

ORIGINAL ARTICLE

The Effect of Nutritional Education Through Digital Media on Mothers Behaviour Regarding Nutritional Intake of Under-five Children in Sukadana Village Ciamis Regency

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ABSTRACT

Introduction: Malnutrition among under-five children remain major public health concern in Indonesia. Inadequate feeding practice, low dietary diversity, and low intake of animal source food (ASF) was reported as a determinant factor that contribute to this problem. ASF which contains essential nutrients, is needed for optimal growth and development. However, the level of knowledge and behavior that support ASF intake is still not optimal, even though it has been supported by conventional nutrition education programs. Hence, this study aims to investigate the effect of nutritional education through digital media on parent behaviour regarding ASF intake. **Methods:** This quasi-experimental study, using a pre-posttest design, was conducted on 150 respondents selected through stratified purposive sampling. Nutritional education was provided through digital media, and changes in parental behaviour before and after the intervention were assessed using a questionnaire. The data were analyzed using descriptive statistics and correlational analysis, with a paired t-test to evaluate the intervention effectiveness. **Results:** Nutritional education through digital media significantly improved parents' behavior regarding ASF intake for under-five children ($p = 0.000$), with most parents achieving the good behavior criteria after intervention (84.0%). **Conclusion:** Digital media can be an effective tool to increase parent' understanding and awareness of the importance of ASF intake. Integrating digital media into nutrition promotion programs is essential for personalized education and community engagement in stunting prevention. Future development should address accessibility, digital literacy, and broader public health integration.

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INTRODUCTION

Malnutrition is recognized as a significant public health concern among under-five children, especially in low- and middle-income countries (LMIC) (1). Malnutrition problems are usually characterized by high rates of stunting, wasting, and underweight (2). Although sub-national data for LMIC shows considerable improvement, mortality rates was relatively increased in under-five children due to the undernutrition (3). This

condition also worsens by socio-economic disparities, food insecurity, and increased vulnerability to infection within under-five children (4,5). Indonesia as part of LMIC also faces similar problems, with high rates of stunting (21,5%) as reported by the Ministry of Health of the Republic of Indonesia in 2023 (6). Although various stunting prevention program have been launched, these efforts seems insufficient to reach the WHO standard for stunting prevalence is that it should be less than 20% (7). Considering this problem may have long-term impact on physical and cognitive development, nutritional problems in under-five children remains a priority that needs to be addressed (8).

Nutritional intake is a key component in maintaining

a healthy nutritional status, thereby supporting the growth and development of under-five children (9,10). Adequate intake of essential nutrients such as protein, vitamins, and minerals during pregnancy and the first 1000 days of life, can prevent chronic malnutrition which is the main cause of stunting (11,12). Recent study from Indonesia, inadequate feeding practices, low dietary diversity, and low intake of animal source foods (ASF) was reported as a determinant factor that contribute to child stunting (13,14). Several studies also argue that, low intake of ASF is driven by several factors including socio-economic limitations, insufficient knowledge about nutrition, and cultural factors (15–17). In alignment with the government efforts to reduce socio-economic disparities, families with under-five children need to be encouraged to actively participate in improving nutritional intake through adequate nutritional education (18,19). Despite the importance role of both parent in nurturing their children, mothers are more likely to play an essential role in household affairs especially in improving nutritional intake (20). Improving mothers' knowledge regarding nutritional aspects would have a significant effect on childcare practices and influence food choices (12,21). Therefore, it is important to improve parental knowledge about nutrition to improve ASF intake.

Although many nutritional education programs have been carried out conventionally, such as direct counselling at integrated health posts or other health services, the level of understanding and changes in parent behaviour in fulfilling ASF intake in under-five children is not yet optimal (22). Previous study highlight that low maternal education level and restriction on mothers ability to access vital information regarding under-five children nutritional needs are ultimately affecting their children dietary intake and overall health (23). Improving access to nutritional information for parents with under-five children can be achieved through several strategies. According to previous evidence, utilizing interactive platforms such as mobile apps and websites can engage parent or caregivers to monitor their children's eating habits (24). These platforms also include gamification elements that make learning about nutrition fun, thereby increasing user engagement and information retention (25).

Along with the development of technology, digital media offers great potential in reaching the wider community in effective and efficient manner. According to We Are Social 2023, internet penetration in Indonesia reached 76.8%, with most users are active on social media. This shows that digital media has a potential to reach wide range of users and can be used as an effective educational tool (26). However, research examining the effect of nutritional education through digital media on changes in maternal behaviour, especially in increasing ASF intake among under-five children is still limited (27). In contrast, most previous studies focus more

on nutritional education in general without paying attention to the aspects of the media used and its impact on specific behaviour changes. Therefore, this study is expected to provide new insights into a more effective way to increase mothers' understanding and awareness of the importance of ASF intake for under-five children, and encourage positive behaviour change through digital media.

MATERIALS AND METHODS

Study Design & Setting

This quasi-experimental study was conducted to determine the effectiveness of nutritional education regarding ASF intake by involving 150 participants from Sukadana Village. Sukadana Village is one of the areas in Ciamis Regency, West Java Province, which is reported to face major challenges related to stunting with a stunting prevalence reaching 20.2% in 2022 (28). A stratified purposive sampling technique was used to select at least 50 respondents from three village regions: Sukamaju, Ciilat, and Kedung. The participant criteria for this study included parents, both mothers or fathers, with under-five children, particularly those who have access to digital media and are actively involved in managing their children's nutrition. This sampling method was employed to ensure that each socio-economic group was represented in each region. However, as a non-probability sampling technique, there may be subjectivity and unintended bias in the sample selection process. In addition, the selected samples may not be well-defined or may not fully represent the population. Structured nutritional education on ASF intake in under-five children was delivered to participant using smartphone-based educational video. The main content delivered in this nutrition education session focuses on important dietary guidelines and healthy eating habits regarding ASF intake (such as protein, iron, vitamin B12, and other essential nutrients) for under-five children.

Data Collection

In this study, data collection was conducted using an instrument designed by the researcher consisting of 20 questions item to assess changes in participants' behaviour related to animal source food (ASF) nutrition intake. A structured questionnaire using a Likert scale was developed to measure various dimensions of self-reported nutritional practices among parents with under-five children. All participants completed the questionnaire before the intervention (pre-test) and after the intervention (post-test). This approach facilitated quantitative data analysis, allowing us to evaluate the effectiveness of the intervention by comparing pre- and post-intervention scores to identify significant changes in parent behaviour regarding ASF intake in under-five children.

Data Analysis

Quantitative data obtained from the questionnaires

were analysed using descriptive statistics to describe the distribution frequency of respondents' profiles (age, occupation, education, number of biological children, and family income). In addition, parametric analysis will also be used to measure changes in parents' behaviour before and after the nutritional education intervention was given. The paired sample t-test was used to evaluate significant differences between parents' behaviour before and after nutrition education. This test was chosen because the data obtained were numerical, and the study was conducted on a single group of respondents. Since the data followed a normal distribution, a paired sample t-test was performed to assess behavior changes before and after the intervention.

Ethical Clearance

This research has obtained research ethics permission from The Research Ethics Committee of Faculty Medicine Universitas Sebelas Maret with letter number 192/UN27.06.11/KEP/EC/2024. Researchers ensure that all participants understand the information related to the research and are willing to participate in the research as indicated by a written consent form.

RESULT

Respondent Demographics

Characteristics of the respondent in this study are based on several individual aspect (age, occupation, education, number of biological children, and family income). A total of 150 respondent are participated in the intervention and completed the behavioural assessment related to ASF intake. Most of the respondents are between 25-35 years old (33.3%) and have a senior high school education (50.0%). Respondents are spread across a range of economic statuses, with the majority worked as housewife and had lower family income (48.7%) (See Table I).

Table 1 : Socio-demography of Respondents (N=150)

Characteristics	Total of Respondents	
	N	%
Age of The Respondent		
<25 years old	30	20.0
25-35 years old	50	33.3
35-45 years old	40	26.7
>45 years old	30	20.0
Occupation		
Housewife	73	48.7
Civil Servant	4	2.7
Self-employed	7	4.7
Teacher	8	5.3
Farmer	24	16.0
Merchant	28	18.7
Healthcare workers	6	4.0
Marital Status		
Married	139	92.7
Divorced	11	7.3
Economic Status (Family income)		
< Regional minimum wage*	125	83.3
> Regional minimum wage*	25	16.7
Educational Status		
Elementary School	9	6.0
Junior High School	32	21.3
Senior High School	75	50.0
Diploma	19	12.7
Bachelor	15	10.0
Number of Biological Children		
1	44	29.3
2	30	20.0
3	32	21.3
4	44	29.3
Age of The Child		
<25 month	73	48.7
25-35 month	19	12.7
35-45 month	24	16.0
45-59 month	34	22.7
Child Gender		
Male	77	51.3
Female	73	48.7

*Regional Minimum Wage of Ciamis Regency is Rp2.021.657

Behaviour Changes

In this study, behavior is grouped into three categories, namely good, fair, and poor behavior as shown in Table II. Before the intervention the average score was (Mean (SD)=1.23+0.57) and after the intervention (Mean (SD)=1.94+0.88). There was a two-fold increase in the number of participants who had good behaviour (84.0%) regarding ASF intake after the nutritional education session was conducted (See Table II). The results also suggest that digital media is significantly improving parents' behaviour regarding ASF intake in under-five children (p=0.000) after the intervention was given.

Table II: Comparison in Behaviour Before and After Intervention (N=150)

Category	Comparison of Behavior				Paired t-test (p value)
	Pre-test	%	Post-test	%	
Good	63	42.0	126	84.0	0.000
Fair	33	22.0	13	8.7	
Poor	11	36.0	11	7.3	

DISCUSSION

Poor feeding practices, low dietary diversity, and low intake of animal source foods (ASF) have been reported as key determinant contributing to child stunting and a barrier to stunting prevention programs (13,14,29). Parental knowledge and awareness on child feeding play an important role in supporting good feeding practice (30). According to previous study, improving parent health literacy through structured health education programs is related to healthier eating habits and affects the overall nutritional status of children (31). However, a study conducted by Ainy et al. (2021) highlighted that mothers faced challenges due to limited access to information about healthy feeding practices (32). The use of digital media in delivering nutritional education is a promising solution due to its ability to widely deliver information in creative way (24). Given the limited research on the use of digital media in nutritional education related to ASF intake, this study aims to investigate the effect of nutritional education through digital media on parent behaviour regarding ASF intake in under five children.

This study shows that nutritional education through digital media has been proven as an effective strategy to improve parent knowledge and behaviour on ASF feeding. This is in line with previous research showing that digital media can be a powerful tool to increase mothers' knowledge regarding nutritional practices for their infants (33). According to the Health Belief Model that emphasizes the role of perceived susceptibility and severity in motivating behavioural changes, mothers are more likely to adopt healthier feeding practices when they understand the risks associated with inadequate nutrition (34). Supported by another study, structured health education may lead mothers to have significant improvement in knowledge and behaviours related

to nutrition, as evidenced by increased consumption of diverse and healthy foods for their children (35). Moreover, the better the parental knowledge, the greater the quantity and quality of food provided to toddlers, ensuring that children nutritional intake is adequately met (36). However, short-term interventions are not sufficient to improve the nutritional status of children experiencing stunting (37). Continuing health promotion by providing nutrition training and support are needed to create sustainable framework in reducing stunting rates (38). In this context, the use of digital media is very important to facilitate health promotion and education programs.

Compared to conventional health education which has the advantage of fostering personal relationships and direct support, the use of digital media may offer greater accessibility, interactivity, and personalization in cost-effective manner (39). These advantages may help to overcome the issues related to resource constraints that limit the availability of educational materials and trained personnel, which are common in low- and middle-income countries (LMIC) (35). Integrating digital media into health education program may significantly increase the reach and effectiveness of promoting healthy behaviours among diverse populations (40). Digital media can be an effective tool to engage communities in the planning and implementation of health promotion and education, which can also support the sustainability of these programs (41). According to several study which discusses the application of digital media in nutritional education program, the use of digital media can be effective in improving nutrition-related outcomes both for parents and their children (42,43). Therefore, digital media can be an alternative solution used to increase the scope of information delivery and overcome problems related to distance and resource constraints.

Although digital media offers a promising solution in optimizing health education and promotion programs to reduce stunting, there are several aspects are need to be considered. Study conducted by Labrique et al. (2018) emphasize several critical factors to consider in implementing digital media for health education program including community engagement, user interface design, integration into existing health system, ongoing training and support, and robust monitoring and evaluation (44). In this case, it is important to ensure that recipients of health education also have adequate digital literacy skills to ensure that they could receive health information properly (45). Effective information retention through intuitive interface design can boost user engagement, which is vital for the sustainability of community-based health education programs (41). Consequently, digital media should not be viewed as a standalone solution to existing problems; rather, it should be utilized to enhance the effectiveness of health promotion and education initiatives. Additionally, public health policies should integrate digital media strategies into existing nutrition programs targeting

parents (46). This is also include creating user-friendly mobile applications that provide personalized nutrition information, utilizing social media for community engagement and peer support, and establishing regular monitoring and feedback systems to evaluate the effectiveness of these interventions (25).

The role of digital media in improving parents understanding of nutritional intake for children under five carries important implications for public health policies focused on reducing malnutrition and stunting. This approach not only provides immediate access to essential nutritional information but also promotes ongoing engagement through interactive content and community support (47).

CONCLUSION

Nutritional education through digital media is proven to be effective in improving parents' behaviour related to fulfilling ASF intake in children under five. This study shows that digital media can be a powerful tool to deliver relevant nutrition information and encourage positive behaviour change. The results of this study were supported by statistical analysis that showed significant differences in parents' behaviour before and after the nutritional education intervention. Continuing nutrition promotion programs integrated with the use of digital media is necessary to provide personalized information on nutrition and engage the community in stunting prevention program. The future development of education programs should address several challenges, including limited access to digital media and differences in digital literacy. Further research is needed to explore the impact of digital media on other aspects of nutritional behavior and how these strategies can be integrated into broader public health programs.

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This study has several limitations in its research methodology. As a result, the generalizability of the findings is limited due to its single-center design, inadequate sample size, and use of a purposive sampling technique. In this study, randomization of participants was not performed and the intervention was not assigned to two different groups such as intervention and control groups. Thus, it is difficult to establish causality between the intervention and the observed effects with certainty due to the presence of confounding factors that are not adequately measured. Moreover, our evaluation was limited to the cognitive aspects of respondents through pre- and post-tests. The author would like to express their utmost gratitude to the Faculty of Medicine, Sebelas Maret State University, which has facilitated and supervised the process of study to completion.

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