

EFFECTIVENESS OF CHALLENGE CARD MEDIA IN ENHANCING MATERNAL KNOWLEDGE ON STUNTING AND RELATED NUTRITION PRACTICES

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Abstract

With a prevalence of 24.1%, stunting is a major health issue in Indonesia. Due to linear growth abnormalities brought on by malnutrition and insufficient nutritional intake, this ailment poses a threat to the country's future generation's quality of life. Increasing mothers' awareness of stunting is therefore crucial, and using visual-based instructional materials is one of the best ways to do this. This study aims to analyze the effect of card challenge, a visual-based educational media, on increasing maternal knowledge about stunting. A quasi-experimental one-group pretest–posttest design was employed involving 50 mothers of toddlers in Bangkalan Regency. The intervention consisted of health education using Challenge Cards, conducted in small group sessions. Maternal knowledge was measured using a validated 10-item questionnaire covering the definition, causes, impacts, and prevention of stunting. Data were analyzed using the Wilcoxon Signed-Rank Test. The results showed that there was a significant increase in maternal knowledge after being given a card challenge game with a value of $p = 0.000$ ($p < 0.05$). This indicates that the intervention using card challenge games has succeeded in significantly increasing mothers' understanding of stunting. Card challenge games have proven to be effective in increasing mothers' knowledge about stunting, providing a positive impact on stunting prevention efforts. This study underscores the importance of innovative, interactive, and culturally adaptable health education methods to empower mothers in improving child health and nutrition. The intervention model has the potential to be scaled up and integrated into broader stunting reduction programs in Indonesia.

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INTRODUCTION

Stunting is a nutritional problem that threatens the quality of life of the nation's next generation due to failure to grow and low productivity in young adulthood and the risk of degenerative diseases 1–3. Stunting is quite common in countries with low economies 4,5. Based on the standards of World Health Organization (WHO), stunting is defined as a linear body growth disorder caused by chronic malnutrition and also a lack of adequate nutrient intake on a regular basis 6. Marked with a

z-score of height by age (TB/U) $< -2SD$ 7. Stunting can endanger the quality of Indonesia's human resources 8.

Globally, the number of stunting children is 28.5% with 31.2% in developing countries while in Southeast Asia it is 29.4% 9,10. According to the Indonesian Ministry of Health, (2020), the number of stunted toddlers in Indonesia is 24.1%. Reporting from the EPPGBM SIGIZI (Electronic Application for Community-Based Nutrition Recording and Reporting) on January 20, 2021, there were 1,325,298 (11.6%) of 11,499,041 children under five who were stunting in 34 provinces 11. In

2021, Bangkalan Regency had as many as 38.9% of stunted toddlers, making it the area with the highest incidence of stunting in East Java 12. Based on 2021 data on the Bina Bagda/Ministry of Home Affairs application, there are 27 stunting locus villages in Bangkalan, most of which come from villages with extreme poverty. In 2022, the number of villages with stunting incidence decreased to 16, but in 2023, the number will increase again to 20 villages 13. There were 27 stunting locus villages identified in Bangkalan in 2021, most of which were classified as areas with extreme poverty, poor sanitation, and limited access to health services. Efforts by the local government and health sector, including the implementation of the Program Bangkalan Sehat and the involvement of posyandu cadres, contributed to a decline in the prevalence of stunting to 26.2% in 2022.

According to the World Health Organization (WHO) concept framework in the decision of the Indonesian Ministry of Health, (2022), stunting is considered to be the result of a combination of several factors, including poor nutritional intake, poor maternal knowledge, inadequate breast milk (breast milk), and animal protein in complementary foods (MPASI). Based on research, mothers who do not know about nutrition will greatly affect their child's health, such as not being able to choose and providing healthy food 14. The quality of human resources will be affected by the level in the future, which will have an impact on the Human Development Index 15.

To reduce the prevalence of stunting in Indonesia, it is very important to provide information about the problem. One of the efforts that can be made is to increase mothers' knowledge about stunting through health education 16. Therefore, the researcher is interested in implementing a community empowerment program in Bangkalan Regency with the theme "*Smart Education*" to increase mothers' knowledge about stunting. This activity will include stunting education and health education using challenge card media.

This card challenge is an innovation that contains health information packaged with an attractive design, as well as a desire to achieve sustainable lesson learning. This card was developed by the research team based on evidence-based health

education principles and adapted from previous community empowerment models used in maternal and child health promotion (Kusumaningrum et al., 2022; Wulandari & Hartati, 2021). Several studies have shown that game-based or participatory learning tools such as challenge cards are more effective in improving knowledge retention, motivation, and behavioral change compared to conventional lecture-based health education methods (Rahmawati et al., 2020; Nugraheni et al., 2023). The closeness between health workers and the community can be conveyed better through direct empowerment.

METHODS

This research is a quantitative study with a quasi-experimental design method. The type of design used was a one-group pre and post-test with a sample of 50 mothers who had toddlers. The inclusion criteria were: (1) mothers with children aged 0–5 years; (2) able to read and write; (3) willing to participate by signing an informed consent form; and (4) available for the entire intervention process. The exclusion criteria were: (1) mothers who were ill or unable to complete the intervention session; and (2) participants who submitted incomplete questionnaires. The sampling technique used in this study is total sampling. Data collection was conducted using a questionnaire on maternal knowledge about stunting that had previously been tested for validity and reliability. Respondents totaling 25 people were obtained the results of all questions having a value of $> r$ table ($n=25$, $\alpha=0.05$ then r table = 0.413), so that the 10 questions were declared valid and got an alpha cronbach of $0.664 > 0.60$, which means that the questionnaire was declared reliable. The questionnaire contains 10 question items that include the definition, impacts, characteristics, and causes of stunting. This questionnaire contains 10 questions containing definitions, causes, characteristics, impacts, and stunting prevention. If you answer correctly and according to the key, you will get a score of 1, and if the answer is wrong or does not match the key, you will get a score of 0. The intervention applied in this study was an educational game called the Challenge Card Game, designed to enhance mothers' knowledge about stunting through active and enjoyable learning. The game consisted of 20 challenge cards, each

containing short questions or scenarios related to stunting (definition, causes, impacts, and prevention). Each card was color-coded and visually illustrated to increase participant engagement. Each session lasted approximately 30–40 minutes. Data were analyzed using the Wilcoxon Signed Rank Test, as the pretest and posttest data were not normally distributed based on the Shapiro–Wilk test results. This nonparametric test was chosen to determine the difference in mothers’ knowledge scores about stunting before and after the Challenge Card Game intervention. A significance level of $\alpha = 0.05$ was applied for all analyses.

This research has passed the ethics test from the KEPK, Faculty of Medicine, University of Muhammadiyah Malang with certificate number No. E.5.a/138/KEPK-UMM/V/2024. The analysis of data normality shows that the data is not normally distributed, so what is used in testing the hypothesis of this study is the Wilcoxon test.

The intervention provided was in the form of a challenge card-based health education to mothers who have toddlers in one of the villages in Bangkalan Regency in May 2024. This challenge card game is carried out in groups with each group containing 10 players. Before the intervention, the researcher asked the respondents to do a pre-test first and then continue with education about stunting. The intervention provided was a challenge card-based health education program for mothers with toddlers in one of the villages in Bangkalan Regency in May 2024. This challenge card game was conducted in groups, with each group consisting of 10 participants. Before the intervention, the respondents completed a pre-test, followed by an educational session about stunting. The author chose the challenge card method because it encourages active participation, enhances engagement through play-based learning, and facilitates better understanding and retention of health information among mothers.

After the education was carried out, the researcher began to lead the card challenge game. The next meeting was a card challenge game and ended with a post-test. The Card Challenge game is made with an attractive design using cards that contain challenges and commands regarding mothers' knowledge, which include poor nutritional intake, environmental

cleanliness, toddler visits to posyandu, immunization coverage, adequacy of breast milk (breast milk) and animal protein in Complementary Foods (MPASI) that must be done or completed according to the instructions listed.

Participants are instructed to complete the tasks or answer the questions written on each card according to the provided instructions. The activities are designed to stimulate discussion, encourage critical thinking, and promote peer learning among mothers. This interactive approach allows mothers to actively apply their knowledge to real-life situations, rather than passively receiving information.

The Challenge Card game was developed by the research team based on principles of participatory learning and health promotion theory, aiming to transform health education into a more dynamic and contextually relevant experience. Compared to conventional lecture-based education, this game-based method encourages active engagement, collaboration, and experiential learning, making it more effective for increasing knowledge retention and behavior change related to stunting prevention.

RESULTS AND DISCUSSION

Table 1. Characteristics of Respondents Based on Age, Last Education, and Occupation
N=50

Characteristic	Frequency (N)	Percentage (%)
Age		
20-35 Years	33	66%
35-45 Years	17	34%
Final Education		
SD	8	16
Junior High School/Equivalent	7	14
High School/Equivalent	25	50
College	10	20
Work		
Work	13	26
Not Working	37	74

In table 1. The majority of respondents (66%) were aged 20-35, which is considered the ideal time to have children, as physical and reproductive conditions are at their peak 17. However, the level of knowledge of mothers in this age group is still influenced by the education received 18. Meanwhile, respondents aged

35-45 (34%) have an advantage of parenting experience, but are often less exposed to the latest information related to child health 19. Challenge card-based educational interventions were found to be effective in improving understanding in both age groups, although the interactive approach was more acceptable to younger age groups 20. Most mothers have a high school education (50%), followed by college (20%). Formal education is not always directly proportional to children's health knowledge, as factors such as access to information and cultural influences are often barriers (21,22). Game-based educational media and visual aids have been proven to be able to bridge the knowledge gap at various levels of education 6.

As many as 74% of respondents are housewives, while 26% are working. Mother's employment status affects access to information and time to receive education 23. Housewives are more focused on parenting, but often lack evidence-based information 24. In contrast, working mothers have a greater chance of accessing information at work, even though time constraints are an obstacle 25. Knowledge enhancement requires a multidimensional approach, including holistic and relevant training 26.

Mother's knowledge about stunting

Mothers' knowledge about stunting was measured using pre- and post-test questionnaires. The Shapiro-Wilk normality test was performed with a significance of $p = 0.000 \leq \alpha (0.05)$. Statistical analysis with a Wilcoxon signed-rank rating test because the data is not normally distributed.

The findings demonstrate that the use of challenge cards as an educational medium effectively enhanced mothers' understanding of stunting and its prevention. Before the intervention, the low mean score reflected limited knowledge regarding the causes and preventive measures of stunting, which may be due to a lack of engaging educational media or limited access to health information. After the intervention, mothers showed substantial improvement, suggesting that interactive, game-based learning promotes active engagement, peer discussion, and long-term retention of health information.

Table 2. Mother's Level of Knowledge about Stunting
N=50

Knowledge	Mean	Min-Max	Std. Dev	Z	p value
Before Intervention	4.50	0-10	2.452	-	0.000
After the Intervention	9.84	8-10	0.468	5.686	0.000

Table 2 shows a significant improvement in mothers' knowledge after participating in the Challenge Card Game intervention. The mean knowledge score increased from 4.50 (SD = 2.45) before the intervention to 9.84 (SD = 0.47) afterward. The Wilcoxon Signed Rank Test yielded $Z = -5.686$, $p < 0.001$, indicating a statistically significant increase in knowledge levels. The effect size ($r = 0.57$) demonstrates a strong practical impact of the educational game on mothers' understanding of stunting. Significant differences were found in the mother's level of knowledge before and after the intervention (p -value < 0.05). The average level of knowledge increased from 4.50 before the intervention, suggesting that the challenge card game was effective in improving the mother's understanding of stunting. Similar studies have shown that longer intervention durations, such as 6-12 months, produce more significant impacts 27,28. According to another study, knowledge level measurements were carried out through pre-test and post-test with evaluation up to three months after the intervention, showing similar durations to assess effectiveness and knowledge retention 29–31. Research by Butler and Raley, however, shows that evaluations over longer time frames, such as 10 months, provide a more comprehensive picture of knowledge retention and its impact on clinical practice. A combination of measurements over a duration of three months and longer can provide more holistic insights into the effectiveness of educational interventions 32.

In the context of a short study program, the duration of knowledge measurement may be shorter because of the focus on short-term attitude and behavior change 33. Other studies on stunting prevention, however, tend to involve long-term measurements to see the impact of maternal knowledge on feeding behaviors and child growth 34,35. Previous studies on stunting prevention typically adopt medium to long-term

measurement timelines, ranging from three to six months to evaluate the retention of maternal knowledge and its influence on feeding practices and child growth outcomes. The knowledge gained during the intervention persists and leads to measurable behavioral changes in areas such as complementary feeding, hygiene practices, and utilization of *posyandu* services. Other studies also highlight the importance of maternal education in stunting prevention, although the duration of knowledge measurement in these studies may differ 36.

The short duration in this study still gave positive results because of the interactive and interesting delivery method. This approach allows mothers to understand the material in a way that is fun and relevant to their needs 37. This indicates that the effectiveness of education is not only determined by the duration, but also by the innovative delivery methods.

This study has several limitations. The one-group pretest–posttest design without a control group limits causal interpretation, as external factors may have influenced the results. The short follow-up period also restricts conclusions about long-term behavioral change, and the use of self-reported questionnaires may introduce social desirability bias. The findings provide valuable insights for practice. Community health workers and policymakers can utilize interactive, game-based educational methods to enhance maternal knowledge and engagement in stunting prevention programs may strengthen health promotion efforts, especially in rural or resource-limited settings.

CONCLUSION

Knowledge about stunting is very important for parents, especially mothers. Efforts to increase knowledge about stunting can be carried out through health education using challenge card media. Health education using the media card challenge can significantly increase mothers' knowledge about stunting. Media card challenge can be an alternative health education to increase mothers' knowledge about stunting. Recommendations for researchers are further suggested to conduct interventions and education over a longer period of time, combining several other health education media and

expanding their targets such as pregnant women and parents-to-be.

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