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Empowering Grandmothers through Educational Media: A Quasi-Experimental Study on Stunting Prevention in Yogyakarta, Indonesia

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ABSTRACT

Stunting remains a major public health issue in Indonesia, with multifactorial causes. Grandmothers play a central role in childcare and decision-making within families. Effective educational media are needed to improve knowledge and caregiving practices in family settings. This study aimed to examine the effectiveness of educational modules and videos in improving grandmothers' knowledge and skills in providing health education for stunting prevention. A one-group pretest–posttest quasi-experimental design was conducted among 25 grandmothers who lived with or near their grandchildren. The educational media (module and video) were first validated by experts. The materials included comprehensive information on the definition, causes, signs, symptoms, impacts, and prevention of stunting, as well as methods and techniques for delivering effective health education. Data were collected using knowledge and skill assessment tools, and analyzed using the Wilcoxon signed-rank test due to non-normal data distribution. The results showed that mean knowledge score of grandmothers significantly increased from 69.6 (pretest) to 94.4 (posttest), with a mean difference of 24.8, Z-score = -4.391, p-value = 0.000 ($p < 0.001$). Similarly, the mean skill score in delivering health education improved from 50.20 (pretest) to 84.80 (posttest), with a mean difference of 34.6, Z-score = -4.298, p value = 0.000 ($p < 0.001$). Educational modules and videos are effective in improving grandmothers' knowledge and skills in providing health education for stunting prevention. Integrating family-centered educational tools into community health programs may strengthen family support and contribute to reducing stunting prevalence.

Keyword: Stunting, Grandmother, Health education, Educational module, Video

1. Introduction

Health issues among children remain a major challenge in Indonesia's public health development, particularly concerning nutrition. One of the most pressing nutritional problems is stunting, a growth and developmental disorder caused by chronic malnutrition. The prevalence of stunting among children under five in Indonesia was 21.5% in 2023, indicating that one in five children are affected, with the highest cases occurring between the ages of two and three years (Kementerian Kesehatan RI, 2024). Although this figure shows a decline compared to previous years—37.6% in 2013, 30.8% in 2018, 24.4% in 2021, and 21.6% in 2022 (Kementerian Kesehatan RI, 2023). The effort to eliminate stunting must be continuously strengthened. Indonesia has set a target of reducing stunting prevalence to 14% by the end of 2024, as stipulated in Presidential Decree No. 72/2021 on the acceleration of stunting reduction. Furthermore, reducing stunting is also aligned with the Global Nutrition Target 2025 and recognized as an indicator under the Sustainable

Development Goals (SDGs). However, in the Province of Yogyakarta, the prevalence has increased from 16.4% in 2022 to 18.0% in 2023, reflecting a rise of 1.6% 2023 (Kementerian Kesehatan RI, 2024).

Stunting is not merely a matter of impaired linear growth but also has long-term consequences on cognitive and motor development. Children with lower cognitive abilities often face difficulties in school, and stunting increases the risk of developing non-communicable diseases and higher morbidity and mortality rates (Hall et al., 2018). The consequences of stunting include delays in neurological development, irreversible neurocognitive impairments, weakened immune systems, and a predisposition to chronic diseases in adulthood (Wemakor & Mensah, 2016). These conditions collectively hinder the development of human capital and reduce productivity in adulthood (Soliman et al., 2021).

The causes of stunting in Indonesian children are multifactorial. Economic hardship remains the primary determinant of malnutrition, leading to inadequate nutrient intake, poor sanitation, suboptimal childcare, and low parental education and knowledge (Amaliah et al., 2019; Ismawati et al., 2021; Supriyadi & Oktavianto, 2020). Failure to achieve optimal growth often occurs due to nutritional deficiencies within the first 1,000 days of life (Supadmi et al., 2024). Recurrent infections and chronic malnutrition are also significant contributors. Factors such as poverty, poor sanitation, low maternal nutritional status, lack of family planning, and low levels of education and socioeconomic status are strongly associated with stunting (Anggraini & Romadona, 2020; Vaivada et al., 2020).

Families play a crucial role in a child's growth and development. In the care of pregnant women and young children, family members-particularly those closest to the mother-have a significant influence on caregiving practices and decision-making processes. These key family members typically include husbands and grandmothers (Oktavianto & Paramitha, 2017; Timiyatun & Oktavianto, 2018). The family serves as both a source and a reflection of healthy and clean living behaviors. It is also the primary setting for the formation of a culture of health (Januarti et al., 2020). The health status of toddlers is strongly affected by family caregiving practices, not only after birth but also during pregnancy (Amaliah et al., 2019). External factors that substantially contribute to stunting include caregiving cultures and practices embedded within the family environment. One of the most influential family-related factors associated with stunting is inappropriate feeding practices by caregivers (Januarti et al., 2020; Rachmawati et al., 2021) .

Given these challenges, effective interventions to prevent and address stunting are crucial. The family plays a central role, particularly through motivation, perception, emotions, and attitudes in meeting children's nutritional needs (Indanah et al., 2024; Yuliana & Nulhakim, 2019). Grandmothers, in particular, hold significant influence in family health care, especially regarding maternal and child nutrition (Oktavianto et al., 2018, 2021; Wulandari et al., 2022). Their knowledge and practices strongly affect feeding patterns among grandchildren. Fioresta & Trisnawati (2024), found that many grandmothers exhibited poor feeding practices, including inappropriate menu selection, meal scheduling, frequency, food processing, serving, and feeding techniques. Cultural norms often place grandmothers as advisors and supervisors for mothers in child-feeding practices, leaving mothers with limited decision-making autonomy (MacDonald et al., 2020). Thus, involving grandmothers in family-centered interventions is essential for the success of stunting prevention programs.

The effectiveness of health education within the community is closely tied to the learning components used. Health education becomes more impactful when supported by effective methods and media (Laela et al., 2022; Notoatmodjo, 2018; Oktavianto et al., 2024). Among various media, video is particularly effective as it combines moving images and sound, making learning more engaging and accessible, especially for older adults (Laela et al., 2022; Oktavia et al., 2023). Attractive visual and auditory media not only improve comprehension but also ensure longer retention of information. Additionally, video is beneficial for older adults with limited literacy, as it conveys information through both visual and auditory channels (Oktavia et al., 2023). Thus, video media can serve as a promising tool to empower grandmothers in improving feeding practices and preventing stunting. This study aimed to examine the effectiveness of educational modules and videos in improving grandmothers' knowledge and skills in providing health education for stunting prevention.

2. Methods

A quasi-experimental study with a one-group pretest–posttest design was conducted to evaluate the effectiveness of educational modules and videos on grandmothers' knowledge and skills in stunting prevention. The study was carried out in a community setting where grandmothers lived with or near their grandchildren. The population included grandmothers who had grandchildren aged 6 months to 5 years, both stunted and non-stunted. Inclusion criteria were: grandmothers aged ≤70 years, able to read and write, and willing to participate in the study. Using a purposive sampling technique, 25 grandmothers meeting these

criteria were recruited. The modules and videos addressed stunting prevention and aimed to motivate participants to educate others and implement preventive measures. The materials included comprehensive information on the definition, causes, signs, symptoms, impacts, and prevention of stunting, as well as methods and techniques for delivering effective health education. Prior to the intervention, the module and video were validated by experts in child nursing, medical education, and by grandmothers to assess readability and comprehensibility. The result showed that scores across all aspects were close to the maximum value, indicating that the module and video demonstrated high validity and was deemed highly feasible to be used as a medium in health education for stunting prevention (Tabels 1 and 2). Following validation, the grandmothers received training using both the module and video. The intervention included interactive sessions with explanations, discussions, demonstrations, and guided practice to ensure understanding and skill acquisition. The training was conducted using a lecture method combined with a question-and-answer session, beginning with a video presentation. The training was conducted in two sessions. The first session consisted of a lecture accompanied by a question-and-answer discussion. The second session involved a demonstration of practical skills. The interactive lecture lasted for approximately 90 minutes, followed by a 60-minute session consisting of demonstration and re-demonstration of health education practices. The researcher, who was a lecturer in pediatric nursing, delivered the material on stunting prevention. Health education techniques and demonstrations were presented by a lecturer in health promotion from the public health study program, who was also a member of the research team. Knowledge and skills were measured before (pretest) and after (posttest) the intervention. The grandmothers' knowledge pre-test was administered simultaneously for approximately 15–20 minutes prior to the training activities. In addition, the grandmothers' ability pre-test was carried out individually at their respective homes one to two days before the training. Following the training sessions, the knowledge post-test was administered simultaneously for 15–20 minutes, while the ability post-test was conducted one to two days later at each grandmother's home. Data were collected using structured questionnaires. The grandmothers' knowledge assessment questionnaire consisted of 20 items addressing the definition of stunting, its symptoms, causes, impacts, preventive measures, and counseling aspects. All questions were closed-ended, requiring respondents to select either "true" or "false" as their answers. When completing the knowledge questionnaire, the grandmothers were assisted by a team of enumerators. Each enumerator was responsible for accompanying three to four grandmothers. The range of validity values was from 0.370 to 0.848 and reliability value was 0.877. Normality of the data was tested using the Shapiro–Wilk test. Since several variables were not normally distributed, the comparison of pretest and posttest scores was analyzed using the Wilcoxon signed-rank test. The use of this nonparametric test was justified not only because the data were not normally distributed, but also because the sample size was small (fewer than 30 participants) and the variance was not homogeneous. A significance level of $p < 0.05$ was applied. Ethical principles were upheld by obtaining informed consent from all potential respondents. Participants were assured of their right to voluntarily participate or decline involvement, and they were informed that they could withdraw at any time without consequence. Respondent data were treated with strict confidentiality, with no names recorded and identification maintained through respondent codes. Each participant received equal treatment throughout the study. This study received ethical approval from the health research ethics committee STIKes Surya Global Yogyakarta, under approval number 4.29/KEPK/SSG/VII/2025.

3. Results

The findings of this study consist of the validity assessment of the educational module and video, respondents' characteristics, and the evaluation of grandmothers' knowledge and skills in delivering health education.

3.1 Results of the validity assessment of the stunting prevention module

The module underwent content validation by experts in pediatric nursing (specifically stunting), experts in health education media, and grandmothers as target users to evaluate readability and language appropriateness. The results of the validity test for the module are presented in Table 1.

Table 1 Results of validity testing of the stunting prevention education module by aspect

Aspect	Number of Indicators	Maximum Score	Obtained Score	Conclusion
Content/Material	5	25	25	Valid

Table 1 Continued

Aspect	Number of Indicators	Maximum Score	Obtained Score	Conclusion

Language	4	20	20	Valid
Presentation	5	25	24	Valid
Visual Design	4	20	20	Valid
Total	18	90	89	Valid

Table 1 shows that scores across all aspects were close to the maximum value, indicating that the module demonstrated high validity and was deemed highly feasible to be used as a medium in health education for stunting prevention.

3.2 Results of the validity assessment of the stunting prevention video

The video underwent a similar content validity assessment by experts in reproductive health, health education media, and grandmother. The results of the validity test for the video are presented in Table 2.

Table 2 Results of validity testing of the stunting prevention education video by aspect

Aspect	Number of Indicators	Maximum Score	Obtained Score	Conclusion
Content/Material	5	25	25	Valid
Language	4	20	20	Valid
Presentation	5	25	25	Valid
Audio-Visual Design	5	25	24	Valid
Total	19	95	94	Valid

Table 2 demonstrates that the educational video also achieved scores close to the maximum across all aspects. Therefore, the video was concluded to have high validity and was considered highly feasible for use as a stunting prevention education medium.

3.3 Respondent characteristics

This study involved 25 grandmothers who had grandchildren under five years old, either stunted or non-stunted, and lived in the same household or nearby. Inclusion criteria included being ≤70 years of age and literate. Table 3 presents the characteristics of the respondents.

Table 3 Characteristics of respondents (n = 25)

Characteristics	f	%
Age		
45-50 years	3	12
51-60 years	19	76
61-70 years	3	12
Education		
No formal education	0	0
Primary school	9	36
Junior high school	9	36
Senior high school	5	20
Higher education	2	8
Occupation		
Housewife	17	68
Farmer	4	16
Entrepreneur	2	8
Laborer	1	4
Teacher	1	4
Number of grandchildren		
1	6	24
2	9	36
3	6	24
4	4	16
Living with grandchildren		
Yes	25	100
No	0	0

Table 3 Continued

Characteristics	f	%
Received stunting counseling		

Yes	5	20
No	20	80
Ever watched stunting-related videos		
Yes	3	12
No	22	88
Received educational media on stunting		
Yes	3	12
No	22	88

3.4 Data normality test results

A normality test was conducted as a prerequisite for comparative analysis. The results of the normality test, as a prerequisite for comparative analysis, are shown in Table 4.

The data normality test results are shown in Table 4**.** Knowledge (pretest and posttest) and skills (posttest) were not normally distributed ($p < 0.05$). Therefore, the Wilcoxon non-parametric test was applied for subsequent comparative analyses.

Table 4 Results of data normality test

Variable	p-value	Conclusion
Knowledge (pretest)	0.000	Not normally distributed
Knowledge (posttest)	0.000	Not normally distributed
Skills (pretest)	0.000	Not Normally distributed
Skills (posttest)	0.031	Not normally distributed

3.5 Grandmothers' knowledge before and after training

The grandmothers' knowledge was evaluated before and after the training. The pre- and post-training assessment results, along with the statistical analysis of the differences, are presented in Table 5.

Table 5 Comparison of grandmothers' knowledge before and after training (n=25)

Variabel		*Mean*	Min-Max	Δ*Mean*	Z -value	Std . Deviation	p-value
Grandmothers' Knowledge	*Pretest*	69.6	55-80	24.8	-4.391	9.780-5.830	0.000*
	Postest	94.4	80-100				

*Wilcoxon: negative range = 0; positive range = 25; ties = 0

Table 5 shows that the mean knowledge score increased from 69.6 before training to 94.4 after training, with a mean difference of 24.8. None of the participants experienced a decrease in scores, all of participants (100%) improved, and none had unchanged scores. After participating in the training, the grandmothers demonstrated an increased understanding, particularly regarding the causes, impacts, and prevention of stunting. The Wilcoxon test revealed a significant difference between pretest and posttest scores ($p < 0.05$).

3.6 Grandmothers' skills before and after training

Similarly, the grandmothers' skills were assessed prior to and following the training. The corresponding results and the difference test between the two assessments are presented in Table 6.

Table 6 Comparison of grandmothers' skills in delivering health education before and after training (n=25)

Variabel		*Mean*	Min-Max	Δ*Mean*	Z -value	Std. Deviation	p-value
Grandmothers' Skills	*Pretest*	50.2	35-75	34.6	-4.298	19.065-6.034	0.000*
	Postest	84.8	75-95				

*Wilcoxon: negative range = 0; positive range = 25; ties = 0

Table 6 demonstrates that the mean skills score increased from 50.2 before training to 84.8 after training, with a mean difference of 34.6. One hundred percent of participants improved. After participating in the training, the grandmothers also demonstrated improved skills, particularly in preparing educational materials and media, delivering counseling objectives, explaining the causes and impacts of stunting, describing

prevention efforts, and providing motivation for stunting prevention. The Wilcoxon test confirmed a statistically significant improvement in grandmothers' skills after the training ($p < 0.05$).

4. Discussion

Stunting is caused by multiple factors, not merely the insufficient fulfillment of children's nutritional needs, but also by a variety of underlying determinants. One of the strongest factors influencing child nutrition is the mother's ability to provide adequate care and feeding. According to Has et al., (2024), in Indonesia, mothers are the primary caregivers and the main providers of food for infants and young children. Family support also plays a crucial role in strengthening a mother's capacity to care for her child. A mother's caregiving ability is one of the strongest determinants contributing to stunting among children. The study strongly suggests that efforts should be directed toward improving maternal caregiving skills and strengthening family support, particularly from grandmothers and husbands. Similarly, Santosa et al., (2021), emphasized that, given the complexity of risk factors for child stunting, maternal and family caregiving practices are essential in prevention efforts. Children's nutritional status is influenced by family conditions and the surrounding environment. Interventions that enhance maternal health, behaviors, and family involvement are therefore vital in reducing nutritional problems among children.

Caregiver behavior is another contributing factor to stunting, particularly in terms of how nutritional needs are met. This includes irregular feeding schedules for toddlers and limited dietary variety provided by caregivers. In some cases, stunting has been associated with grandmothers' attitudes and feeding practices for infants and toddlers (Sudrajad et al., 2019). Child health efforts in low- and middle-income countries often focus primarily on mothers, whereas grandmothers play a significant role in decision-making related to pregnancy and childcare (Chung et al., 2020).

Providing information to families is therefore crucial as a fundamental strategy for stunting prevention. Utami et al., (2023), highlighted that knowledge is a predisposing factor underlying behavior. Behavior is also shaped by education level, socioeconomic status, and cultural practices, making knowledge essential for behavioral change. When families receive health education about stunting, they gain a better understanding and are more likely to engage in preventive behaviors. Research findings indicate a strong relationship between parental knowledge, feeding practices, and stunting incidence, underscoring the importance of health promotion within families. Likhar & Patil (2022) dan Utami et al. (2023), recommended support programs for grandmothers and mothers of young children to improve nutrition knowledge and childcare practices. Such programs are important, as both mothers and grandmothers are influential in caregiving and feeding practices. These interventions should not be limited to mothers of toddlers but also extended to pregnant women.

Lavado et al., (2017), reported that child care practices performed by mothers and families are associated with stunting. Adequate knowledge regarding childcare and nutrition empowers mothers to prevent stunting. Family members, especially mothers and grandmothers, play critical roles in determining child growth and development. Similarly, Tome et al., (2021), argued that child growth depends not only on maternal care but also on adequate nutrition, a safe family environment, stimulation, and proper healthcare.

Grandmothers, in particular, are highly influential in children's growth and development. Studies have shown that grandmothers hold significant authority in family health-related decision-making. Their knowledge regarding infant feeding, maternal nutrition, and childcare practices not only influences mothers but ultimately affects children's health and growth (Chung et al., 2020). Grandparental caregiving practices, especially those related to nutrition, are critical in shaping child outcomes. Authoritative caregiving by grandparents tends to reduce the risk of stunting, while permissive styles are associated with poor nutritional status and increased stunting prevalence (Ramadhani et al., 2023).

Thus, programs are needed to strengthen the contribution, confidence, and leadership roles of grandmothers in child feeding and maternal care. Grandmothers should be positioned at the center of such programs. These programs should include assessing their knowledge and roles, affirming their experiences, conducting discussions to negotiate behavioral change, building leadership capacity, and evaluating progress (MacDonald et al., 2020). Culturally tailored approaches, such as using songs, games, visual materials, videos, and storytelling, can help bridge generational differences between grandmothers and mothers (Mui, 2019).

The results of this study indicate a significant improvement in the grandmothers' knowledge and skills in delivering health education on stunting prevention. As presented in Table 5, the mean knowledge score increased from 69.6 before the training to 94.4 after the training, with a mean difference of 24.8. Similarly, Table 6 shows that the mean skill score rose from 50.2 prior to the training to 84.8 afterward, with a mean difference of 34.6. Health education aims to enhance individuals' or groups' understanding in order to foster greater awareness, cultivate positive attitudes, and promote healthier lifestyles (Notoatmodjo, 2018;

Oktavianto, 2017). Its effectiveness depends on how well it aligns with the characteristics of the target population. Therefore, the methods and media employed in health education activities should be adapted to the participants' characteristics to ensure that the materials are engaging and easily understood (Oktavianto et al., 2019, 2025). The observed improvement in the grandmothers' knowledge and skills in this study was strongly influenced by the educational media utilized. The results of the face validity test on both the video and module used by the grandmothers also demonstrated excellent outcomes. The participants reported that the presentation was visually appealing, the language was accessible, and the content was easy to comprehend (as shown in Tables 1 and 2). Appropriate and engaging educational media can enhance the enthusiasm of counseling participants. When mothers of toddlers are enthusiastic and motivated to participate in counseling sessions, their understanding of stunting and its prevention is more likely to increase (Sartika, 2022).

The use of stunting prevention modules and educational videos in this study was proven to be effective. Anggraeni et al. (2022), reported that educational modules positively influence knowledge improvement in stunting prevention. Modules not only enhance knowledge but also foster more positive attitudes among mothers of stunted children. The modules are informative, enriched with illustrations, and therefore more engaging. Beyond mothers of toddlers, modules have also been found effective for pregnant women, increasing their sense of responsibility, autonomy, and initiative in preventing anemia and stunting (Aminin et al., 2023). Yustiari et al., (2025), demonstrated that, in intervention groups provided with modules and support from community health workers, knowledge and behavior improved after one month. Information obtained through modules served as the foundation for behavioral changes, although external factors such as social media might also contribute.

In addition to increasing knowledge, educational modules were effective in shaping attitudes, enhancing community support, and raising awareness about stunting prevention. Yustiari et al. (2025), also found that stunting education modules improved knowledge and attitudes among community health workers (cadres). After cadres were trained and provided education to mothers of toddlers, maternal knowledge and family support significantly increased. Family support, especially from grandmothers, was shown to strengthen awareness and understanding of stunting prevention. Wardani et al. (2020), also demonstrated the effectiveness of modules as an educational medium. In intervention groups provided with modules, significant improvements in knowledge and caregiving abilities were observed compared to control groups. Families showed better feeding practices, disease prevention behaviors, and improvements in environmental hygiene and sanitation.

Alongside modules, this study also utilized animated educational videos for grandmothers. Videos are an effective audiovisual medium that combine visual and auditory features, making them more engaging and easier to understand (Setiyawati et al., 2022). Videos can be replayed, allowing participants to revisit and reinforce information, which enhances memory retention. As an educational tool, videos are both informative and practical, as they can be accessed repeatedly when needed (Oktavianto et al., 2025; Salsabila et al., 2025).

Educational videos have been shown to improve knowledge, attitudes, and community awareness in stunting prevention. They are particularly useful for reaching larger audiences, as they can be easily shared and used in group discussions (Schneider et al., 2021). Participants reported that videos were meaningful, necessary, and motivational for health education activities. Video interventions also improved feeding practices and hygiene behaviors (Schneider et al., 2022). While fostering trust in the accuracy of the information provided (Coetzee et al., 2018). Schneider et al. (2022), further found that respondents appreciated the accessibility of videos, as they could be viewed anytime and anywhere, even daily.

In summary, this study demonstrates that addressing stunting requires a comprehensive family-centered approach that involves not only mothers but also grandmothers as key caregivers. Both educational modules and videos proved effective in improving knowledge and caregiving skills related to child nutrition and stunting prevention. These media facilitated behavioral changes, enhanced family support, and strengthened community awareness. Therefore, integrating culturally appropriate educational tools into family- and community-based programs may serve as a sustainable strategy to empower caregivers and reduce the prevalence of stunting.

The strength of this study lies in the use of video media and modules specifically developed by the research team. Prior to implementation, these media underwent content validity testing involving pediatric nursing experts and health promotion media specialists, as well as face validity testing with the grandmothers. The effectiveness of the media was evaluated using rigorous scientific methods. Furthermore, the research team developed a measurement instrument to assess the grandmothers' knowledge and skills, which was subjected to content and construct validity testing, as well as reliability analysis. However, a limitation of this study is the one-group pretest-posttest design, which, lacking a control group, cannot definitively rule out that

other external factors might have influenced the results. However, these are very common limitations for this type of study and do not detract from the importance of the findings. Other limitation is the relatively small sample size of 25 grandmothers, which restricts the generalizability of the findings to a broader population. Future research with a larger and more diverse sample is recommended to strengthen the external validity and confirm the effectiveness of the developed educational media across different settings.

5. Conclusion

The study demonstrates that educational modules and videos are highly effective in improving grandmothers' knowledge and skills in providing health education for stunting prevention. It is hoped that increasing the role of grandmothers will improve family care practices, which will ultimately reduce the risk of stunting, emphasizing the need for public health policies that strengthen family-based support systems. Moreover, promoting intergenerational nutrition literacy as a new paradigm in family health can ensure continuous knowledge transfer and enhance long-term nutrition outcomes across generations. There is a need for a Posyandu-based program that specifically focuses on strengthening the role of grandmothers in stunting prevention efforts.

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