of participating in activity detection cases, drug monitoring, and educating TB patients. The longer they stay at the pharmacy, the greater the opportunity of doing activity-related TB control. Similar results were also mentioned in a study, where part-time working hours for pharmacists were 10-30 hours per week (63.4%).[12] The number means that pharmacies are dominated by pharmacists who only work in one pharmacy (90.93%). The results obtained are in line with previous research,[12] where most pharmacists only work at one pharmacy (91.5%).

As for characteristics of pharmacy and the type of pharmacy, most respondents worked at a pharmacy independently (91%). Similar results were also mentioned in the research, such as a pharmacy being more independent than the pharmacy network.[11] Mostly in pharmacies, respondents work as available practice doctors (40.3%). There is no difference from research conducted by 43.8% of pharmacies that provide practice doctors.[11]

For characteristics related to TB, almost half of the respondents had no experience following TB training, which is due to a lack of interest in pharmacists in following TB training (41.77%). This aligns with research that found that 49.5% of pharmacists have not yet followed TB training.[11]

Sociodemographic data indicate a predominance of young to early adult female pharmacists, with short to medium tenure, practicing solo in independent pharmacies, and the majority being single. This phenomenon aligns with findings from global surveys, which show that women and a younger workforce increasingly dominate the pharmacy profession.

Similar results were also obtained: In terms of knowledge regarding TB, the acquisition mark is highest in TB symptoms, whereas the mark is lowest in the risk factor

ISSN: 2087-0337
E-ISSN:2715-9949

of TB.[6] A survey in Tanzania also showed that the knowledge of respondents about TB is not adequate in understanding the factors of TB risk.[14] Children, the elderly, those with HIV or AIDS, smokers, alcohol consumption, high alcohol consumption, diabetes mellitus sufferers, close contact with TB patients, and officer health are factors at risk of TB.[15] For this reason, the history of asthma is not included as a factor in the risk of TB. On the other hand, because there is still limited epidemiological data to support asthma as a risk factor for the development of TB, it is still not clear whether asthma can become a risk factor for TB.[16] Many respondents (61.1%) answered that a combination of OAT is best drunk quickly after eating. This is not following the fact that drinking TB medicine immediately after eating can significantly reduce OAT concentration and absorption. So, it is better to consume the TB drug when the stomach is empty, namely, 1 hour before eating or 2 hours after eating.[17]

The level of knowledge community pharmacists have about tuberculosis, based on calculation results from the formula, shows that the known value of the minimum score value of the Respondent is 6. The average value obtained is around 14.49, and the Standard Deviation (SD) is 1.99. Thus, the level of knowledge pharmacists have about TB is enough.

This is not in line with previous research,[12] where the level of knowledge of pharmacists regarding TB is classified as good; good knowledge is associated with respondents with a background in pharmacology. Findings highlight the importance of giving knowledge about TB to the power pharmacy because they also play a role as the vanguard in the pharmacy field. In Indonesia, the service pharmacy is not integrated with TB programs, and the government and private pharmacist communities lack collaboration. These are potential causes for the limited role of the community pharmacists in educational programs. On the other hand, many respondents disagree whether they get financial profit from activity monitoring the rational use of TB drugs. Meanwhile, each in Malaysia said that 78.4% of the pharmacists' community believe they can monitor the side effects of medications.[18]

Attitude can become a runway for identifying pharmacists who need to improve their understanding or skills in TB treatment. To increase attitude, pharmacists can provide training in addition to drug monitoring for TB patients. With strengthened knowledge and skills, pharmacists can be more effective in delivering services to TB patients and improving their health. In addition, increasing awareness of the critical role of pharmacists in TB management in community health can also become an essential step in the national TB program.[6]

All results are positive, so the relationship between these variables is unidirectional. The results obtained show that there is a relationship between the three variables. This knowledge and attitude can then produce actions to monitor TB patients. This is in line with the KAP theory, which states that changes in human behaviour are divided into three sequential processes: knowledge acquisition, attitude formation, and behaviour formation.[19] Knowledge plays a vital role in determining a practice because knowledge forms beliefs that influence the individual's perception of reality, provide a basis for decision-making, and affect a person's practice towards an object. Pharmacists with a positive attitude tend to be involved in TB patient monitoring practices.[20] This is in line with L. Green's theory states that knowledge, attitudes, beliefs, traditions, and other factors influence individual or community practices. In addition, the availability of facilities and the attitudes and practices of health workers also play a role in supporting and strengthening the formation of health behaviour.[21] Respondent characteristics, such as TB training experience, are critical factors in increasing knowledge about TB.

For the attitude variable, the results show a relationship between gender and obtaining consular services. This can be explained by the fact that providing service information, drug, or consultation medication allows pharmacists to have many

opportunities to meet patients directly, thus increasing pharmacists' confidence that they have a role and are capable of monitoring TB patients' medication.

Several behavioral theories are used to analyze and design intervention programs in KAP research in the health sector, particularly in TB patient monitoring by community pharmacists. Lawrence Green's theory (PRECEDE-PROCEED) states that health behavior is influenced by three main factors: predisposition (knowledge, attitudes, beliefs), enabling (availability of facilities/infrastructure), and reinforcement (environmental support, policies). In the context of community pharmacists, increased knowledge (predisposition) will shape positive attitudes that lead to better TB patient monitoring practices. The Health Belief Model (HBM) theory explains that perceptions of vulnerability, disease seriousness, benefits of healthy behaviors, barriers, and cues to action influence a person's health-related behavior. Pharmacists who believe TB is a severe disease and understand the benefits of effective monitoring tend to carry out their roles better.

In the practice variable, it was found that there was a relationship between obtaining consultation services, with significance ($p = 0.00$). These results are in line with a previous survey.[6] The respondents' characteristics in providing drug consultation services are relevant in carrying out TB patient monitoring practices.

The phenomenon of low practice scores despite adequate knowledge is a common problem in various healthcare contexts. Research findings and literature reviews highlight the lack of translation of knowledge into practice.[22] Adequate knowledge does not necessarily translate into optimal practice. Many pharmacists understand TB theory, protocols, and management, but other barriers can prevent them from applying this knowledge in daily practice.[23] Pharmacists' role in TB management is often suboptimal due to the dominance of different healthcare professionals, such as nurses (TB programmers). Pharmacists in pharmacies are usually excluded from direct collaboration with TB programs, limiting their scope of practice despite adequate knowledge.

Another problem is that not all pharmacies have supporting facilities, such as TB patient monitoring systems, easy-to-use reporting forms, or sufficient time to provide patient consultation and education. This leads pharmacists to focus solely on routine tasks and less on active monitoring. High knowledge, but not supported by a positive attitude, enthusiasm for service, or a perceived importance of the pharmacist's role in TB cases, will hinder its implementation in practice.

Community pharmacists' practice scores in TB patient monitoring in West Java can remain low despite adequate knowledge due to systemic barriers (collaboration, facilities, policies), individual pharmacist attitudes/motivations, and ineffective ongoing coaching and training. Role integration, repeated training, and improved facility support must be prioritized to ensure knowledge can be effectively translated into practical practice.

Conclusion

This study shows that most pharmacists in West Java Province have sufficient knowledge and attitudes related to monitoring TB patients. However, knowledge and attitudes are not yet fully reflected in drug monitoring practice for TB patients. Researchers find that TB education programs are vital for increasing knowledge, attitudes, and practices among power pharmacies in TB patient monitoring activities. Strengthening TB education programs and designing strategies that sustainably involve pharmacy are expected to increase pharmacists' contribution to monitoring treatment efforts for TB patients and support TB programs in the country, especially with a high burden of TB.

Acknowledgement

Grateful to the professional organization, the Pharmacist Association in West Java Region, which has supported this research. Copyright Questionnaire: Mersa Nurain Kausar, Ivan Surya Pradipta, and Efi Fitriana from the Faculty of Pharmacy Universitas Padjadjaran No: 000408154.

Reference

1. Pasaribu R, Ahmad Z, Andriani L, Sudarto S, Rasyid A, Fathurrachman A, et al. Aksi pemberdayaan dan edukasi kader tuberkulosis dalam deteksi kasus tuberculosis, serta deteksi dini hipertensi dan diabetes mellitus di Palembang. J Pengabdi Masy Humanit Med. 2023;4(1):34–43.
2. World Health Organization. Annual report of tuberculosis. Vol. 8, Annual Global TB Report of WHO. 2022.
3. Dinas Kesehatan Provinsi Jawa Barat. Kadinkes: Jawa Barat berhasil obati kasus TBC sebesar 72% [Internet]. 2022 [cited 2025 Jul 22]. Available from: https://www.roemahmedia.com/read/16267/kadinkes-jawa-barat-berhasil-obati-kasus-tbc-sebesar-72
4. Tim Challenge TB. Petunjuk teknis: Penerapan public private mix berbasis kabupaten/kota area binaan challenge TB. Jakarta; 2018.
5. Lestari BW, McAllister S, Hadisoemarto PF, Afifah N, Jani ID, Murray M, et al. Patient pathways and delays to diagnosis and treatment of tuberculosis in an urban setting in Indonesia. Lancet Reg Heal - West Pacific. 2020;5:100059.
6. Pradipta IS, Khairunnisa K, Bahar MA, Kausar MN, Fitriana E, Ruslami R, et al. Knowledge, attitude and practice of community pharmacy personnel in tuberculosis patient detection: a multicentre cross-sectional study in a high-burden tuberculosis setting. BMJ Open. 2022;12(7):1–9.
7. Ramadhany S, Achmad H, Singgih MF, Ramadhany YF, Inayah NH, Mutmainnah N. A review: Knowledge and attitude of society toward tuberculosis disease in soppeng district. Syst Rev Pharm. 2020;11(5):57–62.
8. García PJ, Hernández-Córdova G, Pourjavaheri P, Gómez-Paredes HJ, Sudar S, Bayer AM. Knowledge, attitudes and practices related to tuberculosis in pharmacy workers in a cross-sectional survey in El Agustino, Peru. PLoS One. 2018;13(7):1–11.
9. Kausar MN, Fitriana E, Khairunnisa K, Faruque MO, Bahar MA, Alfian SD, et al. Development and validation of the knowledge, attitude, and practice questionnaire for community pharmacy personnel in tuberculosis case detection, drug monitoring, and education: a study from Indonesia. Infect Drug Resist. 2023;16:3729–41.
10. Sari YO, Prabandasari GI, Almahdy A. Tingkat pengetahuan, sikap, dan praktik apoteker puskesmas di Provinsi Jambi terhadap Covid-19. J Sains Farm Klin. 2022;9(1):24–33.
11. Pradipta IS, Khairunnisa K, Bahar MA, Kausar MN, Fitriana E, Ruslami R, et al. Characteristics, knowledge, attitude, and practice of pharmacy personnel in supporting tuberculosis treatment: A multicenter cross-sectional study in a high-burden tuberculosis country. J Am Pharm Assoc. 2024;64(3):102077.
12. Ranti N. Tingkat pengetahuan, sikap dan perilaku apotek dalam pengendalian tuberkulosis di apotek kota Medan. [Medan]: Universitas Sumatera Utara; 2022.
13. Ambianti N, Tandah MR, Diana K, Balqis R. Analisis tingkat pengetahuan dan sikap tenaga kefarmasian dalam mencegah obat rusak dan kadarluarsa di RSUD Tora Belo. Acta Pharm Indones Acta Pharm Indo. 2022;9(2):105.
14. Rutta E, Tarimo A, Delmotte E, James I, Mwakisu S, Kasembe D, et al. Understanding private retail drug outlet dispenser knowledge and practices in tuberculosis care in Tanzania. Int J Tuberc Lung Dis. 2014;18(9):1108–1113.

15. Kementrian Kesehatan RI. Waspada penularan dan gejala TBC. Kementrian Kesehatan RI. 2024.
16. Yii AC, Soh AZ, Chee CBE, Wang YT, Yuan JM, Koh WP. Asthma, sinonasal disease, and the risk of active tuberculosis. J Allergy Clin Immunol Pract. 2019;7(2):641–8.
17. Kumar AKH, Chandrasekaran V, Kumar AK, Kawaskar M, Lavanya J, Swaminathan S, et al. Food significantly reduces plasma concentrations of first-line anti-tuberculosis drugs. Indian J Med Res. 2017;145(4):517–520.
18. Wong YJ, Thum CC, Ng KY, Lee SWH. Engaging community pharmacists in tuberculosis-directly observed treatment: A mixed-methods study. Prim Heal Care Res Dev. 2023;24(e21).
19. Fan Y, Zhang S, Li Y, Li Y, Zhang T, Liu W, et al. Development and psychometric testing of the knowledge, attitudes and practices (KAP) questionnaire among student tuberculosis (TB) patients (STBP-KAPQ) in China. BMC Infect Dis. 2018;18(1):213.
20. Mardhiyyah CA, Pandanwangi S, Joharudin A, Sundari RT, Sumari, Puteri RS. Analysis of effectiveness and adherence of tuberculosis patients' medication in health care facilities in Indonesia. Saudi J Med Pharm Sci. 2024;10(12):984–9.
21. Sutiningsih D. Hubungan tingkat pengetahuan dan sikap dengan praktik pencegahan covid-19 pada masyarakat pengguna internet di kota semarang. J Epidemiol Kesehat Komunitas. 2021;6(2):300–6.
22. Mardhiyyah CA, Aprilio K, Sumarheni S, Gnanasan S, Pitaloka DAE, Pradipta IS. Can we involve pharmacists as direct service providers for people with tuberculosis? A narrative review of current evidence. Explor Res Clin Soc Pharm. 2025;19(18):100613.
23. Mardhiyyah CA, Zuniarto AA, Amanatin AD, Ryansyah H, Antonia V. Correlation of community pharmacist knowledge, attitudes, and practices in the detection of tuberculosis cases in West Java Province. Med Sains J Ilm Kefarmasian. 2024;9(3):791–802.

ISSN: 2087-0337
E-ISSN:2715-9949