HEALTH PROMOTION MODEL-BASED HEALTH COACHING TO IMPROVE HEALTH CADRES' SKILLS IN PULMONARY TUBERCULOSIS CARE: A QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Background : Tuberculosis (TB) remains a major public health problem that requires active community participation, including the role of health cadres in providing education on pulmonary TB care. However, the ability of cadres to deliver effective education may vary. Health coaching based on the Health Promotion Model (HPM) can strengthen cadres' knowledge, skills, and confidence in delivering health education. **Objective :** This study aimed to assess the effect of HPM-based health coaching activities on cadres' ability to deliver education on pulmonary TB care at the Aur Duri Public Health Centre in Jambi City. **Methods :** This study used a quantitative approach with a quasi-experimental control design. The total number of respondents in the study was 60 health cadres selected by purposive sampling based on inclusion and exclusion criteria. The intervention consisted of HPM-based health coaching activities focused on pulmonary TB care education across five sessions, each lasting 45-60 minutes. Health cadres' abilities were assessed before and after the intervention using a validated Educational Cadres Skills Questionnaire (ECSQ). Data were analysed using a paired-samples t-test. **Results :** The ANCOVA results showed a significant effect of the intervention on posttest scores after controlling for pretest scores (adjusted mean: 60.96 vs. 48.54), $F(1,57) = 37.76$, $p < .001$, partial $\eta^2 = .398$. **Conclusion :** This approach significantly improved cadres' ability and can be recommended as an educational intervention to support community-based TB prevention and care programs.

Keywords: Health Cadres, Health Education, Health Coaching, Health Belief Model, Pulmonary TB Care

INTRODUCTION

Pulmonary tuberculosis (TB) remains a major public health problem and continues to impose a substantial burden on individuals, families, and health systems worldwide. Despite the availability of effective diagnostic and treatment services (WHO, 2024), TB control remains challenging because successful treatment and prevention depend not only on access to health services but also on sustained health-promoting behaviours at the individual, family, and community levels. Early recognition of symptoms, timely health-seeking behaviour, adherence to anti-tuberculosis treatment, appropriate cough and respiratory hygiene, adequate ventilation, and prevention of transmission are essential components of comprehensive TB control (Tampake *et al.*, 2021). Consequently, community-based approaches that can strengthen health education and support health-promoting behaviours remain important in efforts to reduce the burden of pulmonary TB.

Ongoing health educational activities play a crucial role in community-based TB control efforts. Health cadres serve as facilitators of community empowerment during educational sessions for families and patients with pulmonary TB (World Health Organization, 2024). Given the high transmissibility of pulmonary tuberculosis, the quality of information

provided to patients requires improvement. For educational activities conducted by community cadres to succeed, the methods employed must go beyond conventional approaches and incorporate standardised health training (Indonesia, 2024). WHO reports indicate that TB cases reached 10.8 million in 2024, up from 9.8 million in 2023 (WHO, 2024). Pulmonary TB accounts for 12% of deaths among the adult population. Along with India and China, Indonesia is a developing nation with one of the highest TB burdens, accounting for 10% of global cases (*Report 2023*, 2023).

Controlling the disease is a priority in the effort to eliminate pulmonary TB, despite various challenges, particularly regarding treatment adherence and transmission prevention within Indonesian communities (Amirah *et al.*, 2025). In 2024, 1.08 million pulmonary TB cases were identified in Indonesia, with 856,000 patients undergoing treatment. Jambi Province saw an increase in pulmonary TB cases, reaching 2,300 in 2024 (Indonesia, 2024). The prolonged nature of pulmonary TB treatment often leads to patient boredom (Federation, 2023). This state negatively impacts outcomes, contributing to disease recurrence, treatment failure, and increased drug resistance. Monitoring patient treatment and health promotion efforts such as health education are essential for TB control. Recent studies highlight the importance of cadre competence in supporting TB control programs (Fitriadi *et al.*, 2023). Monitoring patient treatment and health promotion efforts, such as health education, are essential for TB control. The importance of cadre competence in supporting TB control programs is recommended. Educational activities increase medication adherence and treatment among pulmonary TB patients. Good knowledge of tuberculosis among health cadres is associated with greater activity in providing education and support to patients, thereby improving treatment adherence (Net *et al.*, 2021).

Research by (Sultan *et al.*, 2025) demonstrated that education provided by health cadres significantly improves family knowledge regarding TB transmission prevention. Meanwhile, TB treatment success rates have risen due to the support cadres provide to patients and their families, specifically in supervising medication adherence and home-based patient care (West and Tenggara, 2020). Another study indicated that communication skills influenced the effectiveness of cadre-led education for the families of TB patients (United and Of, 2021). Key indicator of successful health education. Community members are more receptive to cadres who use simple language and a persuasive approach than to those who focus solely on information delivery (Amirah *et al.*, 2025). This aligns with findings by (Supriatun and Insani, 2021) who reported that some cadres struggle to explain TB care due to a lack of training and ongoing guidance.

Health cadres are an important community resource in TB prevention and care, particularly in settings where health services may have limited capacity to provide continuous support at the community level (Satyo *et al.*, 2024). As community-based health workers, cadres can contribute to health education, identification of individuals with symptoms suggestive of TB, referral to health facilities, treatment support, monitoring of treatment adherence, and dissemination of information concerning TB prevention. Their proximity to community members also enables cadres to establish interpersonal relationships and provide continuing encouragement to patients and families (Fitriadi *et al.*, 2023). However, the effectiveness of

cadres in performing these functions depends on more than their knowledge of TB. They require practical skills in communicating health information, identifying individual needs, motivating behavioural change, addressing barriers, providing counselling, and supporting individuals throughout the TB care process.

Although various studies have examined the knowledge, roles, and support provided by cadres to TB patients, most research still focuses primarily on the patients themselves (Kardiatun *et al.*, 2021). There is limited research specifically evaluating cadres' ability to educate patients and their families about tuberculosis care, even though families play the most crucial role in supporting patients throughout the treatment process (Kandou *et al.*, 2024). The quality of education cadres provide to families determines how successfully those families can manage care, supervision, treatment adherence, and the prevention of transmission (Martono, dkk, 2023). In fact, health education is key to successful TB treatment among patients in the community.

Conventional training for health cadres emphasised adjusting knowledge concerning TB symptoms, transmission, diagnosis, treatment, and prevention (Supriatun and Insani, 2021). Although knowledge is an important prerequisite for effective TB care, knowledge acquisition alone may be insufficient to develop the communication and behavioural-support skills required in community practice. Cadres may understand TB-related information but still experience difficulties in translating this knowledge into effective health education, individualised counselling, motivational communication, and practical support for patients and families (Diana, Siokal and Hidayat, 2024).. Therefore, interventions designed to improve cadres' skills should incorporate not only disease-related information but also a theoretical framework that addresses the determinants of health-promoting behaviour and provides cadres with practical strategies for facilitating behaviour change.

The Health Promotion Model (HPM), developed by Pender, provides a relevant theoretical framework for addressing these needs. HPM conceptualises health behaviour as being influenced by individual characteristics and experiences, behaviour-specific cognitions and affect, and interpersonal and situational influences. Key concepts within the model include perceived benefits and barriers to action, self-efficacy, activity-related affect, interpersonal influences, situational influences, and commitment to action (Rojas-torres *et al.*, 2025). These concepts are particularly relevant to community-based pulmonary TB care because TB-related behaviours are shaped by individuals' previous experiences, perceptions, confidence, social relationships, environmental conditions, and perceived barriers to action (Kardiatun *et al.*, 2021). Applying HPM principles in cadre training can therefore help cadres understand why individuals may or may not engage in recommended TB-related behaviours and enable them to tailor health education according to the specific needs and circumstances of patients and community members.

Health coaching provides a potentially effective strategy for translating HPM principles into practical skills (Fitriadi *et al.*, 2023). Unlike conventional didactic education, health coaching emphasises active interaction, individualised guidance, goal setting, self-efficacy enhancement, problem-solving, and supportive communication. An HPM-based health coaching approach may therefore enable cadres to apply theoretical concepts during their

interactions with patients and community members. For example, cadres can be trained to explore perceived barriers to treatment adherence, strengthen confidence in performing preventive behaviours, identify interpersonal support, establish achievable health goals, and provide cues and encouragement for sustained behavioural change. Through this process, health coaching can transform theoretical knowledge into practical communication and educational skills that are directly applicable to community-based TB care.

Although previous research has demonstrated the important contribution of community health cadres to TB prevention, case finding, treatment support, and health education, evidence-based, theory-driven interventions specifically aimed at improving cadres' practical skills in pulmonary TB care remain limited. Existing training approaches have frequently focused on improving cadres' knowledge and awareness, while comparatively less attention has been given to strengthening their ability to communicate effectively, provide individualised counselling, address behavioural barriers, and facilitate sustained health-promoting behaviours (Kardiatun *et al.*, 2021). Moreover, there is limited evidence concerning whether an HPM-based health coaching approach can effectively improve the skills of health cadres in pulmonary TB care. This gap is important because improvements in knowledge do not necessarily result in improved educational performance or effective support for TB-related behaviour change in community settings.

Addressing this gap is particularly important because cadres occupy a strategic position between formal health services and the community. Strengthening their skills through a theoretically informed and practice-oriented intervention may enhance their capacity to provide more effective TB education and support and, ultimately, contribute to community-based TB control. An HPM-based health coaching intervention offers a promising approach because it combines a behavioural theory of health promotion with an interactive strategy for developing communication, counselling, motivation, and problem-solving skills (Rojas-torres *et al.*, 2025).

Therefore, this study aimed to evaluate the effectiveness of an HPM-based health coaching approach in improving health cadres' skills in pulmonary tuberculosis care. By integrating the Health Promotion Model with health coaching, this study seeks to provide evidence the effectiveness of a theory-informed, community-based approach for strengthening cadres' capacity to deliver TB health education and support health-promoting behaviours among individuals and families affected by pulmonary TB. This study is crucial for generating recommendations to build health cadres' and support the success of Indonesia's tuberculosis elimination program.

METHODS

This study employed a quasi-experimental controlled pretest–posttest design involving an intervention group and a control group (Denise, 2017). The design was used to evaluate the effectiveness of an HPM-based health coaching intervention in improving health education cadres'skills in pulmonary tuberculosis care. In this study, the control group engaged only in routine activities at the public health centre, and the intervention group participated in a health

coaching intervention based on the Health Promotion Model.

The study was conducted from May to June 2026 in the Aur Duri Public Health Centre (Puskesmas) in Jambi City. The population comprised active health cadres at the Aur Duri Public Health Centre. The sample was collected using a purposive sampling technique, based on inclusion criteria to achieve the research objectives. A total of 60 participants were recruited, with 30 assigned to the intervention group and 30 to the control group. The sample size was determined using statistical power analysis ($\alpha = 0.05$, power = 0.80). The inclusion criteria included health workers who had been active for at least one year, were willing to participate as research respondents, and were able to read and write fluently. Exclusion criteria included those on leave or inactive during the study period, and those who did not complete the questionnaire.

A questionnaire was used to collect data on the cadres. The educational skills of health cadres were measured using the Educational Cadres Skills Questionnaire (ECSQ) (Diana, Siokal and Hidayat, 2024). This ECSQ consisted of 20 questions to assess health cadres' ability to provide information, support, and motivation in pulmonary treatment, transmission prevention, therapy adherence, and self-care for pulmonary TB patients. The total score indicated the cadres' educational skills: high (79–100), and low (0–78). The instrument's reliability test showed a Cronbach's alpha of 0.848, and the questionnaire's validity test value was 0.82.

Data collection began after respondents agreed and completed the informed consent form. A pretest was conducted for both the control and intervention groups to assess the cadres' initial skills in providing pulmonary TB care education. The research intervention consisted of five sessions of health coaching based on the Health Belief Model, including coaching, interactive discussions, role-plays, video screenings and home visits. These health coaching sessions lasted 150 minutes and were only provided to cadres in the intervention group. Evaluations were conducted the following week. The educational capabilities of the cadres were reassessed after they participated in health coaching activities to evaluate any changes.

The research data were analysed using univariate and bivariate methods. Baseline characteristics were summarized using descriptive statistics. Differences in health cadres' skills between the intervention and control groups at posttest were assessed using analysis of covariance (ANCOVA), with the posttest score as the dependent variable, treatment group as the independent variable, and pretest score as a covariate. This approach was used to account for baseline differences and to estimate the adjusted effect of the HPM-based health coaching intervention. The adjusted mean difference between groups was reported with a 95% confidence interval and p-value. Within-group pretest-to-posttest changes were also examined descriptively to characterize changes over time. Effect size was reported to indicate the magnitude of the intervention effect. Statistical significance was set at $p < 0.05$. This study has been reviewed and approved by the Ethics Committee of Poltekkes Kemenkes Jambi (Ethics Approval Letter No. LB.02.06/2/0332/2026). The research activities adhered to ethical standards, including obtaining informed consent, respecting participants' rights, and mitigating potential risks to respondents during the study.

RESULTS

Results should be presented in the table below:

Table 1. Distribution of Respondents characteristics

Characteristics Resoondent		Intervention Group		Control Group	
		n	%	n	%
Age	Early Adults	6	20	2	7
	LateAdults	24	80	28	94
Gender	Female	30	100	30	100
Length of Cadres time	1-3 years	26	87	24	80
	4-6 years	4	13	6	20
Education	Primary education	1	3	16	53
	Secondary education	21	70	13	43
	Higher Education.	8	27	1	4

Table 1 shows the health cadres' characteristics: 80% of the intervention group and 20% of the control group fell into the late adulthood age category. All respondents in both groups were female (100%). The majority of respondents had served as cadres for 1–3 years: 87% in the intervention group and 80% in the control group. In terms of education, the intervention group was dominated by respondents with a secondary education (70%), whereas the control group consisted primarily of those with a primary education (53%).

Table 2. Distribution of educational ability among health cadres

Variable		Intervention Group		Control Group	
		n	%	n	%
Educational Ability (pretest)	Low	16	53	15	50
	High	14	47	15	50
Educational Ability (posttest)	Low	11	37	16	53
	High	19	63	14	47

Table 2 shows the educational capabilities of the health cadres before and after health coaching. Both groups were in the low category regarding educational capabilities before the intervention. Following the health coaching activities, the educational capability scores among health cadres in the intervention group increased from 47% to 63%. The control group's educational ability score of health cadres decreased from 50% to 47%.

Table 3. ANCOVA Results for Cadres' Ability to Provide Pulmonary TB Care Education

Variabel	n	df	f	Pretest, Mean ± SD	Posttest, Mean ± SD	Adj. Mean	SE	95% CI	p	Partial η^2
Cadres' Ability to Provide Pulmonary TB Care Education (Intervention)	30	1	84,06	56,03 ± 18,30	62,20 ± 14,45	60.96	1,42	58,11–63,80	<.001	.596

Variabel	n	df	f	Pretest, Mean ± SD	Posttest, Mean ± SD	Adj. Mean	SE	95% CI	p	Partial η^2
Cadres' Ability to Provide Pulmonary TB Care Education (Control)	30	1	37,76	52,00 ± 11,11	47,30 ± 9,15	48.54	1,42	45,70–51,39	<.001	.398
Eror	-	57	-	-	-	-	-	-		-

Based on Table 2. The descriptive results showed that the intervention group had a mean pretest score of 56.03 ± 18.30 and a mean posttest score of 62.20 ± 14.45. In comparison, the control group had a mean pretest score of 52.00 ± 11.11 and a mean posttest score of 47.30 ± 9.15 (Table 1). An analysis of covariance (ANCOVA) was conducted to examine differences in posttest scores between the intervention and control groups while controlling for baseline pretest scores. The pretest score was significantly associated with the posttest score, $F(1,57) = 84.06$, $p < .001$, partial $\eta^2 = .596$. After controlling for pretest scores, a statistically significant difference was observed between the intervention and control groups, $F(1,57) = 37.76$, $p < .001$, partial $\eta^2 = .398$. The adjusted posttest mean was 60.96 (SE = 1.42, 95% CI [58.11, 63.80]) for the intervention group and 48.54 (SE = 1.42, 95% CI [45.70, 51.39]) for the control group. Thus, the adjusted mean difference between groups was 12.41 points (95% CI [8.37, 16.46]), indicating that participants who received the intervention achieved substantially higher posttest scores than those in the control group after accounting for baseline differences.

DISCUSSION

The study indicated that health cadres who received the intervention achieved substantially higher posttest scores than those in the control group after accounting for baseline differences. This study found that health coaching combined with the Health Promotion Model (HPM) was associated with improved health cadres' educational ability regarding pulmonary tuberculosis (TB) care. The findings suggest that a structured coaching approach may support the development of cadres' capacity to deliver TB-related health education. The observed improvement may be understood in the context of the HPM-based intervention, which provided cadres with structured guidance and opportunities to engage actively in the learning process. However, because specific HPM constructs were not directly measured in this study, the findings do not establish that changes in particular constructs, such as perceived benefits, perceived barriers, or self-efficacy, were responsible for the observed improvement. Therefore, these constructs should be regarded as components of the intervention rather than empirically demonstrated mechanisms underlying the outcome. Health cadres who received training combining health coaching and HPM demonstrated a statistically significant increase in educational ability (Karini *et al.*, 2025).

This finding is consistent with the potential value of participatory and structured training approaches in strengthening cadres' capacity to provide pulmonary TB education. However, given the quasi-experimental design, the observed improvement should not be interpreted as definitive evidence of a causal effect of the intervention. From a practical perspective, Health Coaching integrated with HPM may be considered as an approach for strengthening cadre capacity in pulmonary TB education. Its implementation in Puskesmas should take into account

the duration and frequency of coaching sessions, availability of trained facilitators, training materials, staff time, and other resource requirements. The feasibility of integrating the intervention into existing cadre development programs should also be assessed according to the workload and resources available in each primary healthcare setting. Further studies using randomised or other stronger experimental designs are needed to determine the causal effectiveness of this approach and to examine whether changes in specific HPM constructs contribute to improvements in cadres' educational ability. listeners; instead, cadres actively participate in discussions, are trained in empathetic listening, and are taught how to formulate practical education plans (Net *et al.*, 2021). This interactive approach aligns with findings by (WHO (World Health Organization), 2025) who stated that training involving active participation is far more effective at enhancing volunteer skills than one-way lecture methods.

Integrating HPM theory into coaching sessions fosters intrinsic motivation among the cadre. When cadre fully grasp the dangers and transmission processes involved (specifically regarding perceived susceptibility and severity), they come to view the responsibility of providing education as vital. The community health programs are sustainable only when volunteers truly understand the adverse impacts of the disease in question (Kardiatun *et al.*, 2021). During the pulmonary TB care education training, volunteers participated in role-playing exercises to address real-world challenges, such as resistance from patients' families or negative community stigma. This method proved effective in reducing anxiety and boosting the volunteers' self-efficacy when interacting with pulmonary TB patients and their families. According to (Fitriadi *et al.*, 2023), high self-confidence among volunteers is key to maintaining their enthusiasm and commitment to their duties over the long term.

The study results indicate that before the intervention, educational capabilities in both groups were relatively similar; however, the intervention group had a slightly higher proportion of individuals with low educational capabilities than the control group. This finding indicates that the majority of community health workers in both groups had low educational capabilities at baseline, suggesting that the two groups were appropriate for assessing changes in educational capabilities following the intervention. The health workers' educational capabilities were categorised as high following the intervention, which consisted of health coaching activities based on the Health Belief Model. This shift demonstrates that the training successfully enhanced the health workers' ability to convey health information. Such improvement likely stemmed from the acquisition of new knowledge, skills, and experience during the intervention process, enabling them to grasp the material better and feel more confident in educating the community (Wardani *et al.*, 2024). A learning process that combines structured material delivery with interactive practice helps health workers understand learning concepts more effectively than merely receiving information passively (Kusuma and Surakarta, 2018).

A different outcome was observed in the control group, which received only standard instruction without specialised guidance. Statistical data showed no change in the volunteers' educational capabilities. This highlights the shortcomings of traditional methods that rely on rote memorisation or the distribution of brochures without addressing communication skills (Airlangga, Amin and Keperawatan, 2017) assert that merely providing a mass of information without training communication skills or helping with psychological barriers will not transform the capabilities of community health volunteers. Volunteers in the control group who did not

receive such training tended to view the task of TB education merely as a formality or a routine administrative burden; this ultimately fostered a sense of burnout, a phenomenon highlighted (Kader *et al.*, 2020).

These findings reinforce the principle that a health volunteer must possess self-confidence before they can effectively persuade others. Health coaching serves as a practical strategy that translates complex Health Promotion Model (HPM) theories into fluid, solution-oriented communication skills (Februari *et al.*, 2020). These findings offer compelling evidence for the field of community nursing that community empowerment strategies for TB elimination must shift toward training approaches that are more humanistic and behaviour-focused, rather than relying on rigid medical indoctrination (Sultan *et al.*, 2025)

In practical terms, these results suggest that Public Health Centres should revise their volunteer training standards. Community nurses need to adopt the role of coaches or mentors who provide personalised guidance to volunteers (Diana, Siokal and Hidayat, 2024). Furthermore, organising health coaching workshops for both health workers and volunteers should be considered to strengthen volunteer capabilities within the community. Nevertheless, this study has limitations, as it did not examine long-term effects on TB patient recovery rates nor did it control for the impact of volunteers' domestic responsibilities. Consequently, future research could delve deeper into aspects of psychological readiness and the personal challenges cadres face in the field.

CONCLUSIONS

Health Coaching activities integrated into the Health Promotion Model were effective in improving the measured health cadres' ability to provide education on pulmonary TB care. Health cadress in the intervention group achieved significantly higher posttest scores than those in the control group. These findings suggest that the approach may be useful for strengthening volunteer capacity in pulmonary TB education. Community health centres (Puskesmas) may consider incorporating Health Coaching activities into regular cadre training and development programs, while further studies using stronger experimental designs are warranted to establish causal effects.

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