



Empowering Adolescent Peer Cadres for Tuberculosis Prevention: The “PEKA TB” Initiative at SMPN 31 Padang

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ABSTRACT

Tuberculosis (TB) remains a major public health issue, particularly among adolescents in densely populated school environments with poor ventilation. This community service aimed to strengthen TB prevention and control efforts through the establishment and empowerment of “PEKA TB” (Pencegahan dan Penanggulangan Tuberkulosis) cadres at SMPN 31 Padang. The activity employed a pre-post test design with an educational and participatory approach, involving 34 students from grades VIII and IX as peer health cadres. The intervention consisted of interactive lectures, discussions, and simulations on TB transmission, prevention, and the PEKA TB framework (Examine-Educate-Coordinate-Act). Evaluation using structured questionnaires measured knowledge, attitude, and practice before and after the intervention. The results showed significant improvements across all variables, indicating that peer-based education effectively enhanced students’ awareness, attitudes, and preventive behaviors toward TB. The empowerment of adolescent cadres successfully fostered active participation in school health promotion and strengthened collaboration between schools and local health authorities. This initiative demonstrates that student-centered, peer-led education is a sustainable strategy to create a healthy, TB-free school environment.

Keywords: tuberculosis, adolescent health, peer education, cadre empowerment, school-based intervention

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* and remains a serious global health problem. Although it primarily affects the lungs, TB can also invade other organs. Transmission occurs through droplets expelled by TB patients when coughing, sneezing, or speaking (WHO, 2022). Indonesia ranks among the countries with the highest TB burden worldwide, with an estimated 845,000 new cases reported in 2021 (Kemenkes, 2020). This highlights that TB remains a major public health challenge that requires comprehensive and sustainable preventive strategies.

Schools serve as institutions that provide education under the supervision of teachers. Beyond their academic function, schools may become potential sites of disease transmission if health and environmental management are inadequate. The school-age period is also a critical stage during which children are highly susceptible to infectious diseases, including TB. At this stage, health education and the cultivation of healthy living

habits are most effective (Diana, 2018). Consequently, maintaining the health of school-age children is vital for ensuring the well-being and productivity of future generations.

Environmental factors are crucial determinants of health status. A clean and healthy environment not only improves community health but also enhances comfort, learning efficiency, and overall well-being (Notoatmodjo, 2018). The World Health Organization (WHO) has promoted the concept of “Healthy Schools,” emphasizing the creation of safe and healthy learning environments as a strategy to reduce disease transmission, including TB (WHO, 2020).

According to data from the Padang City Health Office, TB cases among children aged 0–14 years were most prevalent in the working area of the Andalas Health Center in 2023, with a total of 30 cases. This indicates active TB transmission in the area and calls for immediate public health action (Dinkes 2024). SMPN 31 Padang, located within this area, represents a high-risk educational institution due to poorly ventilated classrooms, high student density, and suboptimal sanitation (Dotulong, 2018). Such conditions heighten the risk of TB exposure among students.

To address this problem, a community service initiative was implemented through the establishment and empowerment of “PEKA TB” (Pencegahan dan Penanggulangan Tuberkulosis) cadres at SMPN 31 Padang. Based on preliminary observation, several classrooms lacked proper ventilation and exhibited overcrowding and inadequate sanitation facilities. These conditions made the school particularly vulnerable to TB transmission (10). The “PEKA TB” cadres are students selected and trained to participate actively in health promotion and environmental sanitation activities, serving as role models and agents of change within the school environment (Masrizal, 2022).

Research by Supriyono et al. (2022) demonstrated that the empowerment of school health cadres effectively improves students’ knowledge, attitudes, and practices in preventing communicable diseases, including TB (Supriyono, 2022). Moreover, the peer education approach—where information is disseminated through trained peers—has been shown to enhance health knowledge and behavior among adolescents due to shared communication styles and mutual trust (Masrizal, 2022). Empowering school-based cadres is also considered an effective strategy for ensuring the sustainability of disease prevention programs after primary interventions have ended (Santoso, 2023).

This community service program employed a participatory approach involving students as change agents and emphasized multi-sectoral collaboration between SMPN 31 Padang, the Andalas Health Center, and parents. The program’s objectives were to (1) increase students’ knowledge, attitudes, and practices regarding TB prevention and control; (2) establish and train “PEKA TB” cadres as health promoters within the school; (3) enhance students’ capacity to monitor school environmental conditions related to TB prevention; and (4) strengthen collaboration between schools and local health authorities in implementing TB prevention strategies. Through this initiative, it is expected that a clean, healthy, and TB-free school environment can be sustainably achieved.

METHOD

Community Design and Approach

This community service activity applied a pre–post test design with an educational and participatory approach. The intervention focused on tuberculosis prevention and control through the establishment and empowerment of “PEKA TB” (Pencegahan dan Penanggulangan Tuberkulosis) cadres among junior high school students. The design was chosen to evaluate changes in students’ knowledge, attitudes, and preventive practices before and after the educational intervention.

Location and Time

The activity was conducted on September 11, 2025, at SMPN 31 Padang, located in the working area of the Andalas Health Center, Padang City, West Sumatra Province.

Partners and Participants

The main partner of this program was the Andalas Health Center, which provided technical guidance and supported health education activities. The participants consisted of 34 students from grades VIII and IX who were selected as school health cadres (PEKA TB cadres). Participants were chosen based on their activeness and leadership potential in school health activities.

Instruments and Indicators

The primary instrument used in this study was a structured questionnaire designed to assess three major components, namely knowledge, attitudes, and practices related to tuberculosis. The knowledge section evaluated respondents' understanding of the causes, symptoms, modes of transmission, and prevention of TB, using multiple-choice questions. Meanwhile, attitudes toward TB prevention and healthy living behavior within the school environment were measured using a 5-point Likert scale, which was also applied to assess preventive practices such as ventilation management, cough etiquette, and personal hygiene maintenance. Content validity of the questionnaire was ensured through expert judgement involving lecturers from the Faculty of Public Health, Universitas Andalas, as well as public health practitioners from the Andalas Health Center. Furthermore, reliability testing was conducted on a small group of students who were not part of the study sample, resulting in a Cronbach's Alpha value greater than 0.70, indicating that the instrument had good internal consistency and was reliable for use in research.

Activity Stages

This activity consisted of three main stages, namely preparation, implementation, and evaluation. The preparation stage involved coordination with partner schools and the local health center, as well as the development of educational materials and logistical needs such as banners, posters, and pre-post test sheets, followed by establishing the activity schedule. The implementation stage began with an opening speech from the school principal, then continued with interactive educational sessions facilitated by the public health team from Universitas Andalas. The material delivered included TB transmission, symptoms, prevention strategies, and the PEKA TB concept (Examine-Educate-Coordinate-Act). In addition, training was strengthened through simulation activities and group discussions to enhance the role of student cadres, whose primary responsibility was to educate their peers and the wider school community regarding TB prevention. The final stage was evaluation, where participants were given a pre-test prior to the intervention and a post-test afterwards to measure changes in knowledge, attitudes, and practices related to TB prevention.

Evaluation of Success

Program effectiveness was measured by comparing pre-test and post-test scores for knowledge, attitude, and practice variables. Data were analyzed using the Wilcoxon signed-rank test with a significance level of 5% ($p < 0.05$). Improved post-intervention scores were used as indicators of the effectiveness of the educational and empowerment program in enhancing students' awareness and preventive behaviors toward tuberculosis.

RESULTS AND DISCUSSION

Participant Characteristics

Table 1 shows the frequency distribution of participants by sex. The majority of participants were female (61.8%), while male participants accounted for 38.2%. This

finding indicates that female students were more dominant in participating in the “PEKA TB” cadre empowerment program at SMPN 31 Padang. The higher proportion of female participants may reflect a greater interest and responsiveness among female students in school-based health promotion activities. Previous studies have also shown that female students tend to be more active in health-related volunteer activities and demonstrate higher awareness of hygiene and disease prevention behaviors compared to their male counterparts.

In terms of age distribution, most participants were 14 years old (55.9%), followed by those aged 13 years (32.4%) and 15 years (11.8%). This distribution reflects that the engagement in the program was largely concentrated among students in mid-adolescence, a period in which awareness and participation in school health initiatives are often more optimal as students are considered more receptive to health education and behavior-change interventions.

Table 1. Frequency and characteristics distribution of participants (n=34)

Variable	Frequency	Percent
Gender		
Male	13	38.2
Female	21	61.8
Total	34	100
Age		
13 years old	11	32.4
14 years old	19	55.9
15 years old	4	11.8
Total	34	100

Activity Implementation

The community service activity was held at SMPN 31 Padang on September 11, 2025, with the theme "Establishment and Empowerment of PEKA TB Cadres as an Effort to Prevent and Control Tuberculosis in Adolescents." The activity was opened by the Principal, who emphasized the importance of students' role in maintaining school health.

Before the education session, the participants, consisting of 34 students from classes VIII and IX, took a pre-test to measure their initial knowledge about TB. The results showed that most did not understand the symptoms and prevention. The material was delivered by the FKM Unand team through interactive lecture and discussion methods, including the introduction of TB, transmission, prevention, and the PEKA TB strategy (Check, Educate, Coordinate, Action).

The training atmosphere was active, followed by a simulation of the application of the PEKA TB concept in the school environment. After the education session, a post-test was conducted, which showed an increase in students' knowledge of TB symptoms and prevention. As a symbolic gesture, the PEKA TB Cadre pin was installed and educational posters were handed over to the school.



Figure 1. Group photo of the principal, teachers, and students participating in the community service program.

Changes in Knowledge, Attitude and Action

Based on the results of the pre-test and post-test of 34 participants, there was an increase in mean scores on all variables, namely knowledge, attitudes, and actions after being given educational interventions on Tuberculosis and the formation of PEKA TB cadres.

Table 2. Knowledge, attitude and action among participants (n=34)

Variable	Mean	SD	Minimum	Maximum
<i>Knowledge</i>				
Pre test	2.71	1.244	0	5
Post test	4.41	0.783	2	5
<i>Attitude</i>				
Pre test	4.26	0.751	3	5
Post test	4.85	0.359	4	5
<i>Action</i>				
Pre test	3.97	0.834	2	5
Post test	4.88	0.327	4	5

Before the education, the mean knowledge score of the participants was 2.71 ± 1.244 , indicating a low level of initial understanding regarding the causes, symptoms and prevention of TB. After the education, the mean score increased to 4.41 ± 0.783 , indicating a significant increase in understanding of the material presented.

In the attitude aspect, the mean score increased from 4.26 ± 0.751 to 4.85 ± 0.359 . This illustrates that the education provided was able to foster participants' positive attitudes towards the importance of clean living behavior and active involvement in TB prevention efforts in the school environment.

Meanwhile, on the action variable, the mean score increased from 3.97 ± 0.834 to 4.88 ± 0.327 . This increase shows that participants not only understand the concept of TB prevention, but also have better readiness to implement preventive behaviors in real life, such as maintaining cleanliness, paying attention to classroom ventilation, and applying cough etiquette.

Overall, these results indicate that the PEKA TB education and cadre formation activities were effective in improving students' knowledge, attitudes and actions towards

TB prevention. The decreased standard deviation value in the post-test also indicates a more uniform perception and level of understanding among participants after the activity.

Table 3. Results of the Wilcoxon Pre- and Post-Test

	Pre Knowledge - Post Knowledge	Pre Attitude - Post Attitude	Pre Action - Post Action
Z	-4.708 ^b	-3.879 ^b	-4.132 ^b
Asymp.Sig. (2-tailed)	<0.0001	<0.0001	<0.0001

The Wilcoxon Signed Rank Test was conducted to determine the differences in knowledge, attitudes, and actions of participants before and after receiving education on Tuberculosis prevention. The results of the analysis showed that there was a statistically significant difference between the pre-test and post-test scores on the three variables. The Z test value for knowledge was -4.708, attitude -3.879, and action -4.132, with an Asymp. Sig. (2-tailed) < 0.0001 on each variable. Because the p value <0.05, it can be concluded that there is a significant difference between the scores before and after the intervention.

These results indicate that health education activities through the formation of PEKA TB cadres are effective in increasing knowledge, forming positive attitudes, and encouraging TB prevention actions among students of SMPN 31 Padang. These improvements reflect the success of the interactive learning method used in strengthening participants' understanding and health behaviors.

The Wilcoxon Signed-Rank test was appropriate due to the pre-post design on a small sample and ordinal/limited data. Negative Z values indicate the direction of change (decrease in pre→post rank in the test calculation) and $p < 0.0001$ in all three variables confirmed that the increase in scores was not a statistical fluke. In other words, there was strong evidence that the PEKA TB education intervention was associated with improvements in participants' KAP. Similar studies have also used non-parametric analysis to assess pre-post changes in KAP and reported similar results when the intervention was effective.

Knowledge

The increase in knowledge scores from a mean of 2.71 to 4.41 indicates the acquisition of substantial factual information on the causes, symptoms and prevention of TB after education. These results are consistent with a number of studies reporting that integrated educational interventions in schools (including interactive lectures, discussions and simulations) are effective in improving students' knowledge of TB and its risk factors. Short but interactive interventions tend to have a rapid impact on knowledge scores in adolescents because the material is delivered in a context that is relevant and easily digestible by the peer group (Idris, 2020).

Mechanisms & practical meaning. Improved knowledge is an important prerequisite for behavior change - without an understanding of modes of transmission and signs of TB, prevention efforts (e.g. ventilation, cough etiquette, case referral) are difficult to implement. Programs that use peer cadres can strengthen knowledge transfer as peer-to-peer authoritative communication increases acceptance of health messages. A review of evidence suggests peer-education-based interventions in schools are effective for improving knowledge on a range of adolescent health issues (Dodd, 2022).

Attitude

Participants' attitudes improved from a mean of 4.26 to 4.85, indicating a shift towards more positive attitudes towards the importance of TB prevention and involvement in school health activities. This change in attitude was likely influenced by a combination of increased knowledge, role modeling by PEKA TB cadres, and practical experience during the simulation (e.g. checking ventilation, putting up posters). Studies of TB interventions and adolescent health education programs have also shown that participatory experiences and peer education are effective in shaping pro-health attitudes because they foster a sense of social responsibility and group identity that supports healthy behaviors (Dodd, 2022).

Significance. Attitude change is important for sustaining action; a positive attitude towards prevention will increase the likelihood of students maintaining the behavior (e.g. practicing cough etiquette, reminding friends about ventilation). In addition, positive attitudes among cadres have the potential to increase the diffusion effect to other students through peer education.

Action

Actions improved the most (3.97 → 4.88), meaning the intervention not only changed knowledge and attitudes but also triggered readiness and implementation of preventive behaviors (e.g., attention to ventilation, hygiene, cough etiquette). Actual behavior change is often more difficult to achieve than knowledge/attitude change; therefore this finding signifies the success of interactive methods-including simulation and cadre role assignment-that provide direct opportunities to practice and monitor actions. These results are in line with other studies reporting that educational programs in schools can improve TB prevention practices or related health behaviors in students when combined with participatory strategies (Owolabi, 2021).

The literature suggests several reasons why school cadre/peer education is effective: (1) peer-to-peer communication reduces psychological barriers - students value information from peers more; (2) cadre-based interventions facilitate sustainability as cadres can continue to educate after formal activities are completed; (3) participatory methods (simulations, demonstrations, discussions) improve practice skills - crucial for TB prevention in risky settings such as schools. Global reviews also confirmed the effectiveness of peer-led programs for adolescent health issues (Natt, 2019).

CONCLUSION

The community service program through the establishment and empowerment of "PEKA TB" cadres at SMPN 31 Padang has proven effective in increasing students' knowledge, attitudes, and preventive behaviors toward tuberculosis. The involvement of students as peer educators created an active learning environment that strengthened their sense of responsibility and collective awareness of school health. This approach not only enhanced individual understanding but also fostered collaboration among schools, health authorities, and parents in maintaining a healthy school environment. The success of this program highlights the importance of participatory and peer-based health education as a sustainable model for disease prevention in adolescents. It is recommended that similar initiatives be replicated in other schools to strengthen early TB prevention efforts and support the creation of clean, healthy, and TB-free educational settings.

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