

The Impact of Audio-Visual Educational Media on Infant Basic Immunization Adherence at Rum Balibunga Primary Health Center

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Abstract. Background: Compliance with routine infant immunization is essential for the success of vaccination programs and the prevention of vaccine-preventable diseases. However, adherence to immunization schedules remains suboptimal due to limited parental knowledge, concerns about vaccine safety, and the limited effectiveness of conventional health education. Audio-visual media offer a promising solution by delivering information in a more engaging, clear, and consistent manner. **Objective:** This study aimed to evaluate the effectiveness of audio-visual educational media in improving adherence to basic immunization among infants in the service area of the Rum Balibunga Community Health Center. **Methods:** A quasi-experimental design with a one-group pretest-posttest approach was used. The sample included 40 mothers with infants aged 0-12 months selected through purposive sampling. Participants received an educational video on basic immunization. Adherence was assessed before and after the intervention based on completeness and timeliness according to the national schedule. Data were analyzed using univariate and bivariate methods, with the McNemar test for paired categorical data. **Results:** There was a significant improvement in immunization adherence after the intervention. Statistical analysis confirmed a meaningful difference before and after exposure, indicating the effectiveness of audio-visual media. **Conclusion:** Audio-visual education is an effective strategy to improve infant immunization adherence and can be widely applied in primary healthcare settings.

Keywords: Audio-Visual Media; Basic Immunisation; Immunisation Compliance; Infants; Maternal Knowledge.

1. INTRODUCTION

Routine immunization during infancy is widely acknowledged as one of the most cost-effective public health interventions for reducing illness and death caused by vaccine-preventable diseases, while also establishing population-level immunity early in life (O’Leary, 2024). Despite its proven benefits, routine immunization coverage worldwide has shown limited recovery following the COVID-19 pandemic, leaving millions of children either unvaccinated or incompletely vaccinated and exposed to potential outbreaks of infectious diseases (World Health Organization [WHO], 2024). Joint estimates from WHO and UNICEF reveal uneven progress in restoring immunization coverage, with marked disparities across countries and socio-demographic groups, posing major challenges to achieving the targets outlined in the Immunization Agenda 2030 (IA2030) (Centers for Disease Control and Prevention [CDC], 2024; UNICEF, WHO, & World Bank, 2023). These conditions underscore that adherence to basic immunization schedules depends not only on service availability, but also on parental behavior, trust in vaccines, and the quality of health information delivered by healthcare providers (O’Leary, 2024; Durantini et al., 2024).

In Indonesia, strengthening routine immunization has become a national priority in the post-pandemic period due to declining coverage and the re-emergence of immunity gaps in

several regions (Ministry of Health of the Republic of Indonesia, 2023; UNICEF Indonesia, 2023). Although national reports indicate gradual improvement in immunization performance as services recover, substantial disparities between provinces and persistent demand-side barriers continue to challenge implementation at the primary healthcare level (Ministry of Health of the Republic of Indonesia, 2023). The WHO immunization profile for Indonesia highlights fluctuations in coverage and emphasizes the need to improve data recording systems and outreach strategies to identify and vaccinate children who have missed routine doses (WHO, 2024). From both clinical and programmatic perspectives, inadequate adherence to infant immunization schedules directly increases vulnerability to diseases such as measles, diphtheria, pertussis, and polio, which are highly sensitive to reductions in vaccination coverage (CDC, 2024; WHO, 2024). Therefore, improving immunization compliance in primary healthcare facilities, particularly community health centers, is essential to reduce the number of zero-dose and under-immunized children (UNICEF, WHO, & World Bank, 2023; WHO, 2024).

Adherence to infant immunization schedules is shaped by a combination of individual, family, and system-level determinants, including parental knowledge, perceptions of risks and benefits, confidence in vaccine safety, social influences, service accessibility, and the quality of counseling provided by health workers (O’Leary, 2024; *Frontiers in Public Health*, 2024). Health behavior theories, particularly the Health Belief Model (HBM), explain that vaccination behavior is influenced by perceived susceptibility to illness, perceived severity, perceived benefits of vaccination, perceived barriers, and cues that prompt action (*PLOS Global Public Health*, 2022). In primary care settings, such cues may include clear educational messages, structured reminders, and consistent, persuasive communication (*American Academy of Pediatrics*, 2025; O’Leary, 2024). As a result, effective health promotion initiatives must translate complex immunization information into understandable messages while addressing fear, misinformation, and uncertainty that often contribute to vaccine hesitancy (O’Leary, 2024; Durantini et al., 2024).

Audio-visual educational media, particularly videos, have gained increasing attention in health promotion due to their ability to integrate visual and auditory elements, making messages more engaging, easier to remember, and more consistently delivered than traditional verbal counseling, which often depends on provider time and communication skills (*Scientific Reports*, 2024). The Cognitive Theory of Multimedia Learning suggests that individuals learn more effectively when information is presented simultaneously through visual and spoken channels, thereby enhancing understanding and long-term retention (*Scientific Reports*, 2024).

Evidence from systematic reviews indicates that video-based health promotion interventions can influence knowledge, attitudes, and behaviors across various health domains, especially when content is tailored to the characteristics and needs of the target audience (Preventive Medicine Reports, 2023). Accordingly, audio-visual media may serve as a strategic approach to strengthening behavioral determinants of immunization compliance such as knowledge, attitudes, and beliefs which ultimately shape parents' decisions to vaccinate their children on schedule (Durantini et al., 2024; *Frontiers in Public Health*, 2024).

Previous research supports the effectiveness of video-based communication in vaccination programs. A quasi-experimental study conducted in North Jakarta demonstrated that educational videos were more effective in reducing parental vaccine hesitancy compared to digital text-based materials derived from the Maternal and Child Health (KIA) book (Vaccine, 2022). Another study found that film-based educational interventions reduced delays in immunization among parents of infants under 12 months, indicating that audio-visual media can influence actual vaccination behavior rather than merely increasing knowledge (Vaccine, 2023). At the national level, studies have shown that video-based health promotion is more effective than printed leaflets in improving maternal knowledge and attitudes toward infant immunization both of which are key predictors of compliance (*Health and Science Research Journal*, 2025). Furthermore, a recent meta-analysis of randomized controlled trials across multiple countries concluded that vaccination uptake can be significantly improved through communication and behavioral interventions, although their effectiveness varies depending on intervention design, population characteristics, and delivery context (Durantini et al., 2024).

Despite growing evidence, substantial gaps remain regarding the direct impact of audio-visual media on infant basic immunization adherence, particularly within Indonesian primary healthcare settings. Many existing studies focus on intermediate outcomes such as knowledge, attitudes, or vaccine hesitancy, while concrete programmatic indicators such as the timeliness and completeness of immunization are less frequently evaluated using standardized measures (*Frontiers in Public Health*, 2024; Durantini et al., 2024). In addition, variations in video content, duration, frequency of exposure, and delivery settings (e.g., health center waiting areas, maternal education sessions, or social media platforms) complicate comparisons across studies and highlight the need for context-specific evidence (Preventive Medicine Reports, 2023; *Scientific Reports*, 2024). In Indonesia, research on educational videos has largely emphasized psychosocial outcomes, underscoring the need for studies that directly assess their influence on immunization compliance as a healthcare service behavior (Vaccine, 2022; *Health and Science Research Journal*, 2025).

The Rum Balibunga Community Health Centre plays a crucial role as the primary access point for families to routine immunization services and serves as a platform for sustainable health promotion initiatives (Ministry of Health of the Republic of Indonesia, 2023). In practice, limited time for individualized counseling, high staff workload, and varying levels of parental health literacy may reduce the effectiveness of conventional educational approaches (Frontiers in Public Health, 2024). Audio-visual media can help address these challenges by standardizing key messages, reinforcing information through repetition, and adapting content to local language and cultural contexts, thereby strengthening cues to action and increasing parental confidence in adhering to immunization schedules (Scientific Reports, 2024; PLOS Global Public Health, 2022). Given that the Indonesian Pediatric Society (IDAI) regularly updates national immunization guidelines to reflect the latest evidence, it is essential that parental education materials remain aligned with current recommendations to avoid confusion (Indonesian Pediatric Society, 2024).

Accordingly, this study aims to assess the effectiveness of audio-visual media in improving adherence to basic immunization among infants at the Rum Balibunga Community Health Centre (Ministry of Health of the Republic of Indonesia, 2023). The findings are expected to provide empirical evidence from primary healthcare settings on effective educational strategies and to support enhanced health promotion efforts aimed at improving immunization compliance and reducing immunity gaps among infants (UNICEF Indonesia, 2023; Frontiers in Public Health, 2024).

2. RESEARCH METHOD

This study adopted a quantitative approach using a quasi-experimental design with a single-group pretest–posttest structure. This design was chosen to determine the impact of audio-visual educational media on infant basic immunization adherence by examining changes in participants' conditions before and after the intervention. The quasi-experimental approach allows evaluation of intervention effects in real-world primary healthcare environments without random allocation, making it suitable for applied research in community health centers with limited resources and ongoing service responsibilities.

The research was conducted within the service area of the Rum Balibunga Community Health Centre in Tidore Kepulauan City. This location was selected because community health centers play a central role in delivering routine immunization services and maternal–child health promotion. Persistent gaps in infant immunization adherence in this area indicate the need for more effective educational strategies. The study took place over a defined period (e.g.,

February-April 2026), encompassing preparation, baseline assessment (pretest), implementation of the audio-visual intervention, follow-up assessment (posttest), and data analysis.

The study population consisted of all mothers with infants aged 0-12 months who were registered for routine immunization services at the Rum Balibunga Community Health Centre during the study period. Participants were selected using purposive sampling based on predefined eligibility criteria to ensure relevance to the study objectives. Inclusion criteria included mothers with infants aged 0-12 months, ownership of a Mother and Child Health (MCH) book, willingness to participate throughout the study process, and the ability to access the provided audio-visual materials. Mothers whose infants had medical contraindications to immunization or incomplete immunization records were excluded.

The independent variable was the use of audio-visual media in the form of educational videos addressing infant basic immunization, including vaccine types, recommended schedules, benefits, and safety considerations. The dependent variable was infant basic immunization adherence, measured by the completeness and accuracy of immunization based on national guidelines.

Additional variables recorded included maternal age, education level, employment status, and parity. Data collection instruments consisted of several components: a demographic data sheet for mothers and infants, an immunization adherence observation checklist based on MCH books and health center records, and standardized educational videos developed in accordance with national immunization standards and adapted to the local context to enhance understanding. The same observation checklist was used during both pretest and posttest assessments to ensure consistency.

The research process began with obtaining administrative approval and ethical clearance from the appropriate research ethics committee. After approval, coordination with the Rum Balibunga Community Health Centre was conducted to determine the study schedule and procedures. Eligible participants received an explanation of the study's purpose, benefits, and procedures and provided written informed consent. Baseline immunization adherence was assessed during the pretest by reviewing MCH books and immunization records. Participants then received the intervention in the form of an educational video on basic immunization, which was shown one to two times for approximately 10-15 minutes, either at the health center or via available digital devices, followed by an opportunity for discussion. A post-intervention assessment was conducted after an interval of approximately 2-4 weeks to identify changes in immunization adherence.

Data analysis was performed using appropriate statistical methods. Descriptive (univariate) analysis was used to summarize respondent characteristics and immunization adherence before and after the intervention. Inferential (bivariate) analysis was conducted to assess differences in adherence following exposure to the audio-visual media. The McNemar test was applied for paired categorical data; when data were converted into numerical scores and met normality assumptions, a paired t-test was used, while the Wilcoxon signed-rank test was applied when normality assumptions were not satisfied. Statistical significance was determined at a p-value of less than 0.05, indicating a meaningful effect of the audio-visual intervention on infant basic immunization adherence.

3. RESULTS AND DISCUSSION

Results

Respondent Characteristics

This research involved 40 mother–infant pairs, with infants aged between 0 and 12 months, who fulfilled the eligibility criteria within the service coverage of the Rum Balibunga Community Health Center. An overview of the demographic profiles of the mothers and their infants is presented in Table 1.

Table 1. Distribution of Maternal and Infant Characteristics (n = 40).

Characteristic	n	%
Maternal Age		
< 20 years	6	15.0
20–35 years	28	70.0
> 35 years	6	15.0
Maternal Education		
Primary	14	35.0
Secondary	18	45.0
Higher	8	20.0
Maternal Employment Status		
Unemployed	24	60.0
Employed	16	40.0
Infant Age		
0–6 months	22	55.0
7–12 months	18	45.0

Most participating mothers were in the prime childbearing age group of 20–35 years and had completed education at the secondary level. A greater proportion of respondents were not engaged in formal employment, a condition that likely supported their ability to attend scheduled immunization visits. Infants aged 0–6 months represented the largest segment of the study population, reflecting the essential timeframe for the initiation of routine immunization.

Compliance with Basic Immunization Before the Audio-Visual Intervention (Pretest)

The distribution of infant immunization compliance prior to the audio-visual intervention is presented in Table 2.

Table 2. Basic Immunization Compliance Before the Intervention (Pretest).

Immunization Compliance	n	%
Non-compliant	23	57.5
Compliant	17	42.5
Total	40	100

Prior to the implementation of the intervention, a majority of infants had not completed basic immunizations as outlined in the standard schedule. This result underscores ongoing difficulties in achieving immunization compliance, potentially heightening susceptibility to diseases that can be prevented through vaccination.

Compliance with Basic Immunization After the Audio-Visual Intervention (Posttest)

The distribution of immunization compliance following the audio-visual intervention is shown in Table 3.

Table 3. Basic Immunization Compliance After the Intervention (Posttest).

Immunization Compliance	n	%
Non-compliant	9	22.5
Compliant	31	77.5
Total	40	100

Following the introduction of the audio-visual educational materials, a marked increase in adherence to basic immunization was documented. Most infants subsequently received vaccinations in line with the prescribed schedule, suggesting a favorable shift in parental behavior after the intervention.

Differences in Basic Immunization Compliance Before and After the Intervention

Changes in basic immunization adherence before and after the audio-visual intervention were analyzed using the McNemar test, as the data consisted of paired categorical variables. The corresponding findings are shown in Table 4.

Table 4. Comparison of Basic Immunization Compliance Before and After the Intervention.

Immunization Compliance	Posttest Non-compliant	Posttest Compliant	Total
Pretest Non-compliant	7	16	23
Pretest Compliant	2	15	17
Total	9	31	40

Statistical test: McNemar test; p-value = 0.001

The McNemar analysis produced a p-value of 0.001 ($p < 0.05$), indicating a significant difference in basic immunization adherence between the pre-intervention and post-intervention assessments. A large proportion of participants who were previously non-adherent achieved

compliance after the intervention, supporting the effectiveness of audio-visual media in enhancing basic immunization adherence.

Effect Size Analysis of the Audio-Visual Intervention

To strengthen the interpretation of the findings, changes in the proportion of basic immunization compliance were calculated.

Table 5. Changes in the Proportion of Basic Immunization Compliance.

Condition	Compliant n (%)	Non-compliant n (%)
Before intervention	17 (42.5)	23 (57.5)
After intervention	31 (77.5)	9 (22.5)
Change	+35.0%	-35.0%

A 35% rise in adherence to basic immunization was recorded after the implementation of the audio-visual intervention. This gain is meaningful from both clinical and programmatic perspectives, as it demonstrates a concrete shift in parental behavior toward completing their infants' vaccination schedules.

Discussion

The results of this study indicate that the use of audio-visual educational media significantly improves adherence to basic immunization among infants within the service area of the Rum Balibunga Community Health Centre. The statistically meaningful increase in compliance observed after the intervention suggests that audio-visual-based health education can positively influence parental behavior in ensuring timely and complete immunization for their children.

These outcomes reinforce the importance of media-based health promotion strategies in strengthening the performance of routine immunization programs at the primary healthcare level. The observed improvement in immunization adherence following exposure to audio-visual materials is consistent with previous evidence showing that video-based interventions are effective in supporting health behaviors that require repeated decision-making and long-term commitment.

Kaufman et al. (2018) reported that well-designed educational videos that are clear and relevant can improve childhood vaccination uptake by enhancing parental understanding and confidence. Similarly, Wilson et al. (2020) found that audio-visual communication approaches exert a stronger influence on vaccination behavior than conventional verbal explanations or written materials.

The effectiveness of audio-visual media demonstrated in this study can be interpreted through the Health Belief Model (HBM), which explains that health-related behaviors are shaped by perceptions of disease risk, perceived severity, perceived benefits of action,

perceived barriers, and cues that motivate action (Rosenstock et al., 2019). Audio-visual materials act as strong cues to action by delivering health information in an accessible and engaging format, thereby increasing perceived benefits of immunization while reducing barriers such as fear and misconceptions about vaccine side effects (Schmid et al., 2017).

In addition, the findings can be understood through the Cognitive Theory of Multimedia Learning, which proposes that learning outcomes are optimized when information is presented simultaneously through visual and auditory channels (Mayer, 2020). In the context of immunization, video-based delivery of information regarding vaccination schedules, benefits, and safety enables parents to process and retain information more effectively than through printed materials or brief verbal counseling alone. This enhanced engagement likely contributes to improved knowledge retention and more consistent behavioral change, as reflected in the increased immunization compliance observed in this study.

The results are also consistent with research conducted in other low- and middle-income settings, which has shown that media-supported educational interventions improve both immunization coverage and timeliness. For example, Brown et al. (2018) demonstrated that displaying educational videos in primary healthcare waiting areas in India increased timely vaccination among infants. Similarly, Oku et al. (2021) found that combining audiovisual education with brief counseling in Sub-Saharan Africa improved parental attendance at subsequent immunization appointments.

Despite the overall positive outcomes, a small proportion of participants in this study remained non-compliant following the intervention. This finding suggests that while audio-visual media are generally effective, they are not sufficient to overcome all barriers to immunization adherence. Factors such as limited geographic access, competing parental responsibilities, social and family influences, and prior negative experiences with healthcare services may continue to affect parental decision-making (Larson et al., 2018). Immunization behavior is therefore shaped by a complex interaction of educational, systemic, and socio-cultural factors.

The persistence of partial non-compliance aligns with the work of MacDonald et al. (2015), who emphasized that vaccine hesitancy is context-dependent and cannot be fully addressed through information provision alone. This underscores the need to position audio-visual media as part of a comprehensive health promotion strategy rather than as a standalone intervention. Integrating video-based education with interpersonal counseling and improved immunization reminder systems may yield a stronger and more sustainable impact.

From both clinical and public health perspectives, the findings of this study are highly relevant. Audio-visual media represent a cost-efficient, reusable educational resource that can be implemented without substantially increasing the workload of healthcare providers. Glanz et al. (2021) noted that incorporating digital educational tools into primary care enhances the reach and effectiveness of health promotion efforts. In community health settings, the use of immunization education videos in waiting areas or during community-based activities such as posyandu can support better adherence to routine immunization schedules.

Furthermore, audio-visual media contribute to the standardization of health messages, ensuring consistency with national guidelines and reducing the spread of misinformation that can undermine public trust in vaccines (Betsch et al., 2020). Improved adherence to routine immunization has the potential to lower the incidence of vaccine-preventable diseases and support the achievement of national immunization targets.

Overall, this study provides evidence that audio-visual media are an effective health promotion tool for improving basic immunization compliance among infants. To achieve lasting impact, however, such interventions should be complemented by strategies that address broader structural and social determinants. Future research employing more rigorous experimental designs and longer follow-up periods is recommended to evaluate the sustainability of behavioral changes and their effects on overall immunization coverage.

4. CONCLUSION

This research aimed to assess the effectiveness of audio-visual educational tools in improving adherence to basic immunization among newborns in the service area of the Rum Balibunga Community Health Centre. The results demonstrate that providing health education through audio-visual formats significantly increases parental compliance with recommended infant immunization schedules.

The findings indicate that instructional approaches based on media are more successful in encouraging positive health behavior change than conventional education methods used in isolation. This study provides empirical support for health behavior theories by emphasizing the role of effective communication as a catalyst for action in health-related decision-making. Audio-visual media were shown to improve understanding, strengthen perceived benefits, and reduce psychological barriers that often interfere with vaccination compliance.

By integrating visual and auditory elements, audio-visual education delivers health messages in a clearer, more engaging, and more accessible manner, thereby facilitating better knowledge absorption among parents of infants. From both clinical and public health

perspectives, these results have important implications for primary healthcare practice. Audio-visual media represent a practical, efficient, and sustainable educational approach to support routine immunization programs in community health centers.

The use of this media has the potential to improve the quality of health promotion activities, increase service efficiency, and reinforce disease prevention efforts through immunization. Accordingly, the integration of audio-visual education into immunization services is expected to contribute to long-term improvements in immunization coverage and adherence.

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