Jurnal
Berita Ilmu Keperawatan

Jurnal Berita Ilmu Keperawatan
Vol. 18 (1), 2025
p-ISSN: 1979-2697
e-ISSN: 2721-1797
https://doi.org/10.23917/bik.v18i1.7721

e-Nutrilla Education Model Based on Local Food Ingredients Improves Maternal Feeding Behavior and Mothers' Self-Efficacy to Prevent Stunting

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Abstract : *Stunting poses a significant threat to the future Indonesia. The target of a 14% reduction in stunting has not yet been achieved. However, the 2022 Indonesian Nutrition Status Survey (SSGI) highlights the need for local food ingredients in preparing nutrition for stunting prevention. Utilizing locally available food sources serves as an alternative solution to ensure that children's nutritional needs are met easily and affordably. Education incorporating local wisdom is crucial for stunting prevention. To evaluate the effectiveness of education using the e-Nutrilla model as a method to improve children's growth status, maternal feeding behavior, and maternal self-efficacy in providing complementary feeding (MPASI). The research design used was a one-group pretest-posttest without control. The population consisted of all mothers with children aged 12–59 months, with a sample size of 36 mothers. The statistical test applied was the Wilcoxon test. All respondents experienced an improvement in maternal feeding behavior categories from pre-test to post-test, with a Mean Rank of 18.50. The mean difference in maternal self-efficacy before and after education was 0.5, with an Asymp Sig. (2-tailed) value of 0.004. Before the intervention, 6 children (16.7%) showed no growth improvement, which decreased to 3 children (8.3%) after the intervention, with an Asymp Sig. (2-tailed) value of 0.257. The e-Nutrilla education model has a positive effect on maternal feeding behavior and maternal self-efficacy but does not significantly impact children's growth status.*

Keywords: *feeding behavior, food ingredient, local nutrition, self-efficacy, stunting*

Submitted: 18 December 2024, revised: 15 January 2025, accepted: 16 January 2025, published: 30 January 2025

INTRODUCTION

Golden Indonesia 2045 will be achieved if human resources grow and develop to their maximum potential. Currently, the primary nutritional issue for infants and children is stunting. Stunting poses a significant obstacle to the development of human resources in Indonesia. It is a condition of growth failure in children under five caused by chronic malnutrition. Stunted children grow shorter than the standard height for their age and experience delayed brain development. Stunting affects brain growth and development and increases the risk of chronic diseases in adulthood. According to the Ministry of National Development Planning (Kementerian PPN/ Bappenas, 2018), stunting and malnutrition are estimated to reduce the *Gross Domestic Product* (GDP) by 2-3% annually. Stunting disrupts human potential and is closely related to health levels.

Globally, the World Health Organization (WHO) reported that 148.1 million children under five, or 22.3%, experienced stunting in 2022 (WHO, 2023). In Indonesia, the prevalence of stunted children in

2022 was 4,558,899 children, or 21.6%, which marked a decrease compared to 24.4% in 2021 (Kemenkes, 2022). However, the current target of reducing stunting to 14% Kemenkes (2022) has not been achieved

In Yogyakarta, the SSGI reported a stunting rate of 16.4%. Gunung Kidul district had the highest prevalence in Yogyakarta, at 23.5% (Kemenkes, 2022). Data from the Gunung Kidul Health Office in 2017 showed that among 30 community health centers, the three with the highest cases of stunting in children aged 0-59 months were Saptosari (30.11%), Ponjong I (27.41%), and Semin I (23.74%)(Amalia, Lubis and Khoeriyah, 2021).

Child stunting in Indonesia is linked to determinants such as male gender, premature birth, short birth length, non-exclusive breastfeeding during the first six months, short maternal height, low maternal education, low household socio-economic status, poor sanitation (e.g., unimproved latrines and untreated water), limited healthcare access, and rural residence (Beal *et al.*, 2018). Other factors include nutrition-related parenting practice, health history, and physical and psychological environmental conditions (Nova & Afriyanti, 2018). The primary cause of stunting is inadequate nutritional intake (Nova & Afriyanti, 2018). Mothers play a crucial role in providing complementary feeding (MPASI) to prevent malnutrition that causes stunting (Nova & Afriyanti, 2018). Manan & Lubis (2022) found that increased stunted children correlate with poor maternal feeding behavior. Maternal knowledge can influence maternal self-efficacy in providing which also contributes to preventing stunting. Research conducted by Rezki et al (2023) showed the influence of expertise on mothers' self-efficacy in providing complementary feeding to prevent stunted

Maternal feeding behavior refers to actions by mothers to ensure sufficient nutritional intake for their children(Amalia, Lubis and Khoeriyah, 2021). However, many practices in maternal feeding behavior are still incorrect, such as offering fast food to children, allowing children to consume instant noodles instead of rice, giving sweet foods as rewards, and using gadgets to encourage eating (Wati, Kartini and Rahfiludin, 2021). A preliminary study conducted in Gunung Kidul found that out of 58 children aged 0-59 months, 4 were stunted. Interviews with two mothers revealed errors in feeding practices, such as giving instant noodles twice a week, allowing children over one year old to consume MSG-containing foods, providing tea as an alternative to milk, and using YouTube on gadgets to encourage eating. The mothers lacked confidence in their ability to provide proper nutrition for their children.

Nutritional intake issues are significant cause of stunting in Indonesia. Thus, food security, including the availability, affordability, and accessibility of nutritious food, must be prioritized for stunting prevention. Utilizing local food resources is essential for providing affordable and healthy food. Local food sources are not only more accessible but also cost-effective (Sutyawan, Novidiyanto and Wicaksono, 2022). The National Population and Family Planning Board (BKKBN) recommends implementing family nutrition kitchens based on local food resources as part of national strategies to reduce stunting (BKKBN, 2021). Gunung Kidul's geographic conditions, with its southern border along the Indian Ocean, provide abundant marine biodiversity. The Bulurejo hamlet in the Saptosari district has potential local food resources such as tubers (cassava and sweet potatoes), legumes (mung beans, soybeans, and peanuts), and corn (Wahyu *et al.*, 2021).

One strategy to prevent stunting is through education. Health education is a form of health promotion aimed at facilitating behavioral changes. Casnuri (2022) found that nutrition education improved feeding practices for young children. Kemenkes (2021) highlights that effective communication for stunting prevention includes group counseling and identifying local assets to address the root causes of stunting.

Social media-based counseling and education on stunting prevention have been proven effective in improving MPASI feeding behavior (Sari, Prawesti and Febrianti, 2021). The e-Nutrilla model is designed as an innovative, locally wisdom-based education tool to prevent stunting. This study aims to evaluate the effectiveness of the e-Nutrilla education model in improving child growth status, maternal feeding behavior, and maternal self-efficacy in providing complementary feeding (MPASI) as a stunting prevention strategy.

METHODS

The studied was a quantitative study with a quasi-experimental research method. The research design employed was a one-group pretest-posttest without control. The studied was conducted in September 2024 in a hamlet in Saptosari, Gunungkidul, Yogyakarta, Indonesia. That hamlet was chosen because the stunting rate was high in the last year in that area The population study consisted of all mothers with children aged 12-59 months, at the age of 12 months, the child starts eating family meals. The sampling technique used was purposive sampling. Inclusion criteria: Mothers with children aged 12-59 months; able to read, willing to participate as respondents, owning a mobile phone capable of accessing images and videos, having the WhatsApp application. Exclusion criteria: mothers with severe sensory perception disorders (hearing and vision) and mothers with disabled children. The total sample for this study was 36 respondents.

The dependent variables in this study were child growth status, maternal feeding behavior, and mothers' self-efficacy in providing complementary feeding (MPASI). Statistical analysis was performed using the Wilcoxon test. The e-Nutrilla education model based on local food provides health information to mothers about stunting and MPASI. The e-Nutrilla education model includes:

1. Stunting education with the lecture method.
2. MPASI preparation education using local food ingredients from Gunungkidul, such as cassava and marine fish.
3. Mentoring through social media.The social media used was a WhatsApp group, and monitoring was conducted every day for 14 days.

The study assessed child growth status, maternal feeding behavior, and mothers' self-efficacy in providing MPASI. Child growth status refers to the developmental status recorded in the child's KMS (Child Health Card), categorized as either "increased" (N) or "not increased" (T). The indicator used was weight increment. Measurement tools for growth status included standardized digital scales. Maternal feeding behavior refers to the actions of mothers in providing nutrition to their children, including offering balanced, healthy, and safe meals; promoting good eating habits; and creating a positive eating environment. This was measured using the Maternal Feeding Behavior Questionnaire (MFBQ), which was modified by the researcher. The Maternal Feeding Behavior Questionnaire consists of 18 statements using a Likert scale of 1-5, containing favorable statements with response options of Always (5), Often (4), Sometimes (3), Rarely (2), and Never (1). The results of the questionnaire are classified into three categories: good, sufficient, and poor behavior. Validity testing yielded a correlation coefficient range of 0.444–0.725, and reliability testing showed a reliability score of 0.886. Mothers' self-efficacy in providing MPASI refers to their confidence in giving complementary feeding to their children. This was measured using the General Self-Efficacy Questionnaire, consisting of 10 items with four response options: "very untrue (1), untrue (2), true (3), very true (4). The validity questionnaire demonstrated with a correlation coefficient of 0.444 and validity values ranging from 0.459 to 0.672. Reliability testing showed a Cronbach's alpha value of 0.923, as reported by Dolina (2020).

Data Analysis: Univariate analysis: Frequency distribution was calculated to describe respondent characteristics, including age, education, and occupation. Child characteristics, such as gender and age, were also analyzed. Categorical data variables were presented in the form of frequencies and percentages. Bivariate analysis: The Wilcoxon test was used for data analysis because the data is ordinal.

The study adhered to ethical research standards and obtained Ethical Clearance from the Health Research Ethics Committee (KEPK) of STIKES Bethesda Yakkum Yogyakarta. The ethical clearance certificate number is No. 155/KEPK.02.01/X/2024.

RESULTS

This research was conducted in September 2024 in one of the villages in the Saptosari area, Gunung Kidul. The steps of this research were illustrated in the scheme at Figure 1:

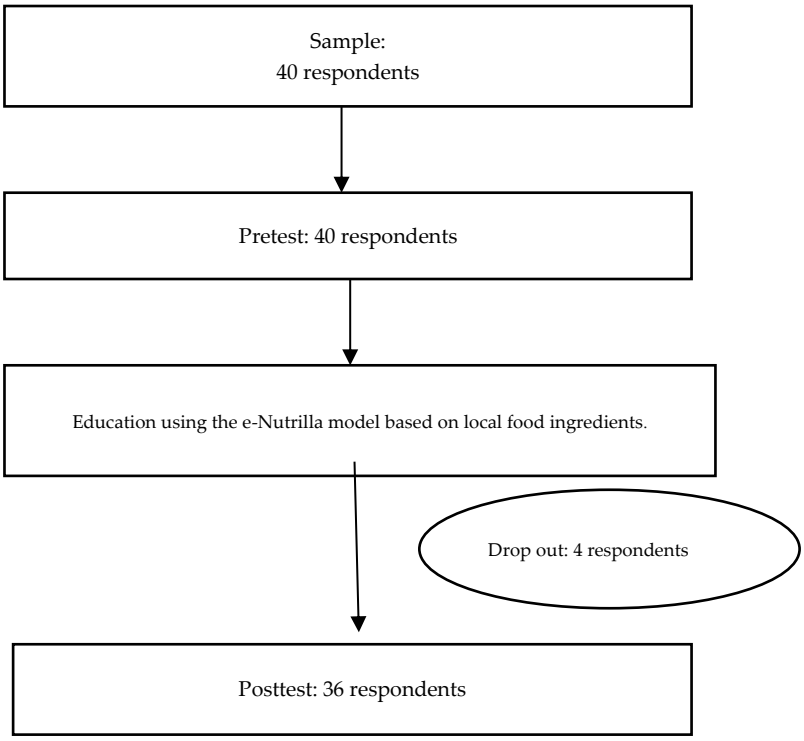

Figure 1 The Research Steps

Table 1. Frequency Distribution of Respondent Characteristics (N=36)

Characteristics	Category	Frequency (N)	Percentage(%)
Mother's Age	Early Adulthood (18-40 years)	33	91.7
	Middle Adulthood (41-60 years)	3	8.3
	Total	36	100
Employment	Not Working	31	86.1
	Working	5	13.9
	Total	36	100
Education	Primary	24	66.7
	Secondary	10	27.8
	Higher	2	5.6
	Total	36	100

Table 1 shows that out of thirty six respondents, the majority were in early adulthood (91.7%), most were not working (86.1%), and the majority have been a basic education (elementary and junior high school), which accounts for 66.7%.

Table 2. Frequency Distribution of Respondent Characteristics (N=36)

Characteristic	Category	Frequency (N)	Percentage (%)
Gender	Male	19	52.8
	Female	17	4.2
	Total	36	100
Toddler's Age	*Toddler*	22	61.1
	Early Childhood	14	38.9
	Total	36	100

Table 2 shows that out of 36 respondents, the majority of the children are male (52.8%) and most are toddlers (61.1%).

Table 3. Frequency Distribution of Maternal Feeding Behavior

No.	Maternal Feeding Behavior Before e-Nutrilla			Maternal Feeding Behavior After e-Nutrilla			*Mean rank*	*Asymp Sig.*
		n	%		n	%		
1.	Good	0	0	Good	20	55.6	18.50	0.001
2.	Sufficient	12	33.3	Sufficient	16	44.4		
3.	Poor	24	66.7	Poor	0	0		
	Total	36	100		36	100		

Table 3 shows that before the intervention, the majority had poor maternal feeding behavior (66.7%), and after receiving the e-Nutrilla intervention, none had poor maternal feeding behavior. Out of thirty six respondents, all experienced an improvement in maternal feeding behavior categories from pre-test to post-test. Cut-off categories: good behavior: 66-90; sufficient behavior: 42-65; poor behavior: 18-41. The mean rank, or the average improvement, was 18.50. The asymp sig. (2-tailed) value was 0.000. Since this value is <0.05, the conclusion is that there is an effect of education using e-Nutrilla on maternal feeding behavior.

Table 4. Frequency Distribution of Maternal Self-Efficacy in Providing Nutrition

No.	Maternal Self-Efficacy Before e-Nutrilla			Maternal Self-Efficacy After e-Nutrilla			Rank Difference	*Asymp Sig.*
		n	%		n	%		
1.	High	5	13.9	High	12	33.3	0.5	0.004
2.	Moderate	18	50.0	Moderate	22	61.1		
3.	Low	13	36.1	Low	2	5.6		
	Total	36	100		36	100		

Table 4 shows that before the intervention, there were 13 mothers (36.1%) with low self-efficacy, and after receiving the e-Nutrilla intervention, only two mothers (5.6%) had low self-efficacy. The mean difference between the pre-test and post-test results was 0.5. Cut-off categories: high: 30-39; moderate: 20-29; low: 10-19. The Asymp Sig. (2-tailed) result was 0.004. Since this value is <0.05, the conclusion is that there is an effect of education using e-Nutrilla on maternal self-efficacy in providing nutrition.

Table 5. Frequency Distribution of Child Growth Status

No	Child Growth Status Before e-Nutrilla			Child Growth Status After e-Nutrilla			*Asymp Sig.*
		n	%		n	%	
1	Increased (N)	30	83.3	Increased (N)	33	91.7	0.257
2	Not Increased (NT)	6	16.7	Not Increased (NT)	3	8.3	
Total		36	100		36	100	

Table 5 shows that before the intervention, there were 6 children (16.7%) whose growth status did not improve, and after the intervention, this number decreased to 3 children (8.3%). The Asymp Sig. (2-tailed) result was 0.257. Since this value is >0.05, the conclusion is that there is no effect of education using e-Nutrilla on child growth status.

DISCUSSION

Based on the research findings, the p-value for maternal feeding behavior is 0.000, indicating that education using e-Nutrilla affects maternal feeding behavior. This finding aligns with the study conducted by Wati, Kartini, and Rahfiludin (2021) , which revealed a significant difference in maternal behavior towards feeding stunted toddlers when assisted with booklet media and counseling, with a p-value of 0.001 (<0.05). This is consistent with the study by MY and Wirdana (2023), which demonstrated the influence of health education using local language on maternal feeding behavior. In the current study, was the intervention delivered in local language as well? If so, add the details in Methods section. If not, I do not see the point of why MY and Wirdana's study was brought up as reference

Additionally, the findings align with the study by Hashmi et al. (2019), conducted in refugee areas, where education using *The Healthy Baby Flipbook* improved infant feeding practices as well as water, sanitation, and hygiene (WASH) practices. Counseling and education with social media about stunting prevention have also proven effective in improving complementary feeding behavior (Sari, Prawesti and Febrianti, 2021).

The p-value for maternal self-efficacy in providing nutrition to children is 0.004, indicating that education using e-Nutrilla has an effect on maternal self-efficacy. According to the self-efficacy theory, two key determinants of behavior are perceived self-efficacy and outcome expectancies (Bandura, 1986; Schwarzer & Fuchs, 1996, as cited in (Chen and Chien, 2022) . Self-efficacy refers to an individual's belief in their ability to execute the behaviors necessary to achieve specific performance outcomes, while outcome expectancy denotes beliefs that specific actions will lead to desired outcomes with particular significance (Bandura, 1997, as cited in Chen and Chien, (2022).

Research by Putri (2023) indicates that most mothers have low self-efficacy regarding the quality and quantity of complementary feeding (55%) and responsive feeding (52%). This finding is consistent with previous studies, which revealed a significant relationship between mothers' knowledge and self-efficacy in providing complementary feeding before and after intervention (Rezky *et al.*, 2023).

This study shows that education using the eNutrila model significantly improves maternal feeding behavior and maternal self-efficacy in providing nutrition to children but does not affect children's growth status. The implications of this study can be utilized by community health centers and health cadres to provide education based on local wisdom.

CONCLUSION

This study shows that education using the eNutrila model significantly improves maternal feeding behavior and maternal self-efficacy in providing nutrition to children but does not affect children's growth status. The implications of this study can be utilized by community health centers and health cadres to provide education based on local wisdom.

ACKNOWLEDGMENT

The authors would like to thank all the mother and cadre who participated in the study, Ministry of Education, Culture, Research, and Technology and Bethesda Yakkum Health Science Institute, Yogyakarta.

AUTHOR CONTRIBUTIONS

Ignasia Yunita Sari (IYS), Nining Indrawati (NI), Mei Rianita Elfrida Sinaga (MRE), Alda Tri Erawati (ATE), Christine Ester Rumbiak (CER).

I.Y.S : supervision, conceptualization, methodology. and final approval of the manuscript. N.I.: data curation, writing. M.R.E: visualization, investigation. A.T.E : data collection, writing. C.E.R.: data collection, writing. All the authors involved in revision and approved the final version of the manuscript

FUNDING STATEMENT

The Directorate of Academic Affairs funded his research for Vocational Higher Education, Ministry of Education, Culture, Research, and Technology

ETHICAL STATEMENT

The study was conducted with a commitment to upholding ethical principles, ensuring patient confidentiality and informed consent at all times. The study adhered to ethical research standards and obtained Ethical Clearance from the Health Research Ethics Committee (KEPK) of Bethesda Yakkum Health Science Institute. The ethical clearance certificate number is No. 155/KEPK.02.01/X/2024, affirming compliance with the required ethical standards for conducting this research.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are not publicly available due to privacy or ethical restrictions. However, they are available from the corresponding author on reasonable request and with permission from Bethesda Yakkum Health Science Institute, Yogyakarta,

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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