

THE EFFECTIVENESS OF POSTER AND VIDEO MEDIA EDUCATION TO INCREASE MOTHERS' KNOWLEDGE OF TODDLERS ABOUT DIARRHEA PREVENTION AT THE MELATI INTEGRATED HEALTH POST (POSYANDU)

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Abstract

Childhood diarrhea remains an important preventable cause of morbidity, and caregiver knowledge is an important component of household prevention. This study examined changes in mothers' knowledge of diarrhea prevention after health education using poster and educational video media at Melati Posyandu, Binjai, North Sumatra. A true experimental two-group pretest–posttest design was used. Thirty-six mothers of toddlers were recruited by total sampling and randomly assigned to a poster group (n=18) or an educational-video group (n=18). Knowledge was measured using a 20-item Health Belief Model-based questionnaire. Data were assessed using Shapiro–Wilk tests, paired-samples t-tests, and normalized gain analysis. Both interventions produced significant within-group improvements in knowledge ($p<0.001$). Mean scores increased from 57.89 to 64.06 in the poster group and from 56.33 to 62.11 in the video group. The reported normalized gain was 80.06% for posters and 77.63% for videos. Thus, both media were associated with improved knowledge, while the poster group showed a descriptively higher gain. The findings support the use of accessible visual and audiovisual media in Posyandu-based diarrhea-prevention education, with media selection adapted to local needs and opportunities for repeated exposure.

Keywords: educational video; diarrhea; health education; knowledge; poster

INTRODUCTION

Childhood diarrhea remains a major public health problem, particularly among children under five years of age. Recent evidence shows that diarrhea-prevention strategies are strongly linked to household water, sanitation, hygiene, and caregiver practices. A 2026 systematic review of randomized trials concluded that community-based health education for childhood diarrhea can improve caregiver knowledge and hygiene-related behaviors, although intervention content and study quality vary across settings (Lima et al., 2026). Evidence from large reviews also shows that water, sanitation, and handwashing interventions reduce childhood diarrhea risk in low- and middle-income countries (Hubbard et al., 2025; Wolf et al., 2022).

Caregivers play an important role in preventing and responding to childhood diarrhea because many preventive actions occur at household level. Recent evidence has identified gaps in caregiver knowledge about diarrhea prevention and treatment, including recognition of appropriate preventive measures and rotavirus vaccination (Saguda et al., 2024). Handwashing with soap is particularly relevant: systematic reviews and randomized trials have demonstrated reductions in diarrheal disease following handwashing promotion (Ejemot-Nwadiaro et al., 2021; Luby et al., 2005; Luna, 2021). These findings provide a rationale for strengthening health education directed at mothers of young children.

Health education media can make preventive information more accessible by translating abstract recommendations into concise visual or audiovisual messages. Evidence from systematic reviews indicates that visual materials can improve comprehension, knowledge, and recall, especially among people with lower health literacy (Galmarini et al., 2024; Mbanda et al., 2021; Schubbe et al., 2020). Video-based interventions have also demonstrated positive effects on knowledge across different health contexts (Morgado et al., 2024; Tuong et al., 2014; Xiao et al., 2024). In maternal and child health, educational videos have been associated with improvements

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in maternal self-efficacy and caregiver empowerment (Borch-Johnsen et al., 2023; Joventino et al., 2017). Although poster and video media are widely used in health promotion, their effects can differ according to audience characteristics, content design, attention, literacy, and opportunities for repeated exposure. Reviews of multimedia education also emphasize heterogeneity in intervention design and outcome measurement (Deshpande et al., 2023; Weidmann et al., 2023). The present study therefore focused specifically on mothers of toddlers attending Melati Posyandu and measured knowledge before and after a single educational intervention. The objective was to assess changes in mothers' knowledge of diarrhea prevention after poster-based and educational-video interventions.

LITERATURE REVIEW

Diarrhea prevention and health education

Diarrhea prevention requires a combination of hygienic practices, safe water and food handling, sanitation, and timely recognition of danger signs. Handwashing promotion has been shown to reduce diarrheal episodes, although the magnitude of benefit varies by setting and intervention intensity (Ejemot-Nwadiaro et al., 2021). The 2022 Lancet systematic review and meta-analysis reported that promotion of handwashing with soap reduced diarrhea risk among children in low- and middle-income settings (Wolf et al., 2022). More recent evidence indicates that WASH effects can vary by season, emphasizing the importance of context when interpreting intervention results (Hubbard et al., 2025).

Poster and visual media

Poster-based education provides a static visual message that can be viewed repeatedly without requiring electricity, internet access, or a digital device. Evidence from randomized trials and systematic reviews indicates that pictorial information can improve knowledge and recall, particularly when information is simplified and visually organized (Anderson et al., 2019; Schubbe et al., 2020). A scoping review further reported that pictograms and videos were among the visual aids most frequently associated with positive health-literacy outcomes (Mbanda et al., 2021). Visual interventions are therefore relevant for community settings such as Posyandu, where educational materials may remain available after the counseling session.

Video-based education

Video combines visual and auditory information and can demonstrate sequences or behaviors that are difficult to communicate through static text or images. Systematic reviews have found that video-based health education can improve knowledge and, in some contexts, health behaviors, although the certainty and magnitude of effects vary (Morgado et al., 2024; Tuong et al., 2014; Weidmann et al., 2023). In mothers of young children, an educational video has been shown to improve maternal self-efficacy for preventing childhood diarrhea (Joventino et al., 2017). Other randomized studies have reported improvements in parental knowledge following video-based education (Toksoz et al., 2024; White et al., 2023).

Health Belief Model as a framework

The questionnaire used in the present study was constructed around Health Belief Model (HBM) domains: perceived susceptibility, perceived severity, perceived barriers, perceived benefits, self-efficacy, and cues to action. HBM-based interventions have been evaluated across preventive health behaviors, with systematic reviews suggesting that educational interventions can influence knowledge and selected health beliefs, although effects are not uniform across constructs and settings (Abed et al., 2026; Jones et al., 2014; Ritchie et al., 2021). In this study, HBM served primarily as a framework for constructing knowledge-related statements and organizing educational content rather than as a test of the full causal HBM pathway.

METHOD

Design and setting

This study used a true experimental two-group pretest–posttest design. It was conducted at Melati Posyandu, Binjai, North Sumatra, during the Posyandu service schedule coordinated with the Health Promotion section of H.A.H. Hasan Community Health Center. The design allowed changes in knowledge within each intervention group to be assessed before and after education.

Population and sample

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The population consisted of mothers of toddlers registered at Melati Posyandu. Total sampling was used because the accessible population was relatively small. Thirty-six eligible respondents participated, with 18 assigned to the poster group and 18 to the educational-video group through random assignment. Inclusion criteria were biological mothers or primary caregivers of toddlers who attended or were registered at Melati Posyandu, agreed to participate, completed the intervention and measurements, and could communicate in Indonesian. The minimum sample requirement was also justified using the Federer formula, which yielded 16 participants per group; the final sample exceeded this minimum.

Intervention and instrument

The poster and video interventions contained information on diarrhea prevention, including risk, severity, handwashing, safe drinking water, food hygiene, sanitation, and practical preventive actions. Education was delivered once after the pretest. Knowledge was measured using a 20-item Likert questionnaire developed from HBM domains. The questionnaire covered perceived susceptibility (items 1–3), perceived severity (4–6), perceived barriers (7–10), perceived benefits (11–14), self-efficacy (15–17), and cues to action (18–20).

Validity, reliability, and analysis

Instrument testing was conducted among 18 mothers outside the main sample with similar characteristics. All 20 items had item–total correlation coefficients above the reported *r*-table value of 0.497, and Cronbach's alpha was 0.959. Normality was assessed using the Shapiro–Wilk test. Pretest and posttest data in both groups were normally distributed (poster $p=0.862$ and 0.986 ; video $p=0.391$ and 0.737). Within-group changes were tested using paired-samples *t*-tests at $\alpha=0.05$. Normalized gain (*N*-gain) was calculated to describe the magnitude of knowledge improvement. The thesis also reported within-group Cohen's *d* estimates of 1.208 for the poster group and 1.149 for the video group.

Ethical considerations

Participants received information about the study procedures, benefits, potential risks, confidentiality, and voluntary participation before signing informed consent. The manuscript follows the ethical procedures documented in the thesis.

RESULTS AND DISCUSSION

Participant characteristics

Thirty-six mothers participated, with 18 in each intervention group. In the poster group, the largest age category was 31–40 years (50.0%), while in the video group it was also 31–40 years (55.6%). Educational attainment was most commonly senior high school in the poster group (33.3%) and junior or senior high school in the video group (27.8% each). Private-sector employment was the largest occupational category in both groups (33.3% and 38.9%, respectively). Most respondents had two children in the poster group (33.3%), whereas the video group was distributed equally between one and two children (27.8% each). Previous diarrhea in the child was reported by 55.6% of the poster group and 50.0% of the video group. Healthy latrines were reported by 66.7% and 72.2%, respectively. Table 1. Selected characteristics of respondents by intervention group

Characteristic	Poster (n=18)	Video (n=18)
Age 31–40 years	9 (50.0%)	10 (55.6%)
Senior high school	6 (33.3%)	5 (27.8%)
Private-sector work	6 (33.3%)	7 (38.9%)
Two children	6 (33.3%)	5 (27.8%)
Child had previous diarrhea	10 (55.6%)	9 (50.0%)
Healthy latrine available	12 (66.7%)	13 (72.2%)

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The two groups were similar in their broad demographic and household characteristics, and the thesis reported no statistically meaningful heterogeneity for the listed characteristics. This supports the interpretation of within-group changes, although the small sample limits precision.

Knowledge change

Knowledge increased in both intervention groups. In the poster group, respondents classified as having good knowledge increased from 3 (16.7%) before education to 13 (72.2%) after education. In the video group, good knowledge increased from 2 (11.1%) to 11 (61.1%). The mean score in the poster group increased from 57.89 (SD 6.75) to 64.06 (SD 5.10), while the video group increased from 56.33 (SD 5.20) to 62.11 (SD 5.03). The paired-samples t-test showed statistically significant within-group changes in both groups (poster: mean difference 6.17, $t=4.508$, $df=17$, $p<0.001$; video: mean difference 5.78, $t=4.769$, $df=17$, $p<0.001$).

Table 2. Pretest–posttest knowledge scores and reported improvement.

Group	Pretest Mean (SD)	Posttest Mean (SD)	Mean Change	Paired t-test
Poster	57.89 (6.75)	64.06 (5.10)	6.17	$t=4.508$; $p<0.001$
Educational video	56.33 (5.20)	62.11 (5.03)	5.78	$t=4.769$; $p<0.001$

Normalized gain

The reported N-gain was 80.06% for the poster group and 77.63% for the video group. Thus, both interventions showed substantial improvement in knowledge, while the poster group had a descriptively higher N-gain. Importantly, the thesis did not report a direct between-group statistical test of the change scores; therefore, the difference in N-gain should be interpreted descriptively rather than as evidence of a statistically significant superiority of one medium.

Discussion: poster and visual media

The increase in knowledge after poster education is consistent with evidence that pictorial health information can improve understanding and recall (Schubbe et al., 2020). Visual materials can also be useful when health messages need to be concise and repeatedly accessible, which is relevant in Posyandu settings. The present finding is also compatible with randomized evidence that educational posters can affect health knowledge (Anderson et al., 2019). The poster group's higher descriptive N-gain may relate to the opportunity to process short messages at the participant's own pace and to re-view the material after the session. This interpretation is plausible but cannot be established as a causal mechanism from the present design.

Discussion: educational video

The video intervention also produced a significant increase in knowledge. This finding is consistent with systematic reviews showing that videos can improve health knowledge and comprehension (Galmarini et al., 2024; Morgado et al., 2024; Tuong et al., 2014). Evidence from mothers and caregivers is particularly relevant: educational video interventions have improved maternal self-efficacy for childhood diarrhea prevention and caregiver empowerment in other settings (Borch-Johnsen et al., 2023; Joventino et al., 2017). Video may be particularly useful for demonstrating sequential behaviors such as handwashing and safe food or water practices. However, effectiveness can depend on attention, duration, language, and access to the technology needed to view the material.

Implications for Posyandu

The findings suggest that both media can be integrated into routine Posyandu health promotion. A practical approach is to use video during group education and provide a poster as a persistent visual reminder. This approach is compatible with evidence that multimedia interventions can improve knowledge while also highlighting the need to adapt educational materials to literacy and contextual needs (Deshpande et al., 2023; Mbanda et al., 2021). Recent Indonesian evidence also supports video-supported maternal education delivered through community channels as a feasible way to improve maternal knowledge (Permatasari et al., 2026).

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Limitations

Several limitations should be considered. The sample was small and drawn from a single Posyandu, which limits generalizability. The intervention was delivered once and knowledge was measured immediately after education, so retention over longer periods was not established. The questionnaire was based on HBM constructs but the study did not test the full HBM causal pathway or behavioral outcomes. In addition, although N-gain values differed between groups, a direct statistical comparison of change scores was not reported. Future studies should use larger samples, assess longer-term knowledge retention and preventive behaviors, and directly compare change scores or adjusted posttest outcomes between media groups.

CONCLUSION

Health education using both posters and educational videos was associated with significant improvements in mothers' knowledge of diarrhea prevention at Melati Posyandu. The poster group increased from a mean score of 57.89 to 64.06, while the video group increased from 56.33 to 62.11; both within-group changes were statistically significant ($p < 0.001$). The reported N-gain values were 80.06% and 77.63%, respectively, indicating substantial improvement in both groups. The poster group showed a descriptively higher gain, but the thesis did not report a direct between-group statistical comparison; therefore, the difference should not be interpreted as statistically proven superiority. Posyandu health promotion may use either medium according to local resources, literacy, accessibility, and the need for repeated exposure. Future research should include larger multicenter samples, longer follow-up, and behavioral outcomes.

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