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Implementation of Community Diagnosis in Suppressing New TB Cases in Village X

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Abstract

The purpose of this study was to increase public knowledge in Kiarapayung Village, within the Pakuhaji Community Health Center (Puskesmas) working area regarding pulmonary TB and its prevention. Community diagnosis in the Pakuhaji Community Health Center working area used the Blum Paradigm, with data from mini-surveys, interviews, and observations. Problem priorities were determined through USG (Urgency, Seriousness, Growth), non-scoring Delphi, and Fishbone and Five Whys analysis for root causes. Interventions included pulmonary TB education, coughing/sneezing etiquette practices, and proper handwashing. Monitoring was conducted using the PDCA cycle, while evaluation used a systems approach. Based on the Blum Paradigm, lifestyle factors play a role in the high number of TB cases. The intervention results showed that 24 participants (60%) obtained a post-test score of ≥70 points, and there was an increase in the average pre-test and post-test scores of 46.6%. One random participant was able to demonstrate coughing etiquette and proper handwashing.

Introduction

In 2022, there were 8,941 cases recorded, and in 2023, this number increased to 9,000. This increase occurred among productive-age individuals, namely those aged 18 to 45. The Tangerang Regency Health Office recorded a TB prevalence of 282 cases per 100,000 people, with an estimated population of around 4 million. This practice is supported by a significant and continuous increase in visits by pulmonary TB patients to community health centers. Furthermore, poor patient habits and a lack of knowledge about pulmonary tuberculosis contribute to the continued rise in cases. In addition to TB, hypertension is also a challenging health issue. In 2024, hypertension was among the top ten diseases at the Pakuhaji Community Health Center, with 7,767 cases. Furthermore, in cases of gastritis, according to a report from the Banten Provincial Health Office, there was a 12% increase in gastritis cases in 2022 compared to the previous year. The Pakuhaji Community Health Center also saw an increase in gastritis cases in 2024. This situation indicates the need for integrated interventions, including increased health promotion, early detection, and improved immunization coverage to reduce the incidence of the disease (Ahmed et al., 2023; Kapuria et al., 2023; Patel et al., 2024). Therefore, based on the above, the author has determined four lists of problems to be further identified along with their cases, namely (Almomani et al., 2022; Bektas et al., 2025; Craciun et al., 2023; Dash et al., 2024) TB, hypertension, and gastritis . After identifying the root causes of the problem, it was found that public knowledge about tuberculosis is still minimal. Furthermore, many people still practice unhealthy lifestyles such as smoking, littering

and burning garbage, and a lack of understanding of coughing and sneezing etiquette and proper handwashing (Blanc et al., 2024; AbdulRaheem, 2023; Wallace et al., 2024). This condition is further reinforced by data on the significant increase in tuberculosis cases in the last three months, namely in May, June, and July 2025. Other factors contributing to this problem include the economic conditions of the community, which are mostly lower-middle class, and a relatively low level of education, with most having only received education up to elementary school (Wirtz et al., 2022; Rathod et al., 2023; Jiang et al., 2023). As a follow-up to the identified issues, an intervention was implemented in the form of outreach activities that included education on the importance of the six steps of proper handwashing, proper coughing and sneezing etiquette, nutritious food consumption patterns, and efforts to prevent tuberculosis transmission. Educational materials also covered the dangers of exposure to cigarette smoke and pollution from burning waste, as well as the importance of compliance and discipline in taking medication for tuberculosis patients (Owolabi et al., 2022; Sarwar et al., 2023; Zhang et al., 2024). Handwashing and proper coughing etiquette activities were conducted with the community, as well as educational videos were shown to reinforce visual and practical understanding (Chavez et al., 2023; Wong et al., 2023; Dameria et al., 2023). This intervention is expected to increase knowledge, change attitudes, and improve community behavior regarding tuberculosis prevention and control in the Pakuhaji Community Health Center area. as well as community awareness and understanding regarding Tuberculosis in Kiara Payung Village (Puspitasari et al., 2022; Bao et al., 2022; Craciun et al., 2023; Xie et al., 2025).

Globally, tuberculosis caused approximately 1.30 million deaths in the same year. However, with treatment recommended by the WHO, up to 85% of TB cases can be cured (Panigrahi et al., 2025; Umar et al., 2025) . According to the 2023 Global TB Report, Indonesia ranks second as the country with the highest number of tuberculosis (TB) cases in the world after India, followed by China. Data from the WHO 2023 *Global Tuberculosis Report* shows that tuberculosis is the second leading cause of death from infectious diseases after COVID-19 with a death toll almost twice that of HIV/AIDS. Tuberculosis cases are increasing every year. The estimated number of tuberculosis patients suffering from tuberculosis in 2022 is 10.6 million patients, compared to 10.3 million in 2021. The number of new patients diagnosed with tuberculosis in 2022 is 7.5 million. This figure represents the largest increase in new tuberculosis cases compared to previous years, namely 7.1 million in 2019, 5.8 million in 2020 and 6.4 million in 2021. Eight of the 30 countries that contribute more than two-thirds of global TB cases are India (27%), Indonesia (10%), China (7.1%), the Philippines (7.0%), Pakistan (5.7%), Nigeria (4.5%), Bangladesh (3.6%) and the Democratic Republic of the Congo (3.0%). The estimated number of TB cases in Tangerang Regency in 2023 is estimated at 12,468 cases and the number of TB cases obtained is 11,720 cases (94%). The number of TB case detection and treatment shows an increase compared to the previous year, with a total of 8,941 cases recorded in 2023. The highest contribution of notification of the number of TB cases comes from Hospitals, namely 5,791 cases (49.4%), followed by Community Health Centers with 5,778 cases (49.3%). Meanwhile, the lowest number of notification of TB cases comes from Prisons/Detention Centers, namely 16 cases (0.1%). (Tangerang Regency Health Office, 2024).

To address TB, the government issued Presidential Regulation No. 67 of 2021 concerning TB Control. The global commitment to end TB is outlined in the END TB *Strategy* , which targets an 80% reduction in TB incidence and a 90% reduction in mortality by 2030. In this effort, the Indonesian Ministry of Health has developed a TB Elimination Roadmap in line with these global targets. The targets include reducing the incidence to 65 per 100,000 population and the mortality rate to 6 per 100,000 population. This will be achieved by increasing TB detection and treatment coverage to ≥ 90%, TB treatment success to ≥ 90%, and TB Preventive Therapy (TPT) coverage to ≥ 80%. Based on 2024 data from Health Service Facilities in Tangerang Regency, all 44 Community Health Centers (Puskesmas) and 27 Hospitals have Tuberculosis

Information System (SITB) accounts and have reported suspected TB cases and findings. There are 2 prisons/detention centers, but only 1 actively reports tuberculosis findings. Of the 216 clinics, only 152 have Tuberculosis Information System (SITB) accounts, and 47 clinics report suspected tuberculosis cases. (Sunaryo Putra & Hariana, 2019).

The large number of private health care facilities that have not reported suspected or cases of Tuberculosis will affect the goal of achieving the Tuberculosis Elimination target in 2030. Regarding the recording of reporting the discovery of suspected Tuberculosis in 44 Community Health Centers in Tangerang Regency in 2024, Jambe Community Health Center in the January-June period ranked the lowest in Tangerang Regency in the Suspected Tuberculosis indicator, namely 15.68%, where the target for the suspected achievement of the Community Health Center is 100% of the estimate set by the Regency. Health services for suspected Tuberculosis are included in the type of basic services in the Minimum Service Standards (SPM) for Regency/City Health, Basic Services in the Health SPM are implemented in health care facilities owned by the Central Government, Regional Government, and the private sector. The Minimum Service Standard in the Tuberculosis program is the achievement of Suspected Tuberculosis recorded and reported in the Tuberculosis Information System (SITB). (Ministry of Health, 2024).

Besides TB, hypertension is also a challenging health problem to address. Hypertension was among the top ten diseases at the Pakuhaji Community Health Center in 2024, with 7,767 cases. According to the 2018 Basic Health Research (Riskesdas), there were 4,424 hypertension cases in Tangerang Regency, 15,135 in Banten Province, and 658,201 cases nationwide. Furthermore, data from the Indonesian Ministry of Health indicates that in 2021, the prevalence of gastritis reached 274,396 cases reported to hospitals. According to a report from the Banten Provincial Health Office, gastritis cases increased by 12% in 2022 compared to the previous year. At the Pakuhaji Community Health Center, gastritis cases increased by 3,446 in 2024. Among the 10 most common diseases, tuberculosis is one of them with 1,276 patients. Pakuhaji Community Health Center in 2024 has a target burden of 1,084 suspected tuberculosis suspects to be found, based on data from the Tuberculosis Information System (SITB) July 5, 2024, the achievement of suspected tuberculosis detection for the period January-June 2024 was 170 (15.68%). From the data obtained at Pakuhaji Community Health Center, there was an increase in TB cases from 2023 to 2024 and with the largest spike in Kiara Payung village.

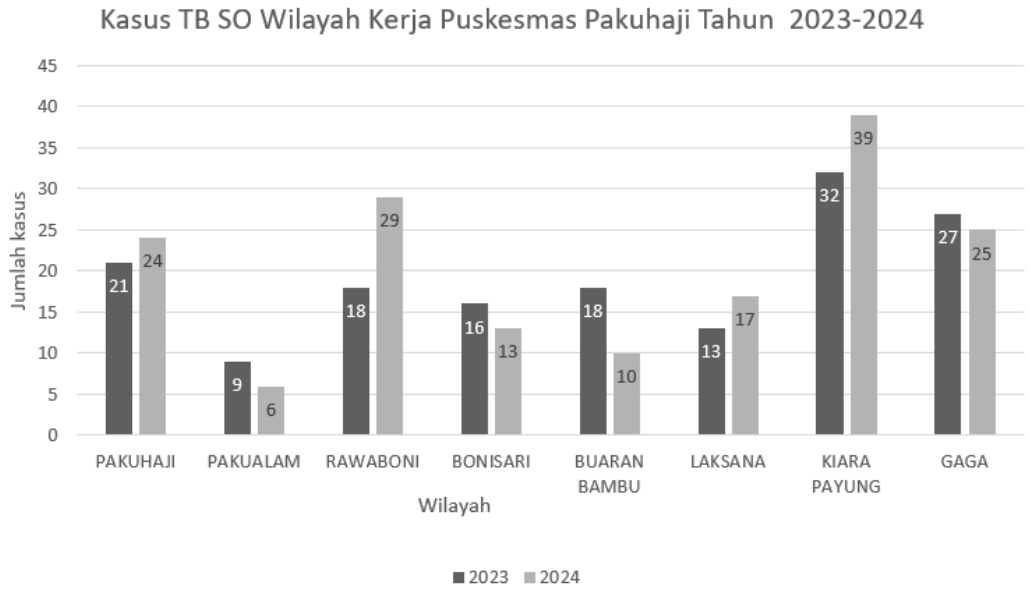

Figure 1. TB cases at Pakuhaji Community Health Center during the 2023-2024 period

Given the high caseload and increasing trend, the Pakuhaji Community Health Center conducted lung health screenings for people who had close contact with pulmonary TB patients. These examinations included X-rays, Molecular Rapid Tests (TCM), *Tuberculin Skin Tests (TST/Mantoux Test),* and Tuberculosis Preventive Therapy (TPT) for individuals with positive TST results. If pulmonary TB is suspected, patients are immediately followed up with sputum smears and placed on a standard pulmonary TB treatment program.

Methods

Research Design

This study employed a community-based analytical and intervention research design aimed at identifying priority health problems,analyzing the root causes of tuberculosis(TB),and implementing evidence-based interventions to reduce TB transmission in Kiara Payung Village.The design integrates problem prioritization,causal analysis,and continuous quality improvement to ensure that the intervention is both contextually appropriate and systematically evaluated.

Determination of Priority Health Problems

The initial stage of the study focused on determining priority health problems using the USG method(Urgency,Seriousness,Growth).This method was applied to three major health issues identified in the community,namely hypertension,gastritis,and tuberculosis(TB).Each problem was assessed based on its level of urgency,the severity of its impact on community health,and its potential for future growth if left unaddressed.Each criterion was assigned a numerical score,and the total score for each health problem was calculated to determine priority status.The health problem with the highest cumulative score was selected as the primary focus of the intervention,ensuring that limited resources were directed toward the most pressing community health concern.

Identification of Root Causes Using Blum's Paradigm

Following the determination of TB as the priority health problem,Blum's health paradigm was used to identify the underlying factors contributing to TB incidence in the village.This framework analyzes health problems through four key dimensions,namely lifestyle,health services,environmental conditions,and genetic factors.In the context of TB transmission,lifestyle factors were emphasized due to their strong association with disease spread.A mini survey was conducted to collect data on smoking behavior,dietary patterns,personal hygiene practices,and daily activities that increase exposure risk.In addition,the study examined community access to health services,including availability of TB screening,treatment adherence support,and health education,as well as environmental conditions such as housing density,ventilation,and sanitation that may facilitate TB transmission.

Prioritization of Causal Factors

After identifying the various factors contributing to TB transmission,the study proceeded to prioritize the most influential causal factors using non-scoring analytical techniques.The Delphi method was employed to achieve consensus among key stakeholders,including public health experts,medical personnel,and community representatives.Through iterative discussions and feedback,participants identified the most critical factors driving TB transmission in the village.To complement this process,Fishbone analysis was conducted to visually and systematically map causal relationships related to lifestyle behaviors,health service limitations,environmental risks,and existing local policies.This combined approach ensured that priority factors were identified through both expert consensus and structured causal analysis.

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Intervention Design and Implementation Using the PDCA Cycle

The intervention was designed and implemented using the PDCA(Plan-Do-Check-Act)cycle as a framework for continuous improvement.At the planning stage,intervention strategies were developed based on the results of problem prioritization and causal factor analysis.These strategies focused on TB prevention and control through behavior change and community education.The implementation stage involved delivering health education sessions to community members,covering topics such as TB transmission mechanisms,proper coughing etiquette,the importance of hand hygiene,and early health-seeking behavior.The evaluation stage assessed intervention effectiveness using pre- and post-intervention assessments to measure changes in knowledge and behavior,as well as participant feedback to capture community perceptions.The final stage involved refining and adjusting intervention strategies based on evaluation outcomes to enhance effectiveness and sustainability.

Evaluation Indicators and Outcome Measurement

The success of the intervention was measured using both process and outcome indicators.Key indicators included improvements in community knowledge regarding TB transmission and prevention,positive changes in health-related behaviors,and increased adoption of preventive practices.Furthermore,the reduction in the number of newly identified TB cases in the village was used as a long-term impact indicator to assess the broader public health effect of the intervention.By integrating systematic analysis,participatory decision-making,and continuous evaluation,this methodology provides a comprehensive and context-sensitive approach to reducing TB transmission and improving community health outcomes in Kiara Payung Village.

Result and Discussion

Based on the results of the analysis using Blum’s paradigm,it was identified that the most influential factor contributing to the increasing number of tuberculosis(TB)cases in the working area of Pakuhaji Community Health Center,particularly in Kiara Payung Village,is lifestyle.This factor includes community habits characterized by limited understanding of TB prevention measures,such as proper coughing and sneezing etiquette,and inadequate handwashing practices according to health standards.In addition,environmental factors such as smoking inside houses,open burning of household waste,and inadequate home ventilation further deteriorate indoor air quality,thereby increasing the risk of TB transmission.Although health services at Pakuhaji Community Health Center are considered relatively adequate,health promotion and education activities have not been optimally implemented,and consequently have not been effective in fostering clean and healthy living behaviors within the community.

Through priority problem analysis using a non-scoring technique,the Delphi method,lifestyle factors were established as the primary priority requiring intervention.Discussions involving health workers,the head of the community health center,and students indicated that lifestyle-related factors are the most feasible to modify through community education and behavioral change interventions.Accordingly,the selected intervention consisted of counseling and practical demonstrations on tuberculosis,proper coughing etiquette,and correct handwashing techniques.

Furthermore,the analysis of root causes using the Fishbone and Five Whys methods revealed that low community knowledge and awareness regarding TB were primarily caused by suboptimal health promotion and education activities at the community health center level.This situation was exacerbated by limitations in human resources,time availability,and health promotion media.Moreover,planning for promotive and preventive programs was not comprehensive and tended to prioritize curative services.It was also found that community participation in counseling activities was low due to insufficient information dissemination and limited motivation.Therefore,the main root cause of the increasing TB cases in the working area of Pakuhaji Community Health Center originates from weak continuous health education

efforts and low community awareness in adopting healthy lifestyle behaviors,particularly those related to TB prevention.As a follow-up to these findings,an intervention was implemented in the form of counseling and demonstrations focusing on tuberculosis awareness,proper coughing and sneezing etiquette,and correct handwashing techniques as efforts to promote behavioral change within the community.

Intervention,Monitoring,and Evaluation

The first intervention was designed to improve community knowledge regarding tuberculosis(TB)and its prevention.The planning stage included the determination of goals,objectives,and counseling materials focusing on risk factors,symptoms,diagnostic procedures,treatment options,and TB prevention strategies.The intervention was implemented by four medical students in Kiara Payung Village and involved 30 community participants.The activity began with participant registration,an opening session,and introductions,followed by the distribution of a pre-test questionnaire to assess baseline knowledge levels.An interactive counseling session was then conducted using lecture and question-and-answer methods.After the counseling session,participants completed a post-test questionnaire to evaluate improvements in knowledge and understanding.

Table 1. Characteristics Participant

Participant Characteristics	Amount (%)
Man	3 (10%)
Woman	27 (90%)

Table 2. 1-test and Post-test Results

Variables	Amount (%) n = 30	Average
Pre-test Score		
<70	10 (33.3%)	36
≥70	20 (66.6%)	90
Post-test Score		
<70	6 (40%)	48.33
≥70	24 (60%)	83.75

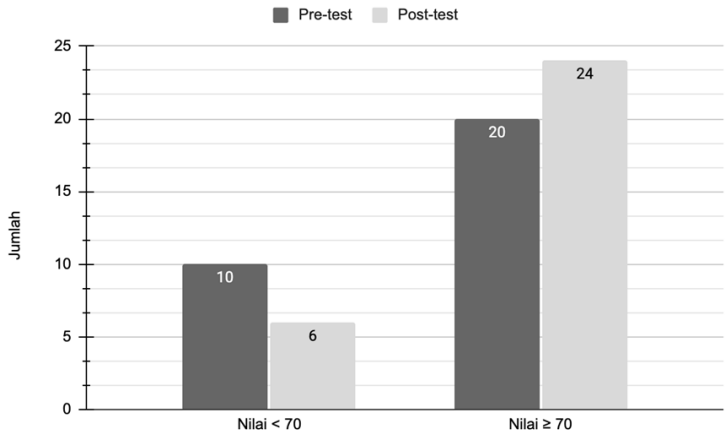

Figure 2.Comparison of Pre-test and Post-test Values

Based on the results presented,there was an increase in the average knowledge score from 36 in the pre-test to 90 in the post-test,with 60% of participants achieving scores ≥70.These findings indicate a significant improvement in community understanding of tuberculosis(TB)following the counseling intervention.

During the implementation phase,monitoring was conducted using the PDCA cycle approach to ensure that activities were carried out effectively and in accordance with the planned objectives.The team observed participant engagement,the clarity of material delivery,and the achievement of learning objectives.Challenges encountered during the activity included several participants experiencing difficulties with reading and writing,which prevented them from independently completing the questionnaires.To address this issue,medical students assisted participants by reading the questions aloud and repeatedly explaining key counseling points orally,ensuring that all participants were able to comprehend the material.

Based on the monitoring results,improvements were made by incorporating additional visual aids and strengthening oral delivery methods in subsequent activities.The evaluation stage was conducted using a systematic approach by assessing the input,process,output,and outcome of the intervention.The evaluation results demonstrated a significant improvement in participant knowledge and confirmed that the counseling intervention was effective in increasing community awareness of TB prevention.

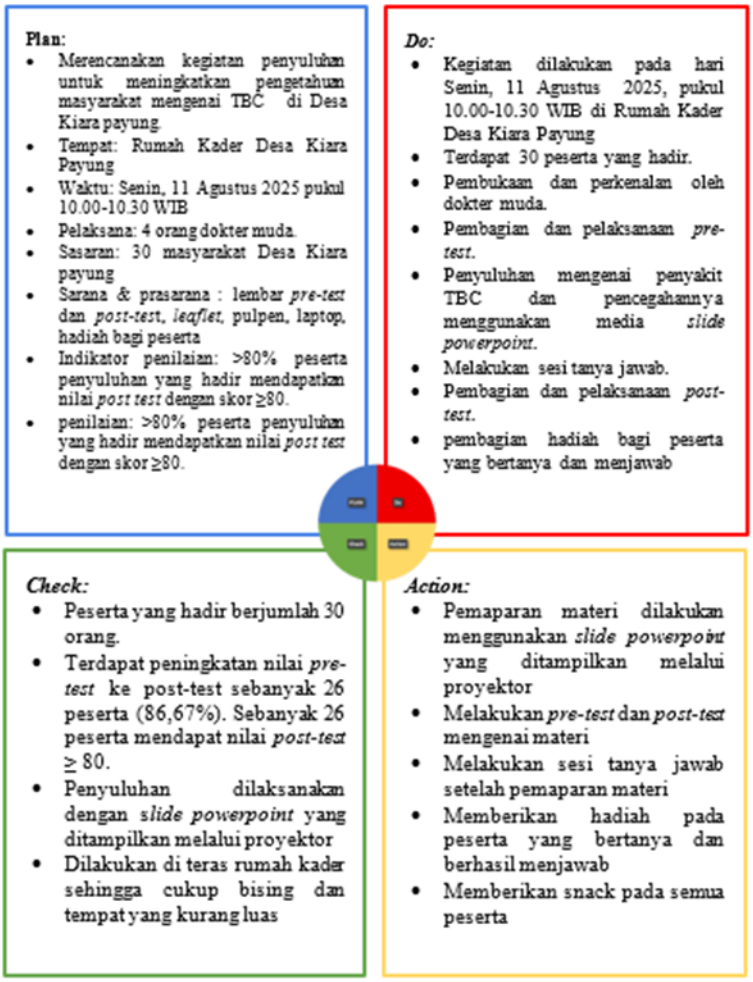

Figure 3. PDCA Cycle Intervention I

The second intervention focused on educating and practicing proper coughing and sneezing etiquette as an effort to prevent tuberculosis(TB)transmission.The planning stage included determining activity targets,preparing educational materials,and providing supporting media in the form of educational videos.The activity was implemented on August 11,2025 by four medical students and attended by 30 community members of Kiara Payung Village.The implementation began with the screening of an educational video,followed by a brief explanation of the importance of proper coughing and sneezing etiquette,and continued with a direct demonstration by the intervention team.One participant was randomly selected to repeat

and demonstrate the correct technique in front of other participants. During the implementation stage,monitoring was conducted using the PDCA cycle approach.The implementation team observed the flow of activities and participant involvement to ensure that the intervention was carried out according to plan.Challenges encountered included environmental noise around the counseling location,as the activity was conducted on residents' terraces,resulting in some participants having difficulty hearing the explanations clearly.To address this issue,the medical students repeated key parts of the material and adjusted their voice volume during demonstrations to ensure effective message delivery.Based on the monitoring results,subsequent activities were planned to be conducted in more conducive locations,and the use of visual media was increased to enhance participant understanding.

The evaluation stage was conducted using a systematic approach that assessed the readiness of implementers and educational media(input),the activity implementation process(process),participants' ability to correctly perform coughing and sneezing techniques(output),and the impact on behavioral change within the community(outcome).The evaluation results showed that all participants were able to correctly practice proper coughing and sneezing techniques,indicating that the intervention was successful in improving community knowledge and skills related to TB transmission prevention.

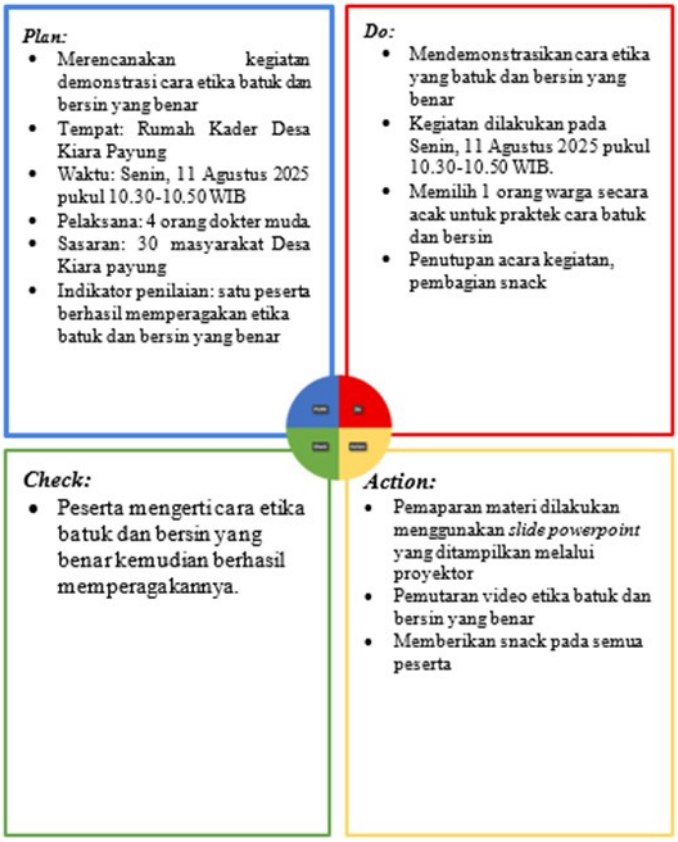

Figure 4.PDCA Cycle Intervention II

The third intervention aimed to improve community skills in proper handwashing according to World Health Organization(WHO)standards.The planning stage involved preparing educational materials,audiovisual media,and demonstration tools.The intervention was conducted on the same day,August 11,2025,from 10.50–11.20 WIB at the Kiara Payung Village Cadre House and involved 30 participants.The activity began with a brief explanation of the importance of handwashing,followed by the screening of an educational video,and continued with a demonstration of the six-step handwashing technique by the medical students.Afterward,participants were asked to repeat the demonstrated steps,and one participant was randomly selected to independently perform the handwashing procedure.

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During implementation,monitoring was conducted using the PDCA cycle approach to evaluate participant engagement and the smoothness of the activity.Challenges encountered included several participants not paying sufficient attention during the initial demonstration,resulting in errors in the sequence of handwashing steps.To address this issue,the medical students repeated the explanation and re-demonstrated the steps until all participants were able to perform them correctly.Based on the monitoring results,follow-up actions included adding repetition sessions,preparing additional educational slides,and providing small incentives in the form of snacks to increase participant motivation.

The evaluation stage was conducted using a systematic approach that assessed input in terms of readiness of educational tools and media,the demonstration process,output in the form of participants' successful performance of the correct steps,and outcomes reflected in improved community skills and awareness of the importance of proper handwashing in preventing infectious diseases.The evaluation results indicated that all participants were able to demonstrate the six-step handwashing technique in accordance with WHO standards.

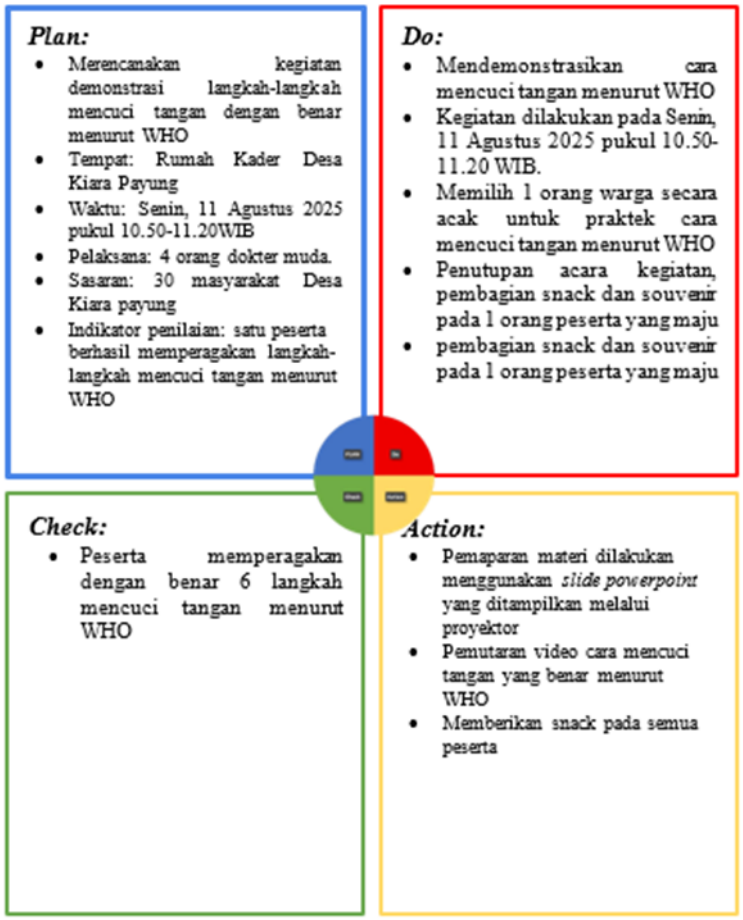

Figure 5. PDCA Cycle Intervention III

The determination of the root problem in efforts to increase community knowledge about tuberculosis(TB)and its prevention in Kiara Payung Village began with the identification of factors influencing the level of public understanding.Based on data obtained during the first intervention(Intervention I),constraints were identified in participants' comprehension of counseling materials,particularly related to limited reading and writing abilities among some participants.This condition became a barrier to understanding TB-related information delivered in text-based formats (Baillie et al., 2023; Mohd et al., 2023; Musanje et al., 2023; .Therefore,to address this issue,counseling activities were refocused on oral delivery methods supported by visual aids and direct demonstrations.In addition,another challenge encountered was environmental noise at the counseling location,which affected participant concentration during

educational sessions (Mishra & Ward, 2024; Pérez et al., 2022; Martin & Ward, 2024; Bartold & Ivanovski, 2022).These factors must be carefully considered in the design of subsequent interventions to ensure more effective knowledge transfer (Chauhan et al., 2024; Ratnayake et al., 2025; Kumar et al., 2025).

Conclusion

Based on the results of the interventions carried out,several effective steps were successfully implemented to prevent the occurrence of new tuberculosis(TB)cases in the community.The interventions included counseling on pulmonary tuberculosis and its prevention,demonstrations of proper coughing and sneezing etiquette,and demonstrations of correct handwashing techniques according to World Health Organization(WHO)standards.Counseling on TB and its prevention produced significant results,as evidenced by improvements in community knowledge reflected in the comparison between pre-test and post-test scores.Most participants demonstrated increased understanding of TB,indicating the success of the counseling in delivering accurate information and enhancing public awareness of the importance of TB prevention.Overall,the interventions effectively increased community knowledge and awareness regarding TB and its prevention.It is expected that this improved knowledge will not only be retained during educational sessions but also applied in daily life,with the community becoming more proactive in preventing TB transmission.This success highlights the importance of hands-on educational approaches and underscores the need for continuous education and motivation to sustain healthy lifestyle behaviors and reduce TB incidence in the future.

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