


## Development of a Mobile Application-Based Food Parenting Guide Educational Media to Improve Mothers' Knowledge of Balanced Nutrition for Toddlers

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### Abstract

Maternal nutrition literacy is a crucial determinant of toddler nutritional status. The majority of current health applications focus on calorie intake and do not accommodate the essential aspect of food parenting, which is crucial in shaping healthy eating behaviors in children. This study aims to develop an Android educational app called "Food Parenting Guide" and to evaluate its effectiveness in improving mothers' knowledge of balanced nutrition for toddlers. This quasi-experimental study with a one-group pretest-posttest design involved 96 mothers of toddlers in Bengkulu City, selected through purposive sampling. The application was developed using the ADDIE model. Effectiveness was analyzed using the Wilcoxon Signed Rank Test, and the correlation among respondent characteristics was tested using the Chi-Square and Spearman's Rank tests. The results showed a significant increase in the average knowledge score from  $54.27 \pm 12.84$  to  $78.42 \pm 9.16$  ( $p < 0.001$ ). The proportion of "good" knowledge increased significantly from 15.6% to 72.9%. Furthermore, education level, experience in using health applications, and frequency of access were significantly correlated with this increase in knowledge ( $p < 0.05$ ). In conclusion, the "Food Parenting Guide" application was effective in increasing mothers' knowledge of toddler nutrition. This educational media is recommended as a complementary tool for nutrition counseling at Posyandu to support the effectiveness of sustainable maternal and child health promotion programs.


Keywords: Educational media, Food Parenting Guide, Mobile application, Toddler nutrition, Health promotion


Article History : Submit : 16 January 2026 Accepted : 25 February 2026 Publish : 28 February 2026

Doi : <https://doi.org/10.64146/9ctemy69>

### How to cite this article:

Eka Daryati, M. (2026). Development of a Mobile Application-Based Food Parenting Guide Educational Media to Improve Mothers' Knowledge of Balanced Nutrition for Toddlers. Health Smart : Jurnal Kesehatan Masyarakat, 2(1), 75-88. <https://doi.org/10.64146/9ctemy69>

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e-issn: 3110-2131

## INTRODUCTION

Nutrition problems in the toddler population remain a multidimensional public health challenge in Indonesia. Referring to data from the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of stunting in toddlers was recorded at 21.6%, followed by wasting at 7.7%, and obesity at 3.5% (Kementrian Kesehatan RI, 2022). These statistics reflect that the double burden of malnutrition still requires serious attention and comprehensive handling. The first 1,000 days of life (HPK) up to the age of five is a crucial golden age, where the quality of nutritional intake greatly determines the health and growth of children in the future (Black et al., 2013; Prendergast & Humphrey, 2014).

Mothers' knowledge of balanced nutrition is a fundamental variable that influences children's nutritional status. Various literature confirms a positive correlation between mothers' nutritional literacy levels and the quality of feeding practices and children's nutritional status (Abuya et al., 2012). Mothers with adequate nutritional understanding tend to have better capabilities in preparing varied menus with balanced nutrient composition and implementing regular feeding schedules. Conversely, a lack of knowledge often results in maladaptive feeding practices, such as inappropriate timing of complementary feeding, selection of foods that are low in nutrients, and inappropriate meal portions (Dewey & Adu-Afarwuah, 2008).

Transformative nutrition education strategies are essential. Effective education is not merely about transferring information, but must be able to reconstruct mothers' attitudes and behaviors in daily feeding management. The concept of food parenting provides a comprehensive framework for understanding the dynamics of parent-child interactions in the context of eating (Vaughn et al., 2019). The scope of food parenting includes feeding practices, mealtime structure, and the creation of a conducive food environment, which collectively shape children's eating behavior patterns (Vollmer & Baietto, 2017).

Digital transformation, along with the acceleration of mobile technology, opens up new opportunities in health promotion innovation. The high penetration of smartphones in Indonesia creates strategic momentum for developing mobile application-based interventions (Kemp, 2023). Compared to conventional media, mobile applications offer superior modalities in the form of unlimited access regardless of time and place, ease of content updates, interactivity, and the ability to personalize information (Zhao et al., 2016). The validity of this approach is supported by various

international studies that prove the efficacy of mobile applications in improving nutrition knowledge and behavior parameters in various target groups (DiFilippo et al., 2015; Schoeppe et al., 2016).

The development of nutrition education applications tailored to Indonesia's demographic context, with an emphasis on food parenting, remains relatively limited. The majority of applications available on the market are general and do not fully accommodate mothers' specific needs for balanced nutrition for toddlers, in line with local cultural wisdom. Despite the enormous potential of technology, the availability of nutrition education applications specifically designed for the Indonesian context, especially those emphasizing food parenting guidelines, is still very limited. The majority of maternal and child health and nutrition applications currently available on the market tend to be general in nature, focusing solely on tracking growth curves or calculating macronutrient intake, and do not yet accommodate the specific needs of mothers regarding strategies to modify children's eating behaviors (Chen & Lin, 2023). This gap underscores the urgency of developing educational media that is not only clinically and empirically appropriate but also aligned with the challenges of daily parenting.

This study adopts Davis' (1989) The Technology Acceptance Model (TAM) has its theoretical basis, which postulates that technology adoption is influenced by perceived usefulness and perceived ease of use. These two factors are crucial in ensuring the sustainability of health education application use (Venkatesh & Davis, 2000).

Based on this background, this study aims to develop a mobile application-based educational media, "Food Parenting Guide," and to evaluate its effectiveness in improving mothers' knowledge of balanced nutrition for toddlers. This application features comprehensive tools, including interactive learning modules, a nutritional needs calculator, daily menu guides, schedule reminders, and discussion forums. Theoretically, this study is expected to contribute to the scientific knowledge of technology-based health promotion. In practice, the results of this study are expected to provide an innovative educational instrument to accelerate improvements in the nutritional status of toddlers in Indonesia. The hypothesis is that mothers' knowledge will increase significantly after using the "Food Parenting Guide" application.

## **METHOD**

### **Research Design**

This study used a quasi-experimental design with a one-group pretest-posttest approach. This design was chosen because it allows for the evaluation of changes in knowledge in the same group before and after the intervention (Campbell & Stanley, 1963). A quantitative approach was used to objectively and quantitatively measure the intervention's effectiveness.

### **Research Location**

The research was conducted in Bengkulu City from January to April 2024. The location was selected based on demographic considerations, as Bengkulu City has urban characteristics with a high smartphone penetration rate and representative socio-economic variations. Data collection was carried out at five Posyandu (integrated health service posts) spread across three different sub-districts.

### **Research Target**

The research population consisted of all mothers with toddlers aged 6-59 months in Bengkulu City. The sample was determined using purposive sampling with the following inclusion criteria: (1) mothers with toddlers aged 6-59 months, (2) owning an Android-based smartphone, (3) able to operate mobile applications independently, (4) willing to participate during the research period. Exclusion criteria included mothers with limited internet access and toddlers with special health conditions requiring specific diets. Based on the Lemeshow formula calculation with a 95% confidence level and 80% power, the minimum sample size was determined to be 82 respondents. This study involved 96 respondents to anticipate dropouts.

### **Data Collection Techniques and Instrument Development**

The research instruments consisted of: (1) a questionnaire on respondent characteristics, including age, education, occupation, number of children, and experience using health applications; (2) an instrument on balanced nutrition knowledge for toddlers, consisting of 25 multiple-choice questions covering the domains of knowledge about macro nutrients, micro nutrients, balanced nutrition guidelines, food parenting practices, and food safety. The knowledge instrument was developed based on the Indonesian Ministry of Health's Balanced Nutrition Guidelines and related literature, then validated by three nutritionists and one health education expert. The construct validity test using Pearson's correlation showed a calculated  $r$  value between 0.412 and 0.756 ( $>r$  table 0.361), and the Cronbach Alpha reliability test produced a value of 0.847.

The development of the "Food Parenting Guide" application follows the ADDIE Model. The analysis stage includes identifying user needs through Focus Group Discussions with 15 mothers of toddlers and an interview- t with nutrition experts. The design stage includes storyboard preparation, user interface design, and educational content development. The development stage involves programming the Android application using the Flutter framework and validation by media and subject matter experts. The implementation phase involved a limited trial with 20 mothers to obtain user feedback. The evaluation phase included revisions based on feedback and retesting.

**Data Analysis**

Data were collected through a pretest before the intervention, access to the application for 4 weeks, and a posttest after the intervention period. Application usage was monitored through the analytics feature embedded in the application. Data analysis used the Wilcoxon Signed Rank Test to compare pretest and posttest scores because the data were not normally distributed based on the Shapiro-Wilk test. Bivariate analysis used the Chi-Square and Spearman tests to explore the relationship between respondent characteristics and changes in knowledge. The significance level was set at  $\alpha = 0.05$ .

**RESULTS AND DISCUSSION**

**RESULTS**

This study successfully involved 96 respondents who met the criteria and completed the entire research series without any dropouts. Respondent characteristics are presented in Table 1.

Table 1. Respondent Characteristics

Characteristics	f	
Age		
17-25	18	18.8
26-35 years	56	58.3
36-45 years	22	22.9
Education		
Elementary/Junior High School	16	16.7
High School/Vocational School	46	47.9
Higher Education	34	35.4
Occupation		
Housewife	54	56.3
Employed	42	43.7
Number of Children		
1-2 children	70	72.9
≥3 children	26	27.1
Health App Experience		

Yes	66	68.8
No	30	31.2

Table 1 shows that the majority of respondents were in the 26-35 age group (58.3%), had a high school education (47.9%), and were housewives (56.3%). Most respondents had 1-2 children (72.9%), and 68.8% had previous experience using health applications.

Table 2. Comparison of Knowledge Scores Before and After Intervention

Variable	Pretest	Posttest	$\Delta$	p-value
Knowledge Score				
Mean $\pm$ SD	54.27 $\pm$ 12.84	78.42 $\pm$ 9.16	24.15	<0.001*
Median (Min-Max)	53 (28-82)	80 (56-96)	-	

\*Wilcoxon Signed Rank Test; significant at  $\alpha=0.05$

The results of the knowledge score analysis are presented in Table 2. There was a substantial increase in knowledge scores from the pretest to the posttest. The average pretest score was 54.27 (SD=12.84), increasing to 78.42 (SD=9.16) in the posttest. The Wilcoxon test results showed a Z-value of -8.234 with  $p<0.001$ , indicating a statistically significant increase in knowledge.

Table 3. Distribution of Knowledge Categories Before and After Intervention

Knowledge Category	Pretest		Posttest	
	n	%	n	%
Good ( $\geq 76$ )	15	15.6	70	72.9
Fair (56-75)	48	50	22	22.9
Insufficient ( $< 56$ )	33	34.4	4	4.2

The distribution of respondents' knowledge categories before and after the intervention is presented in Table 3. Before the intervention, only 15.6% of respondents had good knowledge. After the intervention, this proportion increased dramatically to 72.9%. Conversely, the proportion of respondents with insufficient knowledge decreased from 34.4% to only 4.2%.

Figure 2. Distribution of Knowledge Categories Before and After Intervention

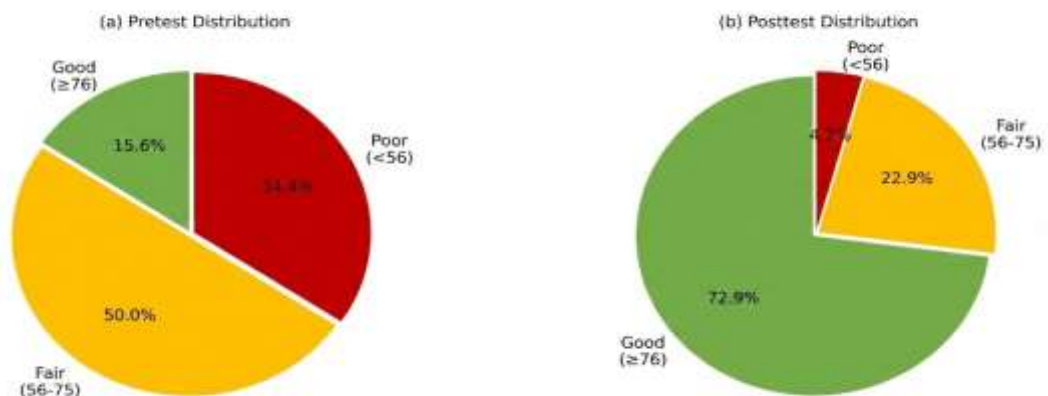


Figure 2. Distribution of Knowledge Categories Before and After Intervention

Table 4. Increase in Knowledge Scores Based on Material Domain

Subject Domain	Pretest	Posttest	Increase (%)
Macronutrients	56.4 ± 14.2	78.2 ± 10.1	21.8
Micronutrients	52.1 ± 15.8	77.4 ± 11.3	25.3
Balanced Nutrition Guidelines	55.8 ± 13.6	78.9 ± 9.8	23
Food Parenting Practices	50.3 ± 16.4	78.9 ± 10.5	28
Food Safety	58.2 ± 12.9	77.6 ± 10.8	19.4

Analysis of knowledge improvement based on subject matter domains shows that the highest improvement occurred in the domain of food parenting practices (28.6%), followed by knowledge of micronutrients (25.3%), balanced nutrition guidelines (23.1%), macronutrients (21.8%), and food safety (19.4%). The complete data are presented in Table 4 and visualized in Figure 1.

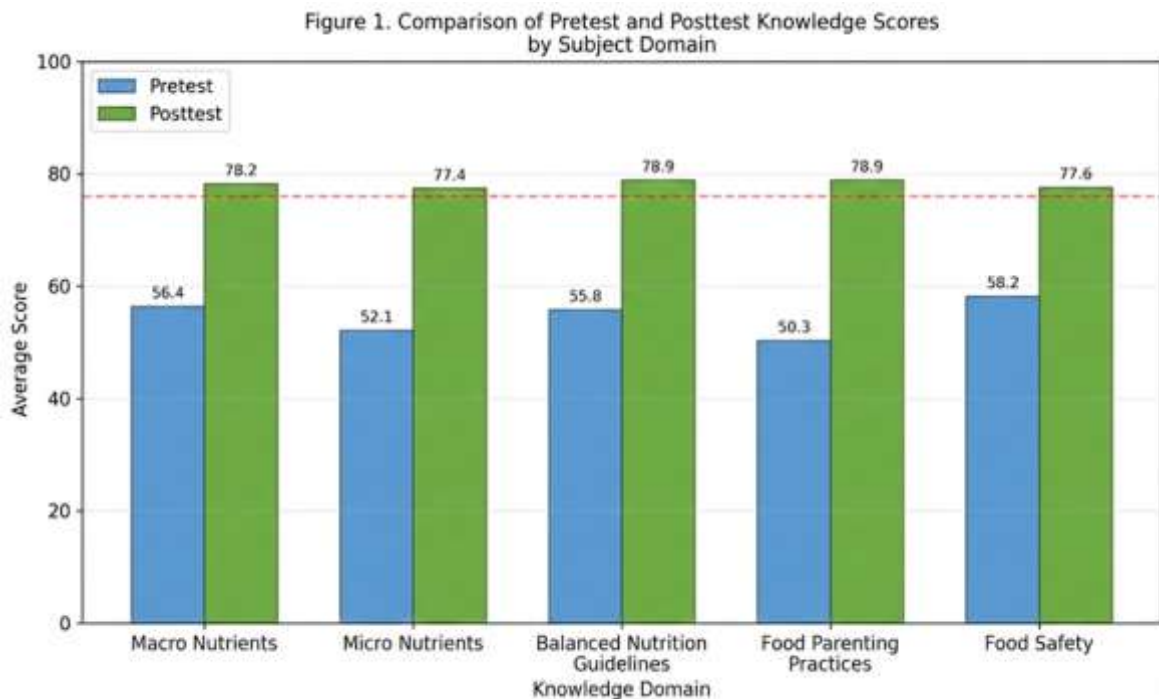


Figure 1. Comparison of Pretest and Posttest Knowledge Scores Based on Subject Matter Domain

Table 5. Usage Patterns of the "Food Parenting Guide" Application

Usage Indicators	Results
Access frequency (times/4 weeks)	18.4 ± 7.2
Duration per session (minutes)	12.3 ± 4.8
Features accessed:	
Interactive Learning Module	86 (89.6%)
Daily Menu Guide	73 (76.0%)

Nutritional Needs Calculator	66 (68.8%)
Discussion Forum	50 (52.1%)

Application usage data shows that the average access frequency was 18.4 times during the four-week intervention period, with an average duration of 12.3 minutes per session. The most frequently accessed feature was the interactive learning module (89.6%), followed by the daily menu guide (76.0%), the nutrition calculator (68.8%), and the discussion forum (52.1%). Table 5 presents complete data on application usage, and Figure 3 illustrates the pattern of feature usage.

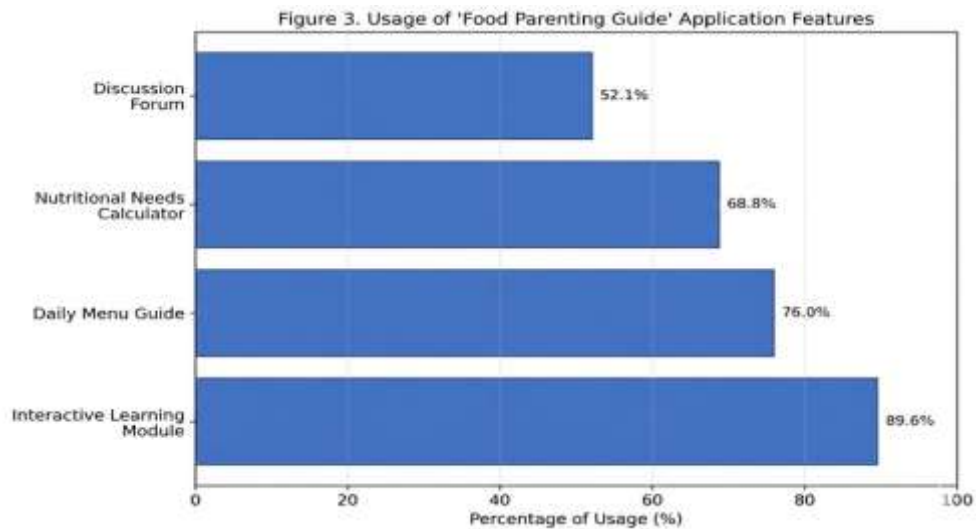


Figure 3. Feature Usage of the "Food Parenting Guide" Application

Table 6. Normality Test

Variable	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test Knowledge	.156	96	.000	.892	96	.000
Posttest Knowledge	.142	96	.003	.915	96	.001

Based on Table 1, the Asymp. Sig. (2-tailed) value for both pretest (0.001) and posttest (0.003) data is < 0.05. This indicates that the knowledge score data are not normally distributed, so hypothesis testing continues using the Wilcoxon Signed Rank Test, a nonparametric test.

Table 7. Differences before and after treatment

	n	Median (min-max)	Mean±s.d.	p
Pre-test knowledge	96	53 (28-82)	54.27±12.8	0.001
Posttest Knowledge	96	80 (56-96)	78.42± 9.16	

Wilcoxon test

Based on the statistical analysis presented in Table 7, the study found a significant increase in mothers' knowledge of balanced nutrition for toddlers after using the "Food Parenting Guide" application. Before the intervention (pretest), the respondents' knowledge scores had a median of 53 (range 28–82) with an average of  $54.27 \pm 12.8$ . After 4 weeks of using the application, posttest knowledge scores showed a significant increase, with a median of 80 (56–96) and an average of  $78.42 \pm 9.16$ .

The Wilcoxon Signed Rank Test confirmed that the difference between the pretest and posttest scores was statistically significant ( $p= 0.001$ ). This finding indicates that the mobile application-based intervention developed in this study was effective in improving mothers' understanding of balanced nutrition principles for toddlers. This improvement is reflected not only in changes in mean scores but also in a shift in the distribution of knowledge categories towards the "good" category, as described in the previous tables.

## DISCUSSION

The results of this study show that the Food Parenting Guide application is effective in improving mothers' knowledge about balanced nutrition for toddlers. The average increase in knowledge scores of 24.15 points (from 54.27 to 78.42) is a clinically and statistically significant achievement. This finding is in line with previous studies that show the potential of mobile applications as an effective health education medium (Schoeppe et al., 2016; Wang & Cheng, 2020).

The novelty of this study lies in revealing the analytical pattern of application-feature usage. Contrary to the general assumption that interactive features and two-way communication are always the main attractions, the data show that the "Interactive Learning Module" (which is self-directed material consumption) is the feature that dominates the access level (89.6%). Conversely, the "Discussion Forum" feature ranks lowest (52.1%). This anomaly indicates that the group of mothers of toddlers in the study area tends to prioritize independent learning and straightforward information consumption over virtual social interaction. Limited time s of domestic childcare, efficiency in finding instant solutions, and the level of Digital Health Literacy are predicted to be the driving factors behind the preference for independent learning. These findings align with the modern digital literacy paradigm, in which users prioritize ease of navigation to specific information nodes relevant to their problems.

The effectiveness of this application can be explained through several mechanisms. First, the interactive learning approach implemented in the application allows users to actively engage in the

learning process, rather than just passively receiving information. This principle is consistent with constructivist theory, which emphasizes the importance of active learner involvement in building understanding (Vygotsky, 1978). Interactive quizzes and menu planning simulations provide opportunities for mothers to apply the knowledge they have gained in contexts relevant to their daily lives.

Second, the accessibility and flexibility offered by mobile applications are distinct advantages. Mothers can access educational materials anytime and anywhere according to their available free time, without being tied to a specific schedule or location. This is particularly relevant given the busy schedules and domestic responsibilities faced by most mothers of toddlers. Research by Dennison et al (2013) also found that accessibility is a key factor in the success of mobile-based interventions in the mother population.

The highest increase in the domain of food parenting practices (28.6%) indicates that educational content on specific feeding strategies is highly needed and effective. This domain includes material on responsive feeding, handling picky eating, and creating a positive eating environment. Vaughn et al (2019) emphasize that understanding proper food parenting practices is an important foundation in shaping healthy eating patterns in children. The results of this study show that mothers have a high interest and need for practical information that can be directly applied in daily parenting.

The finding that education level is significantly associated with increased knowledge is consistent with human capital theory and various previous studies (Grossman, 2006). Mothers with higher education tend to have better literacy and analytical skills, enabling them to understand and integrate health information more effectively. However, it should be noted that mothers with lower education levels also showed a significant increase in knowledge, indicating that the user-friendly design of the application successfully accommodated users with various educational backgrounds.

Previous experience using health applications was also a significant predictor of increased knowledge. This finding can be explained through the concept of self-efficacy in technology use (Compeau & Higgins, 1995). Mothers who were familiar with health applications had higher confidence in exploring the application's features thoroughly. The practical implication of these findings is the importance of including comprehensive tutorials or user guides for less experienced users.

The positive correlation between application usage frequency and knowledge improvement ( $r=0.456$ ) confirms the importance of user engagement in determining the effectiveness of technology-based interventions. These results are in line with the dose-response principle in public health interventions, where the intensity of exposure to the intervention is directly proportional to the magnitude of the impact produced (Durlak & DuPre, 2008). Strategies to increase engagement, such as reminder notifications, gamification, and regular content updates, need to be continuously developed.

This study has several limitations that need to be considered in interpreting the results. First, the one-group pretest-posttest design does not allow for control of confounding factors that may contribute to changes in knowledge. Future research using a randomized controlled trial design will provide stronger evidence of the effectiveness of the intervention. Second, the four-week intervention period may not be sufficient to evaluate long-term knowledge retention and actual behavioral change. Longitudinal studies are needed to understand the impact of the intervention over a longer period of time.

Third, outcome measurements in this study were limited to knowledge aspects and did not cover attitudes, behavioral intentions, and actual feeding practices. In fact, the ultimate goal of nutrition education is behavioral change that contributes to improved nutritional status. Integrating health behavior theories such as the Health Belief Model or Theory of Planned Behavior into the evaluation framework can enrich our understanding of the mechanisms of behavioral change. Fourth, the research sample came from an urban context in Bengkulu City, so generalizing the results to rural populations or other regions needs to be done with caution.

Despite these limitations, this study makes an important contribution both theoretically and practically. The "Food Parenting Guide" application has shown potential as an innovative and effective nutrition education medium. Integrating this application into public health programs, such as the National Family Planning Program ( ) like Posyandu activities or the First 1000 Days of Life program, can expand the reach and increase the effectiveness of existing nutrition interventions.

## CONCLUSION

This study demonstrates that the "Food Parenting Guide" application is effective in improving mothers' knowledge about balanced nutrition for infants. A statistically significant increase in knowledge scores ( $p<0.001$ ) with an average increase of 24.15 points shows that mobile

application-based interventions can be a promising alternative educational medium. Factors such as education, experience using health applications, and intensity of application use are important determinants of intervention success.

Based on the research findings, the following recommendations are made: (1) integration of the "Food Parenting Guide" application into maternal and child health promotion programs in primary health facilities; (2) development of virtual assistance features for users with low digital literacy; (3) further research with a stronger experimental design and evaluation of the impact on toddler behavior and nutritional status; (4) development of an application version for the iOS platform to expand the user reach. With continuous optimization, this application has the potential to become an important instrument in efforts to improve maternal nutrition knowledge and toddler nutritional status in Indonesia.

## REFERENCES

- Abuya, B. A., Ciera, J., & Kimani-Murage, E. (2012). Effect of mother's education on child's nutritional status in the slums of Nairobi. *BMC Pediatrics*, 12(1), 80. <https://doi.org/10.1186/1471-2431-12-80>
- Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, 382, 427–451. [https://doi.org/10.1016/S0140-6736\(13\)60937-X](https://doi.org/10.1016/S0140-6736(13)60937-X)
- Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Houghton Mifflin Company.
- Chen, J. J., & Lin, J. C. (2023). Artificial intelligence as a double-edged sword: Wielding the POWER principles to maximize its positive effects and minimize its negative effects. *Contemporary Issues in Early Childhood*, 25(1), 146–153. <https://doi.org/10.1177/14639491231169813>
- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19(2), 189–211. <https://doi.org/10.2307/249688>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Dennison, L., Morrison, L., Conway, G., & Yardley, L. (2013). Opportunities and challenges for smartphone applications in supporting health behavior change: Qualitative study. *Journal of Medical Internet Research*, 15(4), e86. <https://doi.org/10.2196/jmir.2583>

- Dewey, K. G., & Adu-Afarwuah, S. (2008). Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries. *Maternal & Child Nutrition*, 4(s1), 24–85. <https://doi.org/10.1111/j.1740-8709.2007.00124.x>
- DiFilippo, K. N., Huang, W.-H., Andrade, J. E., & Chapman-Novakofski, K. M. (2015). The use of mobile apps to improve nutrition outcomes: A systematic literature review. *Journal of Telemedicine and Telecare*, 21(5), 243–253. <https://doi.org/10.1177/1357633X15572203>
- Durlak, J. A., & DuPre, E. P. (2008). Implementation matters: A review of research on the influence of implementation on program outcomes and the factors affecting implementation. *American Journal of Community Psychology*, 41(3–4), 327–350. <https://doi.org/10.1007/s10464-008-9165-0>
- Free, C., Phillips, G., Galli, L., Watson, L., Felix, L., Edwards, P., Patel, V., & Haines, A. (2013). The effectiveness of mobile-health technology-based health behavior change or disease management interventions for health care consumers: A systematic review. *PLOS Medicine*, 10(1), e1001362. <https://doi.org/10.1371/journal.pmed.1001362>
- Grossman, M. (2006). Education and nonmarket outcomes. In *Handbook of the economics of education* (Vol. 1, pp. 577–633). Elsevier. [https://doi.org/10.1016/S1574-0692\(06\)01010-5](https://doi.org/10.1016/S1574-0692(06)01010-5)
- Ministry of Health of the Republic of Indonesia. (2022). National Report on the Indonesian Nutrition Status Survey (SSGI) 2022. Ministry of Health of the Republic of Indonesia.
- Kemp, S. (2023). Digital 2023: Indonesia.
- Prendergast, A. J., & Humphrey, J. H. (2014). The stunting syndrome in developing countries. *Paediatrics and International Child Health*, 34(4), 250–265. <https://doi.org/10.1179/2046905514Y.0000000158>
- Schoeppe, S., Alley, S., Van Lippevelde, W., Bray, N. A., Williams, S. L., Duncan, M. J., & Vandelanotte, C. (2016). Efficacy of interventions that use apps to improve diet, physical activity and sedentary behavior: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 13(1), 127. <https://doi.org/10.1186/s12966-016-0454-y>
- Vaughn, A. E., Ward, D. S., Fisher, J. O., Faith, M. S., Hughes, S. O., Kremers, S. P., & Power, T. G. (2019). Fundamental constructs in food parenting practices: A content map to guide future research. *Nutrition Reviews*, 77(2), 97–117. <https://doi.org/10.1093/nutrit/nuy043>
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186–204. <https://doi.org/10.1287/mnsc.46.2.186.11926>

- Vollmer, R. L., & Baietto, J. (2017). Practices and preferences: Exploring the relationships between food-related parenting practices and child food preferences for high fat and/or sugar foods, fruits, and vegetables. *Appetite*, 113, 134–140. <https://doi.org/10.1016/j.appet.2017.02.019>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest*, 158(1S), S65–S71. <https://doi.org/10.1016/j.chest.2020.03.012>
- Zhao, J., Freeman, B., & Li, M. (2016). Can mobile phone apps influence people's health behavior change? An evidence review. *Journal of Medical Internet Research*, 18(11), e287. <https://doi.org/10.2196/jmir.5692>