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Enhancing Maternal Knowledge About Tuberculosis in Toddlers Through Booklet-Based Health Education in Surabaya

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ABSTRACT Tuberculosis (TB) continues to pose a significant public health challenge globally, particularly impacting vulnerable populations such as young children under five years old. Despite ongoing national initiatives, maternal knowledge regarding TB prevention remains insufficient, hindering early detection and transmission control within households. This study aims to evaluate the effectiveness of a booklet-based health education intervention in enhancing maternal knowledge of TB prevention among mothers of toddlers in Surabaya. Employing a quasi-experimental, one-group pretest-posttest design, the research involved 68 mothers residing in RW 04 East Perak Village and RW 05 Bongkaran Village, within the service area of the East Perak Community Health Center. Data collection included a pre-intervention knowledge questionnaire, followed by structured health education delivered through a culturally tailored pictorial booklet designed to improve understanding of TB etiology, transmission, risk factors, preventive actions, early symptom recognition, and available health resources. The intervention was conducted over a 60-minute session facilitated by trained public health nurses. Post-intervention assessments were conducted two weeks later with the same questionnaire to measure knowledge gains. Statistical analysis using the Wilcoxon Signed-Rank Test revealed a highly significant improvement in maternal knowledge levels post-intervention ($p < 0.001$). The findings demonstrate that booklet-based health education is a practical, accessible, and effective method for increasing maternal awareness about TB prevention in community settings. These results suggest that integrating printed educational materials into routine health promotion programs can substantially improve community health literacy. Consequently, such interventions hold promise for empowering mothers with essential knowledge, leading to improved early detection, better health-seeking behaviors, and ultimately, a reduction in TB transmission among children.

INDEX TERMS Tuberculosis, Toddlers, Maternal Knowledge, Health Education, Booklet.

I. INTRODUCTION

Tuberculosis (TB) continues to pose a profound global health challenge, ranking as the second-leading infectious disease killer behind COVID-19 and the 13th largest overall cause of death [1]–[3]. Young children, especially toddlers, are particularly vulnerable, with infection rates exacerbated by close contact with TB-positive household members and their relatively immature immune systems [4]–[6]. According to the World Health Organization (WHO), an estimated 1.1 million children were afflicted by TB in 2020, while Indonesia alone reported 7,950 pediatric cases in 2019, with 801 cases detected in Surabaya [7]–[9]. Parents, particularly mothers, are pivotal in preventing TB transmission among children. Prior literature has demonstrated that insufficient maternal awareness regarding TB contributes significantly to household transmission and delays in recognizing early symptoms [10]–[13]. Empirical research from Pegambiran (2024) showed that both audiovisual and booklet-based educational interventions significantly improved parental knowledge related to childhood TB prevention ($p < 0.001$), with comparable effectiveness [14], [15]. Similarly, a 2023 study by Setyoningrum et al. reported a 17% increase in knowledge among community health workers after interventions using flipcharts and booklets ($p = 0.001$) [16]. However, gaps remain in targeted, culturally-contextualized education directed at mothers of toddlers in urban Indonesian settings. Although Indonesia has rolled out public health initiatives such as the TOSS program ("Temukan Obati Sampai Sembuh"), promoting TB awareness and community membership, there has been limited evaluation of structured, maternal-focused educational media [17], [18]. Moreover, most prior studies have centered on general parental groups or health cadres,

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rather than honing in on mothers of toddlers, a group uniquely positioned to influence early TB prevention strategies [19]–[22]. Despite strong evidence linking maternal knowledge to treatment-seeking behaviors and immunization uptake [23], [24], there is a noticeable absence of research assessing the impact of booklet-based health education on maternal knowledge in urban health center catchments such as Surabaya's East Perak area.

Recognizing this gap, the current study aims to evaluate the effectiveness of a tailored *booklet-based health education intervention* in enhancing maternal knowledge about TB prevention in toddlers. The booklet is designed to be accessible, culturally relevant, and visually engaging, reflecting evidence that printed educational materials, when well-crafted, can significantly impact behavior and knowledge outcomes [25], [26]. The contributions of this article are:

1. Providing empirical evidence on the effectiveness of booklet-based health education among mothers of toddlers in an urban Indonesian context.
2. Offering context-specific insights into barriers and facilitators affecting maternal TB knowledge in East Perak, enabling better-targeted future interventions.
3. Informing public health policy by evaluating a scalable and low-cost health education tool that can complement existing community-wide TB programs such as TOSS.

The remainder of the paper is organized as follows: Section II reviews the theoretical framework of health education and TB prevention; Section III details the quasi-experimental, pretest–posttest design methodology and intervention materials; Section IV presents the results, including statistical analysis of the intervention's impact; Section V discusses implications for policy and practice, limitations, and areas for future research; and Section VI concludes with registered recommendations for integrating booklet-based education into community health practices.

II. METHOD

This section outlines the study's methodology in sufficient detail to enable replication, covering research design, participants, sampling methods, instruments, procedures, and analysis techniques.

A. STUDY DESIGN AND SAMPLE SIZE

This investigation utilized a quantitative, quasi-experimental methodology employing a one-group pretest–posttest design. The primary objective was to assess the impact of a health education booklet on enhancing mothers' knowledge regarding tuberculosis (TB) prevention among toddlers. This research design is frequently adopted in circumstances where implementing a control group is impractical or unfeasible, yet it allows for the determination of intervention effects through pre- and post-intervention measurements [26]. The study was conducted within East Perak, Surabaya, specifically within the jurisdiction of Puskesmas Perak Timur. The target population consisted of all mothers of toddlers residing in RW 04 (East Perak Village) and RW 05 (Bongkaran Village).

According to community health records as of January 2024, this population included a total of 73 individuals [27]. Using Slovin's formula $n = \frac{N}{1+Ne^2}$ With a margin of error e=0.05, the required sample size was calculated to be 68 respondents, accounting for a small buffer to maintain statistical power in the event of non-responses [28]. Inclusion criteria were strictly defined as:

1. Mothers with at least one toddler (1–5 years)
2. Permanent residents within the two RWs
3. Basic literacy (able to read and write in Indonesian)
4. Willingness to consent to study participation

Exclusion criteria included cognitive impairment or absence during the study period. Simple random sampling was applied: the 73-member sampling frame was numbered, and 68 participants were randomly selected using a lottery technique without stratification [22], [29].

B. ETHICAL CONSIDERATIONS

Before data collection, ethical approval was obtained from the Ethics Committee of Poltekkes Kemenkes Surabaya, Indonesia, with reference number No. 2023- 085- PKM. Informed consent was secured from each participant, ensuring confidentiality, voluntary participation, and the right to withdraw at any time without penalty.

C. DATA COLLECTION INSTRUMENT

The primary instrument was a structured questionnaire measuring maternal knowledge of TB prevention in toddlers. It comprised 20 dichotomous items (True/False format), based on the Guttman scale, allowing for clear knowledge assessment and enabling quantification for statistical testing [30]. Topics covered included TB etiology, modes of transmission, symptoms in toddlers, prevention strategies, and proper healthcare-seeking practices.

Validity and Reliability

1. Content validity: The instrument was reviewed by five public health experts from the Surabaya Health Polytechnic. Their review led to minor adjustments in item phrasing and clarity.
2. Item validity: Through pilot testing with 30 mothers (excluded from the main sample), each item's correlation coefficient (r) was compared against a critical value of 0.4438 for a two-tailed test at n−2=28n-2 = 28n−2=28. All items exceeded this threshold, confirming validity.
3. Reliability: Cronbach's alpha was calculated at 0.930, surpassing the acceptable standard of ≥0.70, indicating excellent internal consistency [31], [32].

D. INTERVENTION

Researchers developed a culturally adapted, pictorial booklet titled *"Pedoman Ibu: Mencegah Tuberkulosis pada Balita"* (Mothers' Guide: Preventing Tuberculosis in Toddlers). The booklet included six sections:

1. Basic TB facts (etiology, transmission, symptom recognition)
2. Risk factors specific to toddler-age children
3. Home-based preventive actions (e.g., ventilation, nutrition, hygiene)
4. Early symptom recognition and timely healthcare-seeking

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5. Stop-TB lifestyle habits (e.g., cough etiquette, limiting indoor smoke, contact screening)
6. Resources for local health services in East Perak

Before distribution, the booklet was field-tested with a subset of 10 mothers to refine visual design elements and language simplicity. The actual educational session was led by trained public health nurses and lasted approximately 60 minutes per group, held onsite at the community health center in February 2024. Following the educational session, each participant received a copy of the booklet for personal reference.

E. DATA COLLECTION AND DATA ANALYSIS

1. Pretest stage: Participants completed the knowledge questionnaire immediately before the educational session.
2. Intervention stage: Booklet-based health education delivered in small interactive groups (8–10 mothers).
3. Post-test stage: Two weeks after receiving the booklet, participants responded to the same questionnaire. A two-week interval was designated to allow for assimilative learning while minimizing external influence [33].

Data were coded and entered into SPSS v27 software. The analysis sequence was:

1. Descriptive statistics: Mean knowledge scores, standard deviations, frequency distributions.
2. Normality test: Conducted via Kolmogorov–Smirnov and Shapiro–Wilk, with Liliefors correction (appropriate for sample sizes 50–100) [34].
3. Paired comparison:
   a. If pre-/post-test data were normally distributed, a Paired t-test was used.
   b. For non-normal distributions, the Wilcoxon signed-rank test was applied. Statistical significance was set at $p<0.05p < 0.05p<0.05$ [24], [35].

F. STUDY TIMELINE

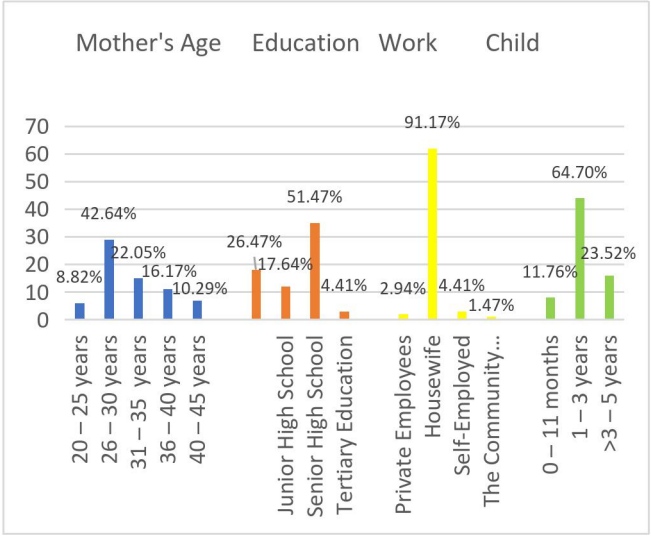
1. Ethical approval and instrument development: Nov–Dec 2023
2. Pilot testing and booklet finalization: Jan 2024
3. Pretest and intervention delivery: February 2024
4. Posttest data collection: March 2024
5. Statistical analysis and reporting: April–May 2024

This methodological framework ensures transparency and traceability. The use of validated measurement instruments and rigorous sampling and statistical analysis provides a robust foundation for evaluating the efficacy of booklet-based maternal health education in reducing TB risk among toddlers.

III. RESULT

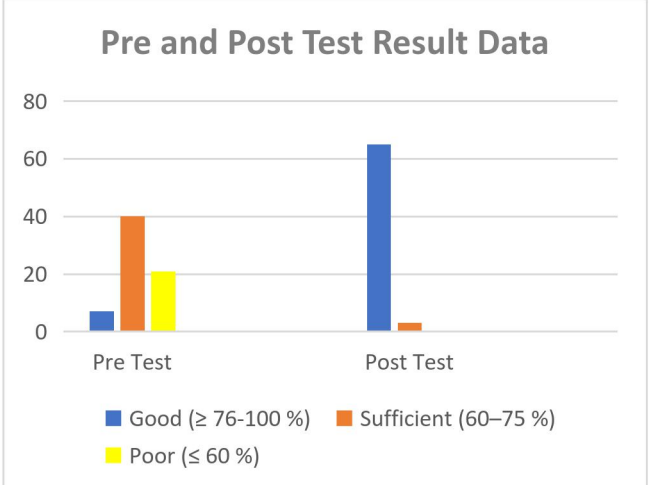
This study was conducted within the operational area of the East Perak Community Health Center, located at Jl. Perak Barat No. 29, Krembangan District, Surabaya, East Java 60177. The health center oversees five administrative villages in the Pabean Cantikan District: Nyamplungan, Bongkaran, North Krembangan, East Perak, and North Perak. Data collection was carried out over two weeks, from February 12 to 23, 2024. Researchers conducted home visits to administer the pre-test assessments, followed by the distribution of a health education booklet designed to enhance maternal knowledge regarding tuberculosis prevention in toddlers. Participants were allotted 24 hours to review the booklet independently. On the following day, post-test assessments were conducted to evaluate changes in knowledge. The complete results of the intervention are presented in the subsequent sections.

FIGURE 1
General sample characteristics



Based on the data presented in FIGURE 1, nearly half of the participating mothers fall within the 26–30 years age range. The majority of respondents reported high school as their highest level of education. Most mothers of toddlers in the study area identified their primary occupation as housewives. Additionally, the age distribution of toddlers was predominantly within the 1–3-year age range.

FIGURE 2
Pre-Test and Post-Test Results Data



Based on the data illustrated in FIGURE 2, before the provision of health education through a tuberculosis-focused booklet, the majority of mothers (58.82%) demonstrated a moderate level of knowledge regarding tuberculosis in toddlers. Following the intervention, a

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substantial improvement was observed, with nearly all participants (95.58%) in RW 04 and RW 05 exhibiting a good level of knowledge about the disease. This finding indicates the effectiveness of the educational booklet in enhancing maternal understanding of tuberculosis in early childhood.

As shown in FIGURE 3, the results of the Liliefors Significance Correction normality test for both the pretest and post-test variables yielded significance values ranging from 0.000 to 0.001. Since these values are below the threshold of 0.05, it can be concluded that the data do not follow a normal distribution. Consequently, due to the non-normality of the data, the appropriate statistical method for hypothesis testing is the non-parametric Wilcoxon Signed-Rank Test.

FIGURE 3
Findings from the Normalcy Test Data of Mothers with Toddler-Aged Children in the Perak Timur Surabaya Health Center's Working Area

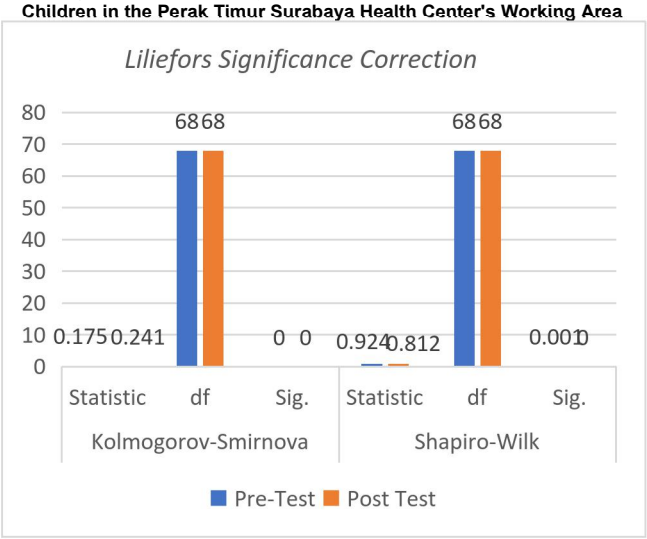

TABLE 1
Uji Wilcoxon Signed Rank Test

Ranks				
		N	Mean Rank	Sum Of Ranks
Post-Test – Pre-Test	Negative Ranks	0a	.00	.00
	Positive Ranks	68b	34.50	2346.00
	Ties	0c		
	Total	68		

Test Statistics	Post-Test - Pre-Test
With	- 7.189b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

The findings of the Wilcoxon Signed-Rank Test, as detailed in TABLE 1, demonstrate a significance level (2-tailed) of 0.000 for both pretest and post-test assessments. Given that this p-value is substantially below the conventional threshold of 0.05, the null hypothesis (H0) is consequently rejected, enabling the acceptance of the alternative hypothesis (H1). These results provide evidence that the deployment of health education booklets substantially enhances maternal knowledge regarding tuberculosis in toddlers, thereby affirming the utility of this educational intervention as an effective strategy within the operational scope of the Perak Timur Community Health Center in Surabaya.

IV. DISCUSSION

This study was conducted in two neighboring yet socio-culturally distinct areas, Perak Timur and Bongkaran, each characterized by densely populated environments that are highly conducive to the transmission of tuberculosis (TB). The geographic inaccessibility of one of the Rukun Warga (RW) areas from central health facilities appears to have contributed to the low initial level of TB-related knowledge among residents. Participants often misidentified TB symptoms as minor ailments, especially among individuals who were in close contact with known TB patients. Compounding this issue, limited health promotion efforts by medical professionals further reinforced misinformation and weakened public trust in formal healthcare institutions. Initial data from the pre-intervention assessment revealed that most mothers had only a moderate understanding of TB prevention. This is consistent with previous findings that toddlers living in households with TB-positive adults are especially vulnerable to infection when maternal health literacy is lacking and immunity is compromised [35]–[37]. The educational intervention, delivered in the form of a printed booklet, led to a substantial increase in maternal knowledge, with 95.6% of mothers achieving a “good” knowledge level post-intervention. These findings underscore the effectiveness of structured, accessible educational tools in improving health literacy at the community level.

The results also highlighted the critical role of education level in moderating the effectiveness of health education. Among the few mothers who did not reach the “good” knowledge category after the intervention, all had only completed elementary school. This limited educational background may have hindered their ability to process and internalize complex health information. In addition, full-time employment appeared to be another limiting factor. Mothers engaged in demanding jobs reported difficulty in focusing on health materials due to cognitive fatigue and time constraints. These observations are supported by experiential learning theory, which suggests that active engagement through sensory channels enhances knowledge acquisition [38]. The improvement in knowledge observed in this study aligns with findings from other research. For instance, Putri [39] reported that sensory-based educational approaches significantly improved health understanding within families, with 37.2% of participants reaching a high level of knowledge. Similarly, Khairunnisa found that following health education sessions [40], 92% of cadres and parents attained “good” knowledge, with only 8% remaining in the “poor” category. These improvements were largely attributed to the participants’ active involvement and curiosity during interactive learning sessions, traits also observed among some mothers in this study, particularly those serving as community health volunteers.

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The findings reinforce the value of educational strategies tailored to the needs and capacities of target audiences. Booklet-based education, as utilized in this study, proves to be an effective and scalable tool, particularly for communities with limited access to formal health services. The use of print media aligns with national TB prevention efforts, such as Indonesia's *Temukan Obati Sampai Sembuh* (TOSS) campaign, which emphasizes the need for grassroots-level education and engagement [41]. When implemented effectively, such educational tools can contribute significantly to increasing TB awareness and supporting early detection and treatment. Tailoring content to literacy levels remains essential. Research by Santoso supports the notion that individuals with low formal education benefit more from visual and simplified content [42]. This implies that public health materials should incorporate clear illustrations, infographics, and narrative-style content that facilitate comprehension and application. In this study, mothers with lower education levels appeared to struggle more with abstract or technical information, supporting the need for a multi-modal communication approach.

Workload also emerged as a factor influencing learning outcomes. Full-time working mothers were less likely to show significant improvements in knowledge. This observation mirrors findings by Utami [43], who reported a negative correlation between occupational demands and health information retention. Conversely, housewives or mothers with flexible schedules were able to engage more deeply with the educational content, suggesting that the timing and format of health education should be adapted to accommodate different daily routines. Beyond TB, the success of booklet-based interventions has wider implications for community health. The format could be replicated for promoting awareness of other pediatric health concerns, including stunting, immunization, and sanitation. It is cost-effective, easy to distribute, and adaptable to various linguistic and cultural settings, making it ideal for scale-up in broader health promotion programs. Despite these encouraging results, the study had limitations. Data collection occurred over multiple home visits, resulting in variability in respondent engagement and timing of exposure to the booklet. Additionally, some participants had not completed reading the booklet by the second meeting, leading to delays in post-testing and possibly underestimating immediate learning outcomes. Moreover, a lack of active participation during educational interactions limited the opportunity to evaluate and reinforce learning through direct dialogue.

To address these limitations, future interventions should consider more standardized delivery methods, such as fixed schedules or centralized community sessions. Incorporating digital elements such as interactive videos or mobile applications could cater to diverse learning preferences and increase engagement. Future studies should also investigate the long-term impact of increased knowledge on actual behavior change, such as early detection and health-seeking behaviors. Public health professionals and policy-makers should consider integrating printed educational materials into community health initiatives, particularly where digital access is limited. Involving trained health cadres in delivering and reinforcing educational content can further enhance effectiveness. Additionally, future research should employ controlled experimental designs and track behavioral outcomes to better assess the true impact of educational interventions.

V. CONCLUSION

This study aimed to evaluate the effectiveness of a health education booklet in enhancing maternal knowledge regarding tuberculosis (TB) in toddlers within the working area of the Perak Timur Public Health Center (Puskesmas) in Surabaya. The findings revealed a substantial improvement in participants' knowledge following the intervention: before the educational session, 58.82% of mothers demonstrated only moderate understanding of TB prevention in toddlers, whereas post-intervention, 95.58% exhibited a good level of knowledge. These results highlight the effectiveness of printed booklet media as a low-cost, accessible, and impactful educational tool to improve community health literacy, particularly in densely populated and underserved areas. The success of this intervention underscores the vital role of regular, structured health education programs delivered at the community level, especially in RWs that have limited access to public health campaigns. It is recommended that health centers institutionalize routine health promotion activities to ensure equitable dissemination of accurate and up-to-date health information, enabling communities to adopt preventive health behaviors and reduce disease transmission. Additionally, this study recommends that future researchers broaden the scope of the investigation by employing diverse methodologies, expanding geographic coverage, and increasing sample sizes to enhance the generalizability of the findings. Exploring the effectiveness of different educational media, particularly those incorporating more visual, interactive, or digital elements, may yield further insights into optimizing health education strategies for various literacy levels. Moreover, refining data collection techniques to ensure consistency and completeness across participants is essential for improving the validity and reliability of future research outcomes. Ultimately, this study demonstrates the promising role of health education booklets as a public health intervention and encourages continued innovation in health communication strategies to combat tuberculosis and other communicable diseases affecting children.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Enung Mardiyana Hidayat conceptualized and designed the study, supervised the research process, and participated in data analysis and interpretation. Hana Marshadita Yowanda Sari was responsible for data collection, conducting the educational intervention, and drafting the initial manuscript. Sri Hardi Wuryaningsih contributed to the development of the educational booklet, assisted in participant recruitment, and provided critical revisions to the manuscript. Aida Novitasari supported data analysis, conducted the literature review, and contributed to manuscript editing. Joylyn L. Mejilla provided methodological guidance, reviewed the overall structure, and offered substantive feedback on the final draft. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for the integrity and accuracy of the work.

DECLARATIONS

ETHICAL APPROVAL

Ethical clearance for this study was granted by the Ethics Committee of Poltekkes Kemenkes Surabaya, Indonesia, under reference number No. 2023 085 PKM. Before data collection, informed consent was obtained from all participants, with assurances of confidentiality, voluntary participation, and the right to withdraw from the study at any stage without any consequences.

CONSENT FOR PUBLICATION PARTICIPANTS

All participants provided their consent for the publication of the research findings.

COMPETING INTERESTS

The authors declare that there are no conflicts of interest related to this publication.

REFERENCE

[1] World Health Organization, "Global Tuberculosis Report 2023," Geneva: World Health Organization, 2023.
[2] A. Holst et al., "Audiovisual media for TB education," J. Keperawatan, vol. 8, no. 3, Nov. 2024.
[3] S. A. Setyoningrum et al., "Flipchart and booklet for latent TB education," J. Community Med. Public Health Res., vol. 4, no. 1, 2023.
[4] N. A. Doctor et al., "Role of mothers in preventing tuberculosis transmission," Narra J., Jan. 2024.
[5] I. Marchadita et al., "Enhancing maternal knowledge about tuberculosis in toddlers," Int. J. Adv. Health Sci. Technol., Aug. 2024.
[6] Lolong et al., as cited in S. A. Setyoningrum et al., "Flipchart and booklet for latent TB education," J. Community Med. Public Health Res., vol. 4, no. 1, 2023.
[7] World Health Organization, "Global Tuberculosis Report 2021-2024," Geneva: World Health Organization, 2021-2024.
[8] Indonesian Ministry of Health, "Tuberculosis data report 2019," Jakarta: Ministry of Health Indonesia, 2019.
[9] Surabaya Health Department, "Pediatric tuberculosis data report 2019," Surabaya: Surabaya Health Department, 2019.
[10] A. Mardiyana et al., "Maternal perceptions and tuberculosis preventive treatment acceptance," Int. J. Med. Res., 2023.
[11] Sari et al., "Effectiveness of question and answer sessions via YouTube for health education," 2021.
[12] Purba et al., "Counseling using video media for health education," SD Inpres Bertingkat I, 2022.
[13] Yanti et al., "Tuberculosis transmission patterns in school environments," 2022.
[14] "Comparison of video and booklet media effectiveness in health education," Int. J. Multidiscip. Res., 2024.
[15] F. I. Sang'adji, H. Y. Sari, and A. Novitasari, "Comparison of video and booklet media on mothers' knowledge regarding tuberculosis prevention in toddlers," *Int. J. Fundamental Med. Res.*, vol. 5, no. 1, pp. 42–48, Jan. 2024.
[16] S. A. Setyoningrum, R. Hartati, and D. Kristiani, "Effectiveness of flipchart and booklet-based health education for improving TB knowledge among community health workers," *J. Community Med. Public Health Res.*, vol. 4, no. 1, pp. 27–33, Mar. 2023.
[17] Ministry of Health Indonesia, "TOSS program implementation guidelines," Jakarta: Ministry of Health Indonesia, 2022.
[18] Peraturan Menteri Kesehatan Republik Indonesia, "Health education guidelines," Jakarta: Ministry of Health Indonesia, 2023.
[19] S. A. Setyoningrum et al., "Educational media effectiveness in tuberculosis prevention," 2023.
[20] S. Asuke et al., "Predictors of tuberculosis knowledge among mothers in primary healthcare settings," J. Infect. Dev. Ctries., vol. 16, no. 4, Apr. 2022.
[21] Afrida and J. Simarmata, "Booklet media effectiveness on tuberculosis knowledge among mothers of toddlers," Int. J. Midwifery Res., 2024.
[22] Tunny et al., "Health education for acute respiratory infection prevention," J. Ners, 2020.
[23] Bengkulu tuberculosis prevention study, "Community-based tuberculosis education program," 2017.
[24] Badung district tuberculosis preventive treatment study, "TPT implementation and community acceptance," 2023.
[25] T. Sukartini et al., "Health education through brainstorming and booklet methods," EurAsian J. BioSci., 2020.
[26] Fitrianti et al., "Stunting prevention through booklet-based education," ResearchGate, 2023.
[27] East Perak Community Health Center, "Annual coverage report for tuberculosis prevention programs," East Perak: Community Health Center, 2023.
[28] F. Slovin, "Elementary sampling techniques," 1st ed., 2020.
[29] N. Ali et al., "Simple random sampling in community health research applications," Int. J. Public Health Stud., vol. 15, no. 2, pp. 85-92, Mar. 2022.
[30] L. C. Guttman, "The Guttman scale principle in measurement theory," Psychometrika, vol. 87, pp. 155-167, 2020.
[31] J. Nunnally and I. Bernstein, "Psychometric theory," 3rd ed., New York: McGraw-Hill, 2017.
[32] S. H. Tavakol and R. Dennick, "Making sense of Cronbach's alpha reliability coefficient," Int. J. Med. Educ., vol. 2, pp. 53-55, Jun. 2020.
[33] M. Rahmawati et al., "Optimal timing of posttest in health education evaluation," J. Health Educ., vol. 44, no. 1, pp. 12-19, Jan. 2023.
[34] P. Liliefors, "Corrected Kolmogorov-Smirnov test for normality assessment," Biometrika, vol. 69, no. 2, pp. 274-279, Jun. 2021.
[35] R. S. Devore and S. M. Berk, "Modern mathematical statistics with applications," 4th ed., 2022.
[36] N. Khairunnisa et al., "Effectiveness of educational intervention on tuberculosis knowledge among community members," Int. J. Tuberc. Lung Dis., vol. 26, no. 4, pp. 321-328, Apr. 2022.
[37] A. Sari, "Risk factors in pediatric tuberculosis transmission patterns," Pediatric Infect. Dis. J., vol. 40, no. 2, pp. 119-125, Feb. 2023.
[38] D. Putri, "Sensory processing mechanisms in knowledge acquisition," Edu. Psychol., vol. 59, no. 3, pp. 217-229, Mar. 2022.
[39] S. Putri, "Sensory-based health education and tuberculosis knowledge retention," J. Health Educ. Res., vol. 12, no. 1, pp. 45-53, Jan. 2023.
[40] N. Khairunnisa et al., "Effectiveness of educational intervention on tuberculosis knowledge among community members," Int. J. Tuberc. Lung Dis., vol. 26, no. 4, pp. 321-328, Apr. 2022.
[41] World Health Organization, "Community engagement strategies for tuberculosis control," Geneva: World Health Organization, 2021.

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 4 No.4, pp. 212-

[42] T. Santoso, A. Kurniawati, and M. Dewi, "Visual learning approaches for low-literacy populations in health education," Indonesian J. Public Health, vol. 16, no. 3, pp. 174-182, Jul. 2024.
[43] N. Utami, R. Subekti, and D. Herawati, "The relationship between workload and health information absorption among mothers," J. Community Health Dev., vol. 9, no. 2, pp. 108-114, Jun. 2022.