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The behaviour of TB patients in East Lombok through a health belief model approach

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Abstract

Background Tuberculosis (TB) is a global health problem, including in Indonesia, with East Lombok as a high prevalence region. Although control programmes have been implemented, TB cases remain high. Patient behaviours that are less supportive of treatment, such as non-compliance and social stigma, pose a challenge to TB control efforts in this area. This study aims to explore the behaviour of people with tuberculosis (TB) in East Lombok using the Health Belief Model (HBM) approach.

Participants and procedure The method applied was a cross-sectional design, involving 112 respondents with TB who were registered at the Puskesmas. Data were collected through interviews using a questionnaire measuring components of HBM, including perceived vulnerability, severity, benefits, barriers, cues to action, and self-efficacy.

Results The analysis showed that perceived vulnerability ($p=0.022$), perceived benefits ($p=0.006$), perceived barriers ($p=0.045$), cues to action ($p=0.004$), and self-efficacy ($p=0.009$) had a significant influence on the health behaviour of TB patients. Patients with high perceived vulnerability were 1.617 times more likely to adhere to treatment, while those with high perceived barriers were 31.6% less likely to adhere. Social support from family and health professionals also played an important role in improving adherence.

Conclusions From this study emphasise the need for interventions designed to increase positive perceptions and reduce perceived barriers, as well as consider the local social and cultural context to improve TB treatment adherence in East Lombok.

Keywords Tuberculosis, Health belief model, Behaviour

Introduction

Tuberculosis (TB) is a contagious infectious disease that is a public health problem worldwide, including in Indonesia. The World Health Organisation (WHO) notes that by 2022, TB will be one of the 10 leading causes of death worldwide, with an estimated 10.6 million people falling ill from TB, and 1.6 million of them dying. Indonesia is among the five countries with the highest TB burden, along with India, China, the Philippines, and Pakistan [1].

Although Indonesia has implemented various TB control programmes, TB cases remain high. One of the regions in Indonesia that has a significant prevalence of

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TB is East Lombok. Based on data from the East Lombok Health Office, in 2022 there were around 1,850 active TB cases, and this figure tends to increase every year [2]. The high prevalence of TB in Lombok Timur reflects the challenges in implementing TB control programmes, including early detection, appropriate treatment, and prevention of transmission.

The main problem faced in TB control in Lombok Timur is the behaviour of TB patients themselves. Unsupportive behaviour towards TB treatment and prevention, such as non-adherence to treatment, lack of awareness of the importance of early detection, and social stigma towards TB sufferers, are obstacles to TB control efforts in this region [3]. TB patients who do not adhere to treatment regimens can lead to drug resistance and wider spread of the disease [4].

An approach that can be used to understand and modify the behaviour of people with TB is through theoretical models that can identify factors that influence health behaviour. One model that has been widely used is the beHealth Belief Model (HBM). HBM is a psychosocial model developed to explain and predict health behaviour, based on an individual's perception of health threats and the benefits of actions taken to address those threats [5, 6].

The Health Belief Model has been used in various studies to understand health behaviours, including those of people with TB. In the context of TB, the HBM can help identify factors that influence an individual's decision to seek treatment, adhere to treatment, and take preventive measures. The model consists of several key components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy [7, 8].

Previous research has shown that perceptions of vulnerability and severity can influence TB patients' decisions to adhere to treatment. For example, a study by Adiani et al. showed that TB patients with high perceived susceptibility tended to be more adherent to treatment than those with low perceived susceptibility [9]. In addition, perceived benefits of treatment and barriers to treatment also play an important role in the behaviour of people with TB [10].

However, research on the use of HBM in the context of TB in Indonesia is limited. The few existing studies have been conducted in countries with high TB prevalence, such as India and South Africa, which have different social and cultural contexts to Indonesia. For example, the study by Dixit et al. [11], A study in Nepal showed that social barriers, such as TB stigma, can reduce the motivation of patients to adhere to treatment. On the other hand, research in South Africa has shown that strong social support can improve TB treatment adherence [12].

In East Lombok, with its distinctive sociocultural characteristics, including the strong influence of tradition and community beliefs, the application of HBM in understanding the behaviour of people with TB may provide greater insight. Research combining HBM with a sociocultural approach specific to East Lombok may assist in identifying key factors influencing the behaviour of people with TB in this region. Although HBM has been widely used in health behaviour research, including TB, there are several studies that need to be developed, especially in local contexts such as in East Lombok. First, research on the use of HBM in understanding the behaviour of people with TB in Indonesia, particularly in East Lombok, is limited. Most existing research has been conducted in countries with different social and cultural characteristics, so the results may not be fully relevant to Indonesia. Previous research has often not considered in depth the sociocultural factors specific to a region. In East Lombok, where community traditions and beliefs are strong, it is important to understand how these factors influence the health perceptions and behaviours of people with TB. For example, belief in traditional medicine or stigma towards TB may influence an individual's decision to seek medical treatment [13, 14]. Although HBM has been shown to be effective in predicting health behaviour, there is a need to develop more specific interventions based on the findings from the application of HBM. Previous research has often stopped at the stage of identifying factors that influence behaviour, without developing specific and contextualised interventions [15]. This study aims to identify factors that influence the behaviour of TB patients in East Lombok using the HBM approach, with a focus on improving adherence to treatment.

Methods

Design study

This study used a cross-sectional design, which is an observational study design in which data are collected at a single point in time. This approach was chosen because it allows researchers to evaluate the relationship between the variables in the Health Belief Model (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy) and the health behaviours of people with TB. This design also allowed for the identification of factors that influence the behaviour of people with TB in the local context of East Lombok.

Population and sample

The population in this study were all TB patients registered at Puskesmas in the East Lombok region in 2024. Based on data from the East Lombok Health Office, there were approximately 1,124 TB patients who met

the inclusion criteria, namely patients who had undergone treatment for at least one month, were over 18 years old, and were willing to participate in the study. A purposive sampling technique was used to select samples that met these criteria. Purposive sampling was used to ensure that the study sample consisted of respondents who fulfilled specific criteria, such as TB diagnosis and treatment experience, relevant to the study objectives. This approach maximised the opportunity to obtain in-depth data on factors influencing TB patient behaviour. The sample size was determined as 122 respondents with an error rate of 5%. The sample size was calculated using G*Power software version 3.1.9.7, with a significance level of 5% and a test power of 80%, referring to a previous study [16].

Research instruments

The main instrument in this study was a questionnaire based on the components of the Health Belief Model. This questionnaire consists of several sections that measure perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Each item in the questionnaire was measured using a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5).

The questionnaire was tested for content validity by consulting with three public health experts to ensure the relevance and clarity of each item. Furthermore, construct validity was evaluated using exploratory factor analysis (EFA), where all items loaded onto their respective factors with factor loadings greater than 0.4, indicating good validity.

Reliability testing was conducted using Cronbach's alpha coefficient to assess internal consistency. The overall reliability score was $\alpha = 0.85$, indicating a high level of reliability. Subscales of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy had alpha values ranging from 0.78 to 0.88. Additionally, test-retest reliability was assessed by administering the questionnaire to 30 respondents with a two-week interval, resulting in an intraclass correlation coefficient (ICC) of 0.87, confirming the instrument's stability over time.

Data collection procedure

Data were collected over a two-month period, from April to May 2024. Data were collected through face-to-face interviews with respondents at the designated health centres. Prior to the interview, the researcher explained the purpose of the study and obtained written consent from each respondent. Each interview lasted approximately 30–45 min, during which the researcher assisted the respondent in answering the questionnaire if needed.

Data analysis

Data obtained from questionnaires were analysed using descriptive and inferential statistical methods. Data were analysed using SPSS software version 26. Bivariate and multivariate logistic regression were applied to evaluate the effect of HBM variables on TB patients' health behaviours with a significance level of $p > 0.05$. The Likert scale was analysed using the mean score for each component, with reliability tested using Cronbach's alpha.

Research ethics

This study has obtained approval from the Health Research Ethics Committee at Poltekkes Kemenkes Surabaya. All participants were given complete information about the purpose of the study, the procedure, their rights as respondents, and guaranteed data confidentiality. Respondents who were willing to participate signed an informed consent before the start of data collection. The data obtained will be kept confidential and will only be used for the purposes of this study.

Results

Table 1 shows the demographic characteristics of 112 TB patients in East Lombok. The majority of respondents were male (57.1%) with the age group above 50 years dominating (44.6%). Smoking was found in 41.1% of respondents, while alcohol consumption was very low (8.9%). The education level of the majority was primary education (35.7%), and 40.2% of respondents were

Table 1 Characteristics of respondents

Characteristics		*n*	%
Gender	Male	64	57.1
	Female	48	42.9
Age	20 years old	10	8.9
	20–29 years old	17	15.2
	30–39 years	14	12.5
	40–49 years old	21	18.8
	≥ 50 years	50	44.6
Smoking	Yes	46	41.1
	No	66	58.9
Alcohol Consumption	Yes	10	8.9
	No	111	91.1
Education	Not in School	17	15.2
	SD	40	35.7
	JUNIOR	19	17
	SMA	31	27.7
	PT	5	4.5
Employment	Not Employed	45	40.2
	Informal Workers	14	12.5
	Formal Workers	5	4.5
	Others	48	42.9

unemployed, suggesting unstable economic conditions among TB patients.

Table 2 illustrates the frequency distribution of the variables in the Health Belief Model (HBM) and the health behaviours of TB patients. Most respondents had a moderate perception of vulnerability (44.6%) and a moderate perception of seriousness (53.6%). For perceived benefits, 49.1% of respondents had moderate perceptions, while 40.2% perceived low barriers. Cues to action (external support) were available to 50.9% of respondents, and 31.3% had low self-efficacy. In terms of health behaviours, 58% of TB patients adhered to treatment, although 42% were non-adherent.

Table 3 presents the results of the logistic regression analysis showing the factors in HBM that have a significant effect on the health behaviour of TB patients. The variables perceived susceptibility ($p = 0.022$) and perceived benefits ($p = 0.006$) had a positive influence, where patients with high perceived susceptibility were 1.617 times more likely to adhere to treatment. In contrast, perceived barriers ($p = 0.045$) showed a negative influence, where patients who perceived many barriers were 31.6% less likely to adhere to treatment. Cues to action ($p = 0.004$) and self-efficacy ($p = 0.009$) also contributed positively to medication adherence.

Table 2 Frequency distribution of Health Belief Model (HBM) variables and health behaviour of TB patients ($n = 112$)

Variable	Category	*n*	Percentage (%)
Perceived Vulnerability	Low	40	35.7
	Medium	50	44.6
	High	22	19.7
Perceived Seriousness	Low	30	26.8
	Medium	60	53.6
	High	22	19.6
Perceived Benefits	Low	20	17.8
	Medium	55	49.1
	High	37	33.0
Perceived Barriers	Low	45	40.2
	Medium	40	35.7
	High	27	24.1
Cue to Action	None	55	49.1
	Available	57	50.9
Air Efficacy	Low	35	31.3
	Medium	45	40.2
	High	32	28.5
Health Behaviour	Non-compliant	47	42.0
	Compliant	65	58.0

Discussion

This study aimed to understand the behaviour of TB patients in East Lombok through the Health Belief Model (HBM) approach. The results of this study indicate a significant relationship between the components of the HBM and the health behaviour of people with TB. The findings of this study indicate that perceived vulnerability significantly influences the health behaviour of people with TB in East Lombok. TB patients who feel more vulnerable to TB complications tend to be more compliant in undergoing treatment. This finding is in line with a study conducted by Li et al. in China, which found that high perceived vulnerability was associated with better treatment adherence among people with TB [17]. Patients who perceive that they have a high risk of complications or transmission tend to be more motivated to adhere to the recommended treatment regimen. However, this result is in contrast to the study by Gebremariam et al. in Ethiopia, which found that perceived vulnerability had no significant influence on treatment adherence. This discrepancy may be due to contextual factors, such as differences in accessibility of health services or different perceptions of risk among different populations [18]. In East Lombok, where access to health services may be more limited, TB sufferers who feel more vulnerable may be more motivated to seek treatment as a form of self-protection.

The results of this study also show that perceived severity influences the health behaviours of people with TB. Patients who perceive TB as a serious and life-threatening disease are more likely to adhere to treatment. This result is consistent with a study conducted by Tola et al., who found that high severity perception increased adherence to TB treatment among patients in Ethiopia. High perceived severity makes sufferers more aware of the serious consequences of TB, so they are more committed to completing treatment [19]. On the other hand, research in South Africa shows that despite high perceived severity, treatment adherence remains low, especially among

Table 3 Multivariate logistic regression test results to identify factors affecting the health behaviour of TB patients ($n = 112$)

Variable	B	SE	Wald	*p*-value	Exp(B)	95% CI for Exp(B)
Perceived Vulnerability	0.480	0.210	5.214	0.022	1.617	1.071–2.441
Perceived Seriousness	0.260	0.180	2.087	0.149	1.297	0.906–1.855
Perceived Benefits	0.630	0.230	7.498	0.006	1.878	1.198–2.944
Perceived Barriers	-0.380	0.190	4000	0.045	0.684	0.472–0.993
Cue to Action	0720	0.250	8.288	0.004	2.054	1.260–3.349
Self-efficacy	0.520	0.200	6.760	0.009	1.682	1.142–2.478

Description: B: Regression Coefficient; SE: Standard Error; Wald: Wald statistic; Exp(B): Odds Ratio; CI: Confidence Interval

sufferers who face social and economic barriers [20]. This suggests that although sufferers are aware of the severity of the disease, external factors such as stigma, poverty, and lack of social support may hinder them in adhering to treatment. Therefore, interventions that not only improve perceived severity but also address these barriers are needed to improve treatment adherence in East Lombok. Perceived severity in Lombok Timur is also influenced by the community's lack of understanding about TB. Many sufferers do not fully understand the long-term effects of TB, which may lead them to underestimate the disease. For example, research by Marahatta et al. in Nepal suggests that inadequate health education may cause people with TB to underestimate the severity of their disease, which in turn reduces their adherence to treatment [21]. This suggests that more intensive educational interventions are needed to improve community understanding of TB severity in East Lombok.

Perceived benefits of treatment were also found to have a significant influence on the health behaviours of people with TB in East Lombok. Patients who believed that treatment would bring great benefits in recovering from TB were more likely to adhere to treatment. This finding is consistent with the study by Ezeosim et al., which showed that perceived benefits were highly positively correlated with treatment adherence among people with TB in Nigeria [22]. A high perceived benefit makes patients more optimistic about treatment outcomes, making them more committed to complete treatment. However, a study by Marahatta et al. in Nepal found that despite high perceived benefits, some TB patients remained non-adherent to treatment due to perceived barriers, such as drug side effects and lack of family support [21]. This suggests that although people realise the benefits of treatment, success in motivating adherence also depends on managing barriers that may reduce the effectiveness of perceived benefits. However, this study also found that there are some TB patients in East Lombok who doubt the effectiveness of modern treatment and prefer traditional treatment. This is due to the strong cultural belief in traditional medicine in this region. A study in Indonesia found that TB patients who have a strong belief in traditional medicine are less likely to trust modern medical treatment, which in turn reduces their adherence to TB treatment [23]. Therefore, interventions designed to improve the perceived benefits of medical treatment need to consider local cultural aspects.

Perceived barriers are a factor that was found to have a negative influence on the health behaviour of people with TB in East Lombok. Patients who perceive many barriers, such as the cost of treatment, distance to health facilities, and social stigma, tend to be less compliant in undergoing treatment. These results are in line with research by McInerney et al., which showed that perceived barriers, particularly financial barriers and stigma, significantly reduced treatment adherence among people with TB in South Africa. These barriers create an additional burden that prevents people from getting the care they need [24]. In addition, a study by Chakrabartty et al. in India also showed that social barriers, such as stigmatisation of TB, are a major barrier for people with TB to receive appropriate treatment [25]. Social stigma can cause sufferers to feel embarrassed or afraid to seek treatment, which in turn reduces treatment adherence. In Lombok Timur, stigma against TB remains a problem, and this requires special attention in the TB control programme. In Lombok Timur, social stigma towards TB remains a major barrier affecting the behaviour of sufferers. Many sufferers are embarrassed or fearful of the community knowing they have TB, making them reluctant to seek treatment or adhere to their treatment regimen. Research in Indonesia has also found that social stigma is one of the biggest barriers to TB treatment, which can prevent people from being properly treated [26]. Therefore, efforts to reduce social stigma towards TB through education and socialisation campaigns are essential to improve treatment adherence in East Lombok.

Cues to action were found to play an important role in encouraging people with TB in East Lombok to adhere to treatment. The most common cues to action found in this study were support from family and health workers. Patients who received support and encouragement from loved ones were more likely to adhere to treatment. This result is consistent with the findings by Cramm et al., who showed that social support is an important factor in improving treatment adherence among people with TB [27]. Research by Cho en Cho in South Korea also showed that cues to action such as health education provided by medical personnel can increase the motivation of patients to comply with treatment [28]. This suggests that in addition to family support, education-based interventions by health workers can also be an effective cue to encourage TB patients to adhere to treatment. In Lombok Timur, such interventions could be further developed to strengthen cues that encourage positive behaviour among people with TB. In Lombok Timur, family support is often a key driver for people with TB to seek and adhere to treatment. However, this study also found that not all people with TB receive adequate support from their families. Some people with TB experienced social isolation or were abandoned by their families due to TB-related stigma. This is in line with the findings of Ratnasari et al., who showed that people with TB who lack social support tend to find it more difficult to adhere to treatment [29]. Therefore, interventions that focus on improving social support for people with TB are critical to improving treatment outcomes.

Self-efficacy, or an individual's belief in their ability to complete treatment, was found to have a significant influence on the health behaviours of people with TB. TB patients in East Lombok who have high self-efficacy are more likely to adhere to treatment. These results are in line with research by Gebremariam et al., which showed that high self-efficacy was associated with increased treatment adherence among people with TB in Ethiopia [18]. High self-efficacy gives people confidence that they are able to overcome challenges that may arise during treatment. However, another study in South Africa showed that low self-efficacy is often related to a lack of knowledge about TB and its treatment [20]. In East Lombok, improving self-efficacy can be achieved through educational programmes that focus on providing accurate information about TB and its treatment, as well as strengthening social support that can increase patients' confidence in completing treatment. However, this study also found that many people with TB in East Lombok have low self-efficacy, particularly among those with low levels of education or who have experienced significant treatment side effects. Low self-efficacy can prevent people with TB from adhering to their treatment, which can ultimately worsen their condition. Therefore, intervention programmes designed to improve the self-efficacy of people with TB are needed, including through skills training, provision of appropriate information, and psychosocial support.

The findings of this study have important implications for the TB control programme in East Lombok. Firstly, interventions aimed at improving perceptions of TB vulnerability and severity need to be further developed. Health campaigns that emphasise the serious risks and consequences of TB can help raise awareness of the importance of adhering to treatment. Second, it is important to address the barriers perceived by people with TB. TB control programmes should include strategies to reduce these barriers, such as providing financial support, expanding access to health facilities, and reducing stigma through community education. Third, social support from family and health workers should be strengthened as effective cues to action. Training programmes for health workers that emphasise the importance of providing emotional and motivational support to people with TB could be an important part of this intervention. In addition, improving self-efficacy through education programmes that provide accurate information and build patients' confidence in undergoing treatment should be a key focus. This study demonstrates the importance of positive perceptions and social support in improving TB treatment adherence. Interventions that are locally based, culturally considerate, and reduce social barriers may improve TB treatment outcomes.

This study has several limitations that need to be considered. First, the cross-sectional design used did not allow for the identification of causal relationships between HBM variables and the health behaviours of TB patients. Second, this study was conducted in one region, namely East Lombok, so the results may not be generalisable to other regions with different social and cultural characteristics. Thirdly, data obtained through self-report questionnaires may be susceptible to socially desirable biases, where respondents may provide answers that are considered more socially acceptable. Limitations in the cross-sectional design were minimised by ensuring data collection was conducted on a representative group of the target population. In addition, social bias was minimised by training interviewers to create a comfortable and neutral environment during questionnaire completion.

Conclusion

This study shows that perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy play an important role in influencing the health behaviour of people with TB in East Lombok. /Overall, the results of this logistic regression analysis suggest that perceived susceptibility, benefits, barriers, cues to action, and self-efficacy are key factors influencing the health behaviours of people with TB in East Lombok. Interventions designed to increase positive factors and reduce perceived barriers may contribute to improved treatment adherence in this region. However, interventions designed to improve TB treatment adherence must consider the local social and cultural context to ensure their effectiveness. With a holistic and evidence-based approach, it is hoped that TB treatment adherence rates in East Lombok can improve, which will ultimately aid in global efforts to control the spread of TB. /Interventions designed to increase positive factors and reduce perceived barriers may contribute to improved treatment adherence in the region.

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Author contributions
All authors conceived and designed the study. NN, DN, SW analyzed the data. NN, DN, SW wrote the manuscript. All authors have read and approved the final manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

This study was conducted following the ethical guidelines and regulations, and approval was obtained from the Health Ethics Commission of Poltekkes Kemenkes Surabaya with approval number No.EA/ 2089 /KEPK-Poltekkes_Sby/V/2024. All participants provided informed consent before data collection, and their confidentiality and anonymity were maintained throughout the research.

Competing interests

The authors declare no competing interests.

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