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# IMPROVING PUBLIC KNOWLEDGE OF THE IMPORTANCE OF SPUTUM EXAMINATION IN THE DETECTION OF PULMONARY TUBERCULOSIS

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## Abstract

*Sputum examination is the main way to diagnose pulmonary tuberculosis (TB), but its result depends heavily on the quality of the sputum collected. Sputum mixed with or consisting of saliva can cause false-negative results and delay diagnosis. This community service activity aimed to improve public knowledge of the importance of sputum examination and the correct way to produce sputum. The activity was held on 14 January 2025 at RSUD Sekayu and involved 45 patients and family members. Education was delivered through interactive counseling, video, leaflets, and a demonstration of sputum collection, followed by participants' return demonstration. Knowledge was measured with a 15-item questionnaire before and after education and analyzed using the paired t-test and N-gain. The mean knowledge score increased from 48.6 ± 15.0 to 81.6 ± 11.4 ($p < 0.001$), with a mean N-gain of 0.64 (moderate). The proportion of participants with good knowledge rose from 2.2% to 75.6%. In the return demonstration, the step most often performed correctly was washing hands and promptly submitting the specimen to the laboratory (93.3%), while the steps most often performed incorrectly were collecting 3–5 mL of sputum (66.7%) and ensuring that the specimen was sputum rather than saliva (73.3%). Nine participants (20.0%) with cough lasting ≥2 weeks were directed to undergo sputum examination. Education with demonstration effectively improves public knowledge of sputum examination, but collecting good-quality sputum still requires supervision by health workers.*

***Keywords:*** *health education; knowledge; pulmonary tuberculosis; sputum examination; sputum quality*

## INTRODUCTION

Tuberculosis (TB) remains a major public health issue in Indonesia. According to the *Global Tuberculosis Report 2024*, Indonesia ranks second globally in the number of TB cases, following India (World Health Organization [WHO], 2024). The government has set a target to

eliminate TB by 2030, as outlined in Presidential Regulation Number 67 of 2021 concerning Tuberculosis Control; a key strategy in this effort is active case finding combined with rapid and accurate diagnosis (President of the Republic of Indonesia, 2021).

Sputum examination—conducted either through acid-fast bacilli (AFB) microscopy or rapid molecular testing—serves as the foundation for diagnosing pulmonary TB. The accuracy of these test results is heavily dependent on the quality of the sputum sample. A high-quality sample must originate from the lower respiratory tract, be mucopurulent in nature, and be sufficient in volume; conversely, saliva or nasal mucus cannot accurately reflect the condition of the lungs (Ministry of Health of the Republic of Indonesia, 2022). Research conducted at Yos Sudarso Hospital in Padang indicates a significant correlation between the quality of AFB smear preparations and pulmonary TB diagnostic outcomes; samples consisting of saliva result in poor-quality smears and can lead to false-negative findings (Niken et al., 2022). In the context of sputum collection from the family members of TB patients, it has been observed that a large proportion of the samples submitted consist of saliva or are contaminated with saliva (Masitah, 2022).

These issues suggest that many patients and their family members lack an understanding of the correct technique for producing and expectorating sputum. Providing education on the proper method for producing and disposing of sputum has been shown to improve the understanding of TB patients (Atanai et al., 2025). Sekayu Regional General Hospital (RSUD Sekayu) serves as a referral hospital in Musi Banyuasin Regency, providing sputum examination services for the diagnosis of TB. Initial coordination with laboratory staff revealed that patients frequently submit insufficient amounts of saliva or sputum, or use containers that are not properly sealed, necessitating a repeat of the sputum collection process. In response, the team from the Bachelor of Applied Science (D4) program in Medical Laboratory Technology and the Master's program in Public Health at Universitas Kader Bangsa conducted an educational session on the importance of sputum testing. This initiative aimed to: (1) increase public awareness regarding tuberculosis (TB) and sputum testing; (2) train participants on how to correctly produce and collect a sputum sample; and (3) encourage individuals exhibiting symptoms of TB to promptly undergo sputum testing.

**METHOD**

***Time, location, and target participants.*** The activity was held on Tuesday, January 14, 2025, at the Sekayu Regional General Hospital (RSUD Sekayu), Musi Banyuasin Regency. The target participants were patients and their family members visiting the outpatient clinic who were aged ≥18 years, literate (able to read and write), and willing to participate in the entire program. A total of 45 participants completed the full activity.

***Implementation team and partners.*** The activity was conducted by faculty members from the Bachelor of Applied Science (D4) program in Medical Laboratory Technology and the Master's program in Public Health at Universitas Kader Bangsa, assisted by students. It was carried out in collaboration with the Laboratory Department, the DOTS (Directly Observed Treatment, Short-course) team, and the Hospital Health Promotion Unit (PKRS) of RSUD Sekayu.

***Stages of the activity.***

1. Preparation. The team coordinated with RSUD Sekayu, developed educational materials—including videos and a leaflet titled "Providing a Proper Sputum Sample for Accurate Test Results"—as well as questionnaires and a redemonstration observation sheet. They also prepared sputum containers and simulated sputum samples for demonstration purposes.
2. Pre-test. Participants provided their demographic information, answered screening questions regarding TB symptoms (such as a cough lasting ≥2 weeks), and completed a 15-item knowledge assessment.
3. Education. An interactive 45-minute educational session covered the causes, symptoms, and transmission methods of TB; the importance of sputum testing (AFB smear and rapid molecular testing/TCM) for diagnosis and treatment monitoring; the distinction between sputum and saliva; the optimal timing for sputum collection; and proper cough etiquette and safe sputum disposal.
4. Demonstration and redemonstration. The team demonstrated the correct procedure for collecting a sputum sample: rinsing the mouth with water, taking 2–3 deep breaths, coughing forcefully from deep within the chest, collecting 3–5 mL of sputum into the container (without touching the rim of the container with the mouth), sealing the container tightly, and subsequently washing one's hands. Each participant then demonstrated the steps again using an empty container and was evaluated using an 8-step observation checklist.

5. Evaluation and follow-up. Participants completed a post-test. Those with a cough lasting ≥2 weeks were referred to the pulmonary clinic for sputum examination, following the hospital's established protocol.

***Instruments and data analysis.*** The questionnaire consisted of 15 true-false items, with scores ranging from 0–100, categorized as good (≥76), fair (56–75), and poor (<56). The difference between pre-test and post-test scores followed a normal distribution (Shapiro–Wilk p = 0.137); therefore, a paired t-test was used. The effectiveness of the education was assessed using the N-gain. The results of the redemonstration are presented as the percentage of participants who performed each step correctly, with a target of ≥80% for each step. Statistical significance was set at $p < 0.05$.

## RESULTS AND DISCUSSION

### *Implementation of activities*

The activity lasted for approximately 2.5 hours and was attended by 45 participants. The participants asked questions actively, specifically regarding why sputum needs to be tested more than once, whether a sputum sample can be collected after brushing one's teeth, and whether family members living in the same household as a TB patient also need to be examined.



**Figure 1. Documentation of Activities**

### *Participant characteristics*

**Table 1. Participant characteristics (n = 45)**

| Characteristics | Category | n | % |
|---|---|---|---|
| Gender | Male | 24 | 53,3 |
| | Female | 21 | 46,7 |
| Age | 18–30 years | 9 | 20,0 |
| | 31–45 years | 16 | 35,6 |
| | 46–60 years | 14 | 31,1 |
| | >60 years | 6 | 13,3 |

| Characteristics | Category | n | % |
|---|---|---|---|
| Education | Elementary/Junior High School | 17 | 37,8 |
| | High school/Equivalent | 21 | 46,7 |
| | College | 7 | 15,6 |
| Status | Patient | 12 | 26,7 |
| | Patient's family | 33 | 73,3 |
| Cough ≥2 weeks | Yes | 9 | 20,0 |
| | No | 36 | 80,0 |

The majority of participants were family members of patients (73.3%), with 84.5% having an educational background of high school level or below. Nine participants (20.0%) reported experiencing a cough for two weeks or longer—a primary symptom of suspected tuberculosis (TB)—and were consequently directed to undergo sputum testing. Family members are a key target group, as they live in the same household as the patients, are at risk of infection, and serve as companions when patients provide sputum samples.

***Changes in participants' knowledge***

**Table 2. Knowledge scores and categories before and after education (n = 45)**

| Parameter | *Pre-test* | *Post-test* |
|---|---|---|
| Mean ± SD | 48,6 ± 15,0 | 81,6 ± 11,4 |
| Median (min–maks) | 46,7 (13,3–80,0) | 86,7 (46,7–93,3) |
| Good, n (%) | 1 (2,2) | 34 (75,6) |
| Enough, n (%) | 13 (28,9) | 8 (17,8) |
| Not Enough, n (%) | 31 (68,9) | 3 (6,7) |
| Mean difference (95% CI) | 33,0 (28,9–37,2) | |
| Paired t test | t = 16,00; p < 0,001 | |
| Average N-gain | 0,64 (moderate) | |
| Score increased/remained the same/decreased | 45/0/0 | |

The mean knowledge score increased by 33.0 points following the educational intervention ($p < 0.001$), with scores improving for all participants. The proportion of participants with a good level of knowledge rose from 2.2% to 75.6%. Prior to the education, most participants were unaware that saliva cannot be used for TB testing, and many believed that a single sputum sample was

sufficient for diagnosis. Following the education, participants understood that the quality of the sputum sample determines the accuracy of the test results.

***Results of the repeat sputum collection demonstration***




**Figure 2. Percentage of participants who performed each step of sputum collection correctly during the redemonstration**

Figure 2 shows that most steps were performed correctly by at least 80% of the participants. The steps most frequently performed incorrectly were collecting 3–5 mL of sputum, ensuring that the collected material was indeed sputum rather than saliva, and adhering to the scheduled collection time. These three steps are the most critical for determining specimen quality. This finding aligns with Niken et al. (2022), who reported that samples consisting of saliva result in poor-quality acid-fast bacilli (AFB) preparations and false-negative outcomes; it is also consistent with Masitah (2022), who found that much of the sputum collected from the families of TB patients consisted of saliva or was mixed with saliva. Therefore, knowledge alone is insufficient. Patients still require supervision by healthcare personnel during sputum collection—for instance, in a designated, well-ventilated area—and laboratory staff must assess the quality of the sputum upon receiving the specimen (Ministry of Health of the Republic of Indonesia, 2022).

The improvement in knowledge observed in this activity is consistent with findings from an educational initiative on proper sputum collection for TB patients at the Sekban Community

Health Center (Puskesmas) in Fakfak Regency, which also enhanced participant understanding (Atanai et al., 2025). Education regarding sputum examination supports the national TB case-finding strategy; individuals who understand the importance of such testing are more likely to seek prompt medical attention if they experience a persistent cough. Furthermore, high-quality sputum specimens help reduce false-negative results and the need for repeat testing (President of the Republic of Indonesia, 2021; WHO, 2024).

***Limitations***

The evaluation was conducted immediately following the educational intervention using a single-group design without a comparator; therefore, long-term knowledge retention remains unknown. Redemonstration was performed using an empty container, meaning that the actual quality of the sputum—such as its appearance (e.g., mucopurulent), volume, and results from acid-fast bacilli (AFB) smear microscopy or rapid molecular testing (TCM)—could not be assessed. Future initiatives should compare the proportion of sputum specimens suitable for testing before and after the educational intervention at the Sekayu Regional General Hospital (RSUD Sekayu) laboratory.

**CONCLUSIONS AND SUGGESTIONS**

**Conclusion**. Education on the importance of sputum examination, accompanied by a demonstration, significantly improved the knowledge of patients and their families at RSUD Sekayu. The mean knowledge score increased from 48.6 to 81.6 ($p < 0.001$; N-gain 0.64), and the proportion of participants with a good level of knowledge rose from 2.2% to 75.6%. However, some participants still struggled with the steps most critical to ensuring sputum quality—specifically, producing an adequate volume and distinguishing sputum from saliva.

**Recommendations.**

1. For RSUD Sekayu: Provide leaflets or posters on proper sputum collection techniques in waiting rooms and sputum collection areas; assist patients during the sputum collection process; and evaluate the quality of specimens upon receipt at the laboratory.
2. For the public: Seek a sputum examination promptly if experiencing a cough lasting ≥2 weeks, and ensure that household members living with a TB patient also undergo testing.

3. For future initiatives: Assess sputum quality and the results of AFB (acid-fast bacilli) or rapid molecular testing (TCM) before and after the educational intervention, and involve community-based TB volunteers (kader TB).

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**REFERENCES**

Atanai, Y., Wahyudi, K., & Hukubun, M. C. (2025). Edukasi cara membuang dahak yang benar pada penderita tuberculosis di Puskesmas Sekban Kabupaten Fakfak. *Jurnal Kreativitas Pengabdian kepada Masyarakat (PKM), 8*(1), 337–344.

Kementerian Kesehatan Republik Indonesia. (2022, 15 Desember). *Pengumpulan dan pengelolaan spesimen dahak*. Direktorat Jenderal Pelayanan Kesehatan. https://keslan.kemkes.go.id/view_artikel/1937/pengumpulan-dan-pengelolaan-spesimen-dahak

Masitah, I. N. (2022). Profil mikroskopis BTA pada sputum keluarga pasien terdiagnosa BTA positif fase lanjutan. *Jaringan Laboratorium Medis, 4*(1), (isi halaman).

Niken, N., Darma, I. Y., & Yulia, H. (2022). Hubungan kualitas sediaan bakteri tahan asam (BTA) terhadap hasil diagnosis pasien tuberkulosis paru. *JPP (Jurnal Kesehatan Poltekkes Palembang), 17*(1), 79–85 (isi halaman akhir yang tepat). https://jurnal.poltekkespalembang.ac.id/index.php/JPP/article/view/1194

Presiden Republik Indonesia. (2021). *Peraturan Presiden Republik Indonesia Nomor 67 Tahun 2021 tentang Penanggulangan Tuberkulosis*.

World Health Organization. (2024). *Global tuberculosis report 2024*. World Health Organization.