Review Article

Preventing Stunting Through Digital Family Empowerment: A Thematic Literature Review

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Abstract

Aims: The increasing prevalence of stunting and its associated morbidities highlight the need for effective prevention measures. Digital-based family empowerment interventions have been identified as a promising approach to prevent stunting. This study aims to investigate various types of digital-based family empowerment interventions in preventing stunting and optimizing child growth.

Method: It is a thematic literature review using a semi-structured search approach with predefined keywords in four major databases, namely Scopus, PubMed, ProQuest, and Google Scholar. The research applies a systematic research method with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and sets search boundaries using the PICO (Population/Problem, Intervention, Comparison, Outcome) approach. Three search criteria include digital-based family empowerment interventions for stunting prevention, articles published within the last five years, and written in English or Indonesian.

Result: From the search, nine articles were selected, forming three main themes: (1) digital-based child growth and development monitoring programs in preventing stunting; (2) digital-based health education programs for stunting prevention; and (3) digital-based nutrition counseling programs in preventing stunting.

Conclusion: Digital-based family empowerment interventions have proven to be effective in stunting prevention efforts. With a better understanding of these interventions, it is hoped that knowledge and skills in preventing stunting and optimizing child growth can be enhanced. The role of nurses can be pivotal in integrating technology into family education.

Keywords:
Digital technology, family empowerment, stunting prevention

INTRODUCTION

Stunting is a condition of growth and development impairment in children that has significant prevalence both globally and in Indonesia (1). Data from the World Health Organization (WHO) indicate that in 2020, approximately 149.2 million children under the age of five (around 22% of the total population) experienced stunting (2). Even more concerning, the majority of stunting cases (98%) occurred in low and middle-income countries, including Indonesia (3). Although there has been a national decline of 1.6% per year in the prevalence of stunting in Indonesia according to the Indonesian Study of Nutritional Status (SSGI) report for 2021,

the rate has not yet reached the target set in the National Medium-Term Development Plan (RPJMN) for the years 2020-2024, which aims for 14% (4). The successful implementation of government policies in reducing stunting requires further efforts.

Stunting can have serious consequences on children, including brain development disorders, cognitive impairment, physical growth disturbances, metabolic disorders in the body, decreased cognitive abilities and learning achievements, and reduced resistance to diseases. Children experiencing stunting are also at high risk of developing diabetes, obesity, heart and vascular function disorders, cancer, stroke, and disabilities in later life stages (5). Empowering families plays a crucial role in preventing stunting in children (6). Family empowerment is a concept described in various theories, one of which is the Family Health Nursing (FCN) Theory developed by Marilyn M. Friedman, emphasizing holistic family care and health promotion (7). Through family empowerment, healthcare professionals can gather information about family history, interaction patterns, involvement in healthcare services, and other factors influencing family health.

Previous studies have shown that family empowerment-based interventions have a significant impact on stunting prevention (8). Family involvement also has a positive influence on optimizing nutrition in children (9–11). However, there are obstacles to family involvement in ensuring proper nutrition for children, such as limited knowledge, awareness, and access to healthcare services related to stunting prevention (12–14). To overcome these barriers and enhance optimal access to healthcare, digital-based innovations offer promising solutions.

The utilization of digital technology in healthcare services allows for easy monitoring of health records and efficient management of health conditions (15). This enables early preventive actions, including stunting prevention, to be implemented more swiftly. Digital-based healthcare services have the potential to enhance the efficiency of healthcare systems and overall public health (16,17). While there have been numerous literature reviews on interventions for stunting prevention through public health approaches (18–20), most of these studies have focused on conventional, offline interventions. Therefore, this research aims to investigate various types of digital-based family empowerment interventions in stunting prevention and optimizing child growth. Consequently, this study is expected to make a significant contribution to more effective and sustainable stunting prevention efforts.

METHODS

This research is a literature study in the form of a traditional review that analyzes relevant articles obtained through a semi-structured thematic search (21–23). The thematic analysis approach is used to formulate the identification results from the literature collection, considering the main issues from the study findings, as well as identifying similarities and unique characteristics of the analyzed articles (24). The author used keywords based on Mesh (Medical Subject Headings) to enhance the accuracy and relevance of the literature search. The article search involved four academic databases, including Scopus, PubMed, ProQuest, and Google Scholar.

The author conducted a quality assessment of the articles using the Critical Appraisal Skills Programme (CASP) assessment tool. Overall, all the articles received a high-quality rating in terms of validity. Three criteria were set to search for articles, including (a) articles discussing digital family empowerment interventions in preventing stunting; (b) articles published within the last five years, between 2018 and 2023; and (c) articles written in English or Indonesian.

In addition to the inclusion criteria mentioned earlier, the author also

established several exclusion criteria to ensure that the selected articles align with the research objectives and focus. Firstly, articles that are not directly related to the research topic, which is digital family empowerment interventions in stunting prevention, will be excluded. This is to ensure that the selected articles are truly relevant and supportive of the research focus. Secondly, articles published before the last five years, i.e., before 2018, will not be included in this research. By limiting the publication timeframe, the author aims to ensure that the information used in this study is up-to-date and current. Furthermore, this research will focus on articles written in English or Indonesian. Articles in other languages will be excluded to ensure a better understanding of the selected articles' content.

The selection of countries was not predetermined because the author intended to explore various innovative family empowerment interventions that could serve as a basis for developing digital family empowerment services in preventing stunting in Indonesia. The author set the article search boundaries using the PICO (Population/Problem, Intervention, Comparison, Outcome) approach to select relevant articles accurately (25).

Table 1. Limitations of PICO in written works

Variable	Information	Keywords
Population	Families with children aged 0-60 months	Family OR Parents OR Mothers OR Fathers OR Caregiver
Intervention	Variety of digital-based family empowerment interventions	Familiy Emporwement Intervention OR Nutrional Counceling OR Growth Monitoring OR Health Education OR AND Digital Healthcare OR Health Technologies AND Mobile App OR OR Website OR Android-based
Comparison	N/A	N/A
Outcome	Prevention of stunting	Knowledge of Stunting OR Attitude of Stunting OR Practice of Stunting Prevention

This research applied a systematic research method using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline. The PRISMA flow diagram was used to illustrate the article selection process in the literature review, visualizing the number of identified, excluded, and selected articles for inclusion in the study, ensuring transparency and accuracy in the article selection process. The initial stage involved searching for articles from various sources relevant to the research topic based on PICO (Table 1). A total of 36 articles were identified in this search. Next, duplicate articles were removed, resulting in 23 articles remaining. Subsequently, these articles were filtered based on predetermined inclusion criteria. Articles that were irrelevant to the research topic, duplicates, or did not meet the inclusion criteria were excluded from the study, leaving 13 articles. The remaining articles were thoroughly evaluated through abstract and full-text reading to determine their relevance and suitability for the research objectives. From this process, 9 articles were selected for inclusion in the literature review. The PRISMA flow diagram provides a clear visual overview of the number of articles identified, excluded, and selected, ensuring transparency and accuracy in the article selection process (26).
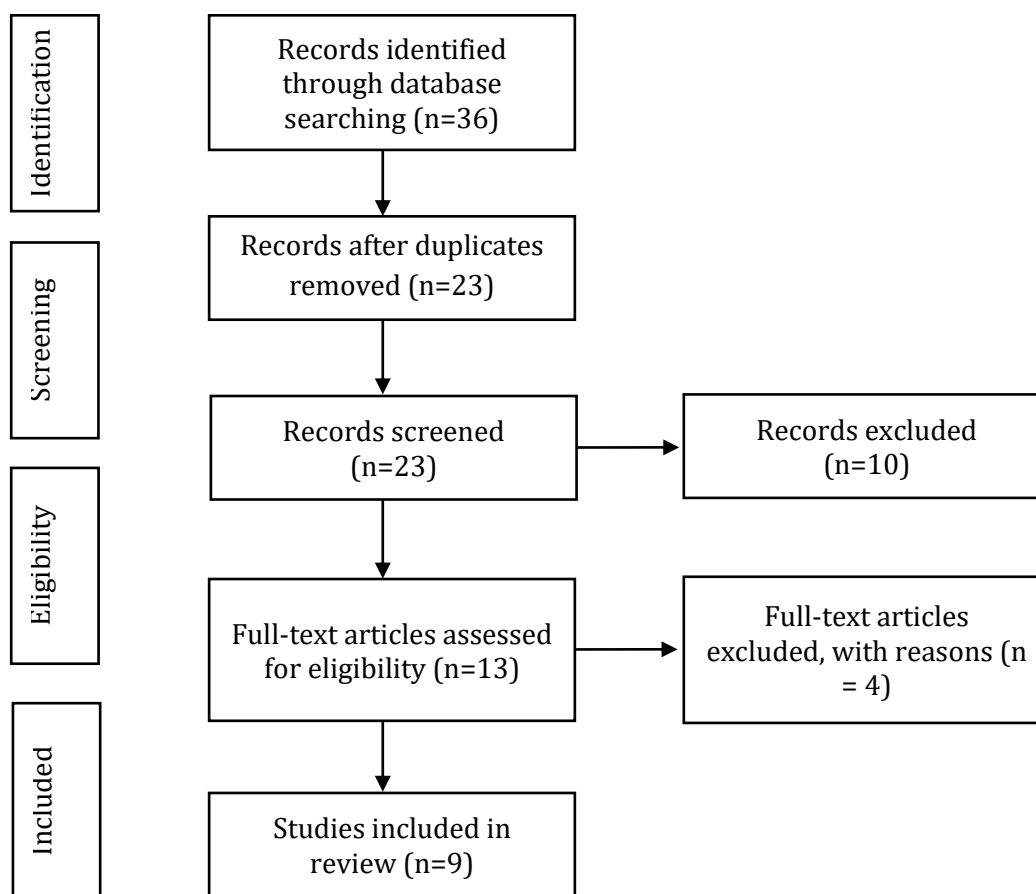
Figure 1. Flow diagram PRISMA

RESULTS

The results of this research identified nine articles that are relevant to the topic and objectives of the study. Through the analysis of these various articles, we revealed three main themes highlighting the central role of family empowerment in efforts to prevent stunting in children (Table 2). The first theme is digital-based child growth and development monitoring programs, demonstrating the importance of using digital technology to monitor and prevent stunting early on. The second theme is digital-based health education programs for stunting prevention, emphasizing the crucial role of health education through digital platforms in increasing family awareness and knowledge about preventing stunting. Meanwhile, the third theme is digital-based nutrition counseling programs, focusing on the need for appropriate nutritional support and information for families to ensure optimal child growth and prevent stunting.

Table 2. List of Articles Relevant to the Purpose of the Written Work.

No	Article Title	Author & Year	Research methods	Research results (Relevant specific results)	Thematic analysis (Update to this Study)
1	Use Of Mobile Application "Balita Sehat" Improves Mother's Knowledge And Attitude In Monitoring Growth And Development	Amaliah, (2018)	Quasi-experimental study	A total of 200 respondents were involved in this research, and after 3 months of intervention, the results showed a significant difference (p value < 0.05) in knowledge and attitudes towards child growth and development monitoring before and after using the Healthy Toddler Application (27)	digital-based child growth and development monitoring programs
2	Pengaruh Penggunaan Aplikasi Stimulasi Tumbuh Kembang terhadap Pengetahuan Ibu dan Pertumbuhan Balita Umur 9 – 24 Bulan	Izah et al., (2018)	Pra experimental study	A total of 40 mothers were involved in this research, which was conducted over four weeks, and the results of the study indicated a significant influence before and after the intervention with a p-value of 0.035 regarding the mothers' knowledge of child growth and development (28).	
3	The Effect Of "Status Gizi Balita" Android Applicattion On mother's knowledge In Nutritional Status Monitoring of Ages 12-24 Months"	Pratiwi & Restanty, (2018)	Pra experimental study	A total of 22 respondents were involved in this study, and the results showed a significant difference in mothers' skills in monitoring nutritional status before and after the implementation of the android-based application "nutritional status of toddlers," with a p-value of 0.000 (29).	
4	The Implementation of "Aplikasi Sahabat Ibu Hamil" on the Quality Improvement of Antenatal care Services in Rural Areas	Farhati et al., (2018)	Quasi-experimental study	A total of 62 respondents were involved in this research, divided into the intervention group and the Control Group. After 3 months of intervention, the results showed a significant difference (p Value < 0.05) before and after the intervention regarding the satisfaction of antenatal care services (30).	digital-based health education programs for stunting prevention
5	The Effect of Health Education with Audio Visual Media on Changes in Mother's	Ginting, (2022)	Quasi-experimental study	A total of 148 respondents were involved in this research. The results of the study showed a significant influence before and after the intervention on	

	Behavior in Stunting Prevention			knowledge, attitudes, and skills (p-value: 0.000) regarding stunting prevention (31).	
6	A Stunting Prevention Application "Nutrimo" (Nutrition Monitoring)	Permana et al., (2021)	Prototyping Development Method	A total of 20 mothers were involved in this research, and the results showed that the application has been designed and can be accessed on the Android Platform. Based on the testing results with all 20 respondents, the Nutrimo application obtained a score above 80%, indicating that the Nutrimo application is user-friendly and informative (32).	
7	The Effectiveness of Web-Based Audiovisual Media Applications in Monitoring Children's Growth to Prevent Stunting	Ernawati et al., (2019)	Quasi-experimental study	A total of 100 respondents participated in this study, divided into intervention and control groups. The intervention was carried out for 3 months, and the results showed a significant influence before and after the intervention on mothers' knowledge about child growth and development (33)	
8	Local Snacks and Virtual Nutrition Counseling Services Increasing Growth of Stunting Children	Nadimin et al., (2021)	Randomised controlled trials	A total of 50 respondents participated in the research, divided into two groups (Intervention and Control). The intervention was carried out for one month, and the results showed an increase in maternal nutrition knowledge scores between before and after the intervention in group one (p = 0.010) (34).	digital-based nutrition counseling programs
9	Shonjibon cash and counselling: a community-based cluster randomised controlled trial to measure the effectiveness of unconditional cash transfers and mobile behaviour change communications to reduce child undernutrition in	Huda et al., (2020)	Randomised controlled trials	A total of 104 random clusters were involved in the study, which were divided into Intervention and Control Groups. Communication for behavioral change in nutrition was conducted through a mobile phone counseling service application called "a mobile phone counselling service (Soi Pushti Sheba)." The counseling sessions were conducted with a frequency of thirty-six sessions every two weeks, lasting for 20 minutes	

rural Bangladesh

each. The results showed a decrease in the number of stunted infants and an improvement in the practice of appropriate Infant and Young Child Feeding (IYCF) practices (35).

DISCUSSION

The aim of this research is to identify digital-based family empowerment programs in stunting prevention. The analysis of various articles yielded three themes, namely (1) digital-based child growth and development monitoring programs in preventing stunting; (2) digital-based health education programs for stunting prevention; and (3) digital-based nutrition counseling programs in preventing stunting.

Digital-based child growth and development monitoring programs in preventing stunting

The theme "Digital-based monitoring program for child growth and development in preventing stunting" is derived from three studies, namely Amaliah, (2018); Izah et al., (2018), dan Pratiwi & Restanty, (2018). This research presents three digital-based applications, namely Healthy Toddler Application, Growth Stimulation Application, and Child Nutrition Status Application. The Healthy Toddler Application helps monitor child growth and development and provides health tips for parents (27). The Growth Stimulation Application assists parents in planning stimulation activities according to the child's developmental stage to optimize their abilities (28). Meanwhile, the Child Nutrition Status Application assesses children's nutritional status based on monitored growth data and provides appropriate nutritional recommendations (29). These three applications support efforts to prevent stunting in children by increasing awareness and healthcare for children through digital technology.

Monitoring child growth and development is defined as a nutritional intervention that measures a child's body weight (BW), enabling appropriate actions to be taken if the child's BW does not increase (36). According to the Indonesian Pediatrician Association (IDAI), the program for monitoring child growth and development aims to involve families or parents to be aware of their child's growth and development, and to detect developmental disorders early, thus increasing the chances of receiving timely and accurate healthcare services while reducing the risk of complications or disabilities (37).

Digital-based health education programs for stunting prevention

The theme "Digital-based health education program for preventing stunting" is formed from four studies, including Farhati et al., (2018); Ginting, (2022); Permana et al., (2021); Ernawati et al., (2019). The synthesized results offer various digital-based health education intervention programs, such as Sahabat Ibu Hamil Application, Health Counseling Application using audiovisual media, Nutrimo (Nutrition Monitoring) Application or nutrition monitoring education; and (4) Health Education using web-based audiovisual media. The Sahabat Ibu Hamil Application is a digital platform that provides information and support for pregnant women, including pregnancy check-up schedules, care tips, and nutrition during pregnancy (30). The Health Counseling Application using audiovisual media facilitates health counseling through online voice or video calls, making it easier to access counseling from healthcare professionals and counselors to address

physical and mental health issues (31). The Nutrimo Application or Nutrition Monitoring Education offers education on healthy eating habits and monitors nutritional intake, promoting awareness of the importance of proper nutrition for health (32). The Health Education using web-based audiovisual media is a digital educational platform that delivers health content through videos, audios, and texts, aiming to enhance public knowledge and awareness of healthy lifestyles and proper health practices (33).

Health education is defined as a crucial component of health promotion involving the delivery of information and increasing awareness to enhance individuals' or communities' understanding of factors influencing health status and promoting healthy behaviors (38). In fact, health education implementation can not only be done face-to-face but also in a digital-based manner. Digital technology has introduced new tools to advance public health and overcome various access and cost challenges (39). The use of digital media and products for health promotion has exponentially grown in the last two decades (40). Digital technology has become an effective tool for disseminating health information to the public, including in stunting prevention health education programs.

Digital-based nutrition counseling programs in preventing stunting

The theme "Digital-based nutrition counseling program in preventing stunting" is based on two studies, namely Nadimin et al., (2021) dan Huda et al., (2020). Examples of digital-based nutrition counseling interventions from the study synthesis include virtual nutrition counseling and mobile applications for nutrition counseling. Virtual Nutrition Counseling is an online nutrition counseling service conducted through digital platforms, where participants can communicate with nutritionists or counselors via audiovisual media or real-time chat without physical meetings (34). This service provides guidance on healthy eating patterns, weight management, handling specific health conditions, and meeting specific nutritional needs. Mobile Application for Nutrition Counseling is a technology-based solution that provides nutrition counseling services through mobile applications, allowing users to access nutrition information, evaluate eating patterns, receive recommendations and nutritional status analysis, and get personalized diet programs according to individual needs (35). The use of this application enables users to easily manage their nutritional health, monitor nutritional development, and receive guidance from nutrition experts without the need for direct meetings, providing flexibility and convenience in managing their nutrition effectively.

Studies state that nutrition counseling is a process where a healthcare professional assists individuals in making healthy food choices to form healthy eating habits (41). The digital-based nutrition counseling program is an innovative approach effective in preventing stunting in children. In this context, nutrition counseling involves providing information, guidance, and support to individuals or families in adopting healthy eating patterns and meeting the optimal nutritional needs of children. By utilizing digital technology as a means of communication, the digital-based nutrition counseling program offers several advantages that can enhance the effectiveness of stunting prevention, including increasing knowledge of healthy nutrition and encouraging more appropriate changes in providing healthy nutrition (42). The digital-based nutrition counseling program holds promise in preventing stunting by increasing nutritional knowledge, improving eating behaviors, and providing personalized support. Leveraging digital technology, this program can reach a broader audience, provide relevant information, and monitor child growth and development more efficiently.

CONCLUSION

Digital-based family empowerment programs can be implemented through three types of interventions, namely child growth and development monitoring programs, health education programs to prevent stunting, and nutrition counseling programs. All of these interventions have been proven effective in improving families' knowledge, attitudes, and skills in preventing stunting. The author suggests that the implementation of these digital-based family empowerment programs should be designed to encourage active family participation by providing interactive content, such as quizzes or games involving family members, online discussions, or community forums.

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Declaration Of Potential Conflicts Of Interest

All authors declare that they have no conflict of interest.

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