

STUNTING PREVENTION APPLICATION IN HEALTH SERVICES: A SCOPING REVIEW

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Abstract

Introduction: The increasing incidence of stunting has the potential to have an impact on morbidity and mortality associated with stunting, so further efforts are needed for prevention, and early treatment of stunted children. **Objective:** To map the types of applications used to prevent stunting. **Design:** A scoping review **Methods:** We reviewed the study empirically by following the 5-stage Arkey and O'Malley scoping review framework. The databases used in this study are *PubMed*, *ScienceDirect*, *ProQuest*, *Wiley Online Library*, and *Garuda* from 2020-2023. **Results:** We identified 880,468 relevant articles from literature searches (we took 701 articles from Pubmed; 655,732 from Science direct; 182,532 from Proquest; 41,458 from Wiley Online Library; and 45 from Garuda). After removing 199 duplicate articles and by title/abstract, we filtered 169 articles with fulltext so that we got 12 articles in data extraction. There are twelve articles discussing the application of stunting prevention. Android-based applications are effective in improving health services because they are easy to use, widely used in obtaining information, and easy to carry anywhere. **Conclusion:** Android and web-based applications can be used as an effort to prevent stunting events.

Keywords: Application; Children; Education; Health Service; Stunting.

1. INTRODUCTION

Stunting is a result of malnutrition in early childhood. Globally malnutrition causes about 45% of deaths in children under 5 years old, while stunting affects about 149 million children under 5 years old in 2020.¹ *The United Nations Children's Fund* (UNICEF) reports the estimated stunting rate of children under 5 years old reaches 149 million.² The prevalence of stunting has decreased over the past 30 years, with around 144 million children still suffering from stunting worldwide and 5 million in Latin America.³

However, the prevalence of stunting in developing countries such as in Sub-Saharan Africa is 34.5%, in Ethiopia 52.4%, in Congo 40%, and in Indonesia it is still high at 30.8%, still above the world at 22.2%.⁴ and over the past decade at the national level it reached about 37%.⁵ WHO has determined that the occurrence of nutritional problems in a country should be less than 20% and have a risk of impaired growth, development and degenerative diseases in adulthood later.¹

The increasing incidence of stunting has the potential to have an impact on morbidity and mortality associated with stunting, so further efforts are needed for prevention and early treatment of stunted children.

The problem of stunting in Indonesia is a serious threat that requires proper and comprehensive handling. In an effort to reduce and deal with these problems, the government has issued several policies and regulations related to *stunting* embodied in National Action Plan on Nutrition and Food Security through the national prevention movement *stunting* national level, especially rural areas launched in 2017.⁶

The use of applications in preventing stunting has also been widely carried out in Indonesia. SIMPATI (Stunting Prevention System) which is a program of Sumedang Digital Region in collaboration with the Sumedang Regency Government and Telkomsel which can be one of the catalysts in stunting prevention in Sumedang Regency, collection, and reporting of toddler data.⁷, while abroad has been done in Pakistan by developing stunting applications that serve to know diagnostic stunting, stunting prevention, dietary practices, and serve as a guide.⁸

On research *Reviews* Previously, it has been done to determine the effectiveness of mobile applications to prevent stunting.⁹, in contrast to the review that will be carried out, which is to map the types of applications used to prevent stunting.

Based on this background, the reviewer tried to conduct the aim of the a scoping review in several research journals was to map the application in preventing stunting in children.

2. METHODS

The scoping review was conducted according to previously developed guidelines and the PRISMA extension for Scoping Reviews.

2.1 Search methods

The search method was performed to collect articles published between 2020-2023 from multiple database sources using the PubMed, Science Direct, Proquest, Wiley Online Library, and Garuda.

Search literature by using keywords, MeSH operators, and Booleans "AND" and "OR" related to the research question. The keywords used in the searching process were made up of different combinations such as (Stunting [MeSH Terms]) OR (Stunted[MeSH Terms]) AND (application [MeSH Terms]) OR (e health [MeSH Terms]) (Table 1).

Table 1: Search Results and Article Selection in Database

Database	Keywords	Result	Access Link	Access Date
PubMed	((Stunting[MeSH Terms]) OR (Stunted[MeSH Terms])) AND (application[MeSH Terms]) OR (e health[MeSH Terms])	701	https://rb.gy/jmbdf	20 June 2023
Science Direct	Stunting OR Stunted AND Application OR E-Health	655.732	https://rb.gy/3ce5g	20 June 2023
Proquest	Stunting OR Stunted AND Application OR E-Health	182.532	https://rb.gy/twyus	20 June 2023
Wiley Onlie Libarary	Stunting OR Stunted AND Application OR E-Health	41.458	https://rb.gy/8418k	20 June 2023
Garuda	Stunting App	45	https://rb.gy/n292c	June 20, 2023

2.2 Inclusion and exclusion criteria

Population, Concept, and Context (PCC) format used (Table 1). The inclusion criteria in this review are publications 2020-2023, articles in English and Indonesian, and stunting research using applications. The exclusion criteria are the title and abstract do not match the research question, publications over 10 years old, article *review*, not *full text*, duplicate articles and secondary/tertiary referral.

Table 2: PCC Format

Population	Stunting
Concept	Health Service
Context	Application

2.3 Study selection

To confirm the suitability of the articles for the intended population and outcomes, the first and second authors reviewed the titles. The abstracts were then assessed to determine if the articles were suitable for further review. The first and third authors evaluated the English articles independently.

2.4 Data Extraction

This scoping review, data extraction was conducted by looking at all twelve relevant published articles then wrote down the important findings of the article (which contains authors names, year, country name, objective, methods, sample, results, and review conclusion) (Table 3).

Table 3: Data Extraction

No	Author, Year, Country	Objective	Method	Result	Review Conclusion
1	Ponum et al., 2020 ⁸ Pakistan	To offer Stunting Diagnostics and Education applications	Design: Cross Sectional Study Sample: 1420 children Age: 4 – 18 years' old	The content of the application is in the form of distribution of sociodemographic characteristics, parental education, mother's employment status, diet of school-age children, and the prevalence of stunting in school-age children.	The use of the Stunting Diagnostic and Education application was developed according to instructions from pediatricians and nutritionists.
2	Haque et al., 2023 ¹⁰ Bangladesh	To build predictive models in order to develop intervention studies to reduce the prevalence of stunting in children aged 12-23 months.	Desain: a cluster randomised pre-post Sample: children between 12 and 23 months old.	- <i>Suchana</i> Program gave an overview in the initial survey showing a stunting prevalence of 52.7%, while 50.0% were stunted at the time of the final survey.	<i>The Suchana programme</i> is one of the largest global nutrition interventions, leading to positive change in critical areas, with expected long-term benefits for the health and livelihoods of beneficiaries.
3	Noman & Thursday, 2022 ¹¹ Indonesian	To design and build a promotion application and maternal and child health services to overcome stunting in NTT province, so that with the improvement of the quality of health promotion and services, it can have an impact on changing public health services.	Design: <i>Descriptive qualitative analysis</i> Sample (User): Mother and Child	- Testing is done by testing each process and possible errors that occur in each process.	- Use this web-based maternal and child health promotion and service application. - The application is built using the Code Igniter 4 framework and a MySQL database.
4	Widodo et al., 2022 ¹² Indonesian	To develop intelligent software for early detection Early detection of stunting in toddlers based on Anthropometry	Design: a guided classification Sample: 240 babies from birth to age five	- The first test results showed an accuracy rate of 85.1%. - The results of the second test showed an accuracy rate of 86% - The results of the third test showed an accuracy rate of 82.4%.	Software to detect stunting status Children can use the Support Vector Machine (SVM) method as a model to detect stunting status in children

				<ul style="list-style-type: none"> - The methods used using the training data can be detected very accurately - The stunting component is measured based on age, weight, and body length simultaneously. 	
5	Rufaindah & Patemah, 2021 ¹³ Indonesian	For this make use of a "Stunting Prevention" application that can Mother's use in knowledge enhancement on how to prevent stunting.	Design: <i>pre-experimental</i> Sample: Mothers of toddlers 0-36 months	Browse android app: <ul style="list-style-type: none"> - Prevention of stunting during pregnancy, during childbirth - Exclusive breastfeeding (in infants 0-6 months) - Breastfeeding until the baby is 2 years old, - Immunizing 	Android apps are effective in upgrading healthcare because it is easy to use, widespread use in obtaining information, easy to carry anywhere.
6	Hidayat et al., 2021 ¹⁴ Indonesian	To observe Application of nutrition for stunted children (GiAS) is it easier to distinguish Macronutrients, Zinc, and Calcium from Stunted Children And non-stunting in children aged 12-24 months.	Design: A Cross-sectional Samples: 88 subjects, 45 stunted children and 43 non-stunted children.	The results of research using the Mann- test Whitney points out the differences in: <ul style="list-style-type: none"> - Carbohydrates (84.99±26.31 vs 151.16±68.43 p=0.001), - Protein (30.81±11.03 vs 60.55±38.43, p=0.001) - Fat (32.80±15.39 vs 64.84±47.81, p=0.001), - Calcium (0.55±0.40 vs 1.43±1.16, p=0.001) - Similarity of zinc (0.005±0.004 vs 0.010±0.016, p=0.084) after 7 days of use of the GiAS application between stunted and non-stunted children. 	Comparison of macronutrients, zinc, calcium in stunted and non-stunting children aged 12-24 months can be differentiated by using the GiAS application.
7	Nurlita et al., 2021 ¹⁵ Indonesian	To determine the validity and reliability of the newly developed <i>Stunting Early Detection Kit (SEDEK)</i> .	Design: A cross-Sectional. Sample: 30 children	<ul style="list-style-type: none"> - Intra-rater reliability is determined using the <i>Intraclass Correlation Coefficient (ICC)</i>. - There was no significant difference between the length measurement using SEDEK and <i>standard gold</i> (p>0.05). 	Current validity and reliability tests Indicates that SEDEK has not been recommended as Stunting Detection Tools for Children Aged 0-24 Moon.

				<ul style="list-style-type: none"> - SEDEK sensitivity is 80%, specificity 85%, positive predictive value 72.7%, negative predictive value 89.5%. - The reliability of SEDEK is indicated by the ICC of 0.781. - The results showed that the current version of SEDEK does not meet the required sensitivity and positive predictive value of more than 80% so that it can be used as a detection tool. 	
8	Indrayana et al., 2022 ¹⁶ Indonesian	To build integrated surveys with Android-based stunting determination application software and a website to get a centralized, basic data set.	Design: Qualitative Sample: 300 samples	The applications developed in this study were tested using the google chrome browser and installed on Android version 5.0 Lollipop and above and can be installed on google play.	Application of Nutritional Status Detection System (SITEKSTAGI) Website-based and Android phone with questionnaire data collection feature.
9	Hadi & Tri Budi Rahayu, 2022 ¹⁷ Indonesia	To develop an android-based application as an effort to prevent stunting early.	Design: <i>research and development</i> Sample: Mother and Child	Applications that will be developed android-based applications.	Sahabat Bunda Application
10	Prasiska et al., 2020 ¹⁸ Indonesia	To conduct an evaluation study on stunting ojo, an android-based application designed to conduct early detection and health information media about the prevention and handling of stunting risk factors in high-risk community groups, namely women of	Design: Qualitative Samples: infertile women, pregnant women, and toddlers 0 to 2 years old	Ojo stunting has an average quality score of 3.77 which shows that Ojo stunting is an industry 4.0 health promotion media innovation that is effectively used as an early detection tool for stunting risk factors that facilitate the performance of health workers, and has a good contribution to community empowerment.	<i>Mobile Application Rating Scale (MARS)</i> is an application of improvements and updates needed to meet several aspects that are still of low value so that the use of the Ojo stunting application can be optimized so that further research is needed to test the usability and feasibility of the application on a larger scale.

		childbearing age, pregnant women, and toddlers 0-2 years.			
11	Anjani et al., 2022 ¹⁹ Indonesia	To see the effectiveness of using Android-based mobile media education apps with a nurturing, loving, and honing approach to posyandu cadres.	Design: <i>Cross sectional</i> Sample: 20 posyandu cadres	The statistical results obtained a p value of 0.001, meaning that there is a significant difference in the level of knowledge of cadres after education using a mobile education app with a <i>gain-score</i> value of 0.48, so it can be said that the educational activities carried out have moderate effectiveness in increasing the knowledge of cadres in Tanjung Mas Village	The use of android applications in educational methods as an effort to prevent stunting with a nurturing, compassion, and sharpening approach provides effectiveness in efforts to increase the knowledge of posyandu cadres
12	Kasjono & Suryani, 2020 ²⁰ Indonesia	To know Application Effect TOP against behavior Prevention stunting on high school students in District Kalibawang Kulon Progo.	Design: Quasi-experimental Sample: High School Student	There was an increase in stunting prevention behavior in the GASING application user group increased by 15.67, while in the group given leaflets increased by 3.54. The results of the Wilcoxon and Mann Whitney test obtained a p-value of 0.000 (p-value	GASING application improves stunting prevention behavior.

3. RESULT

We identified 880,468 relevant articles from literature searches (we took 701 articles from Pubmed; 655,732 from Science direct; 182,532 from Proquest; 41,458 from Wiley Online Library; and 45 from Garuda). After removing 199 duplicate articles and by title/abstract, we filtered 169 articles with fulltext so that we got 12 articles in data extraction. This part of the results is based on inclusion criteria, which is based on the description of the study (Figure 1).

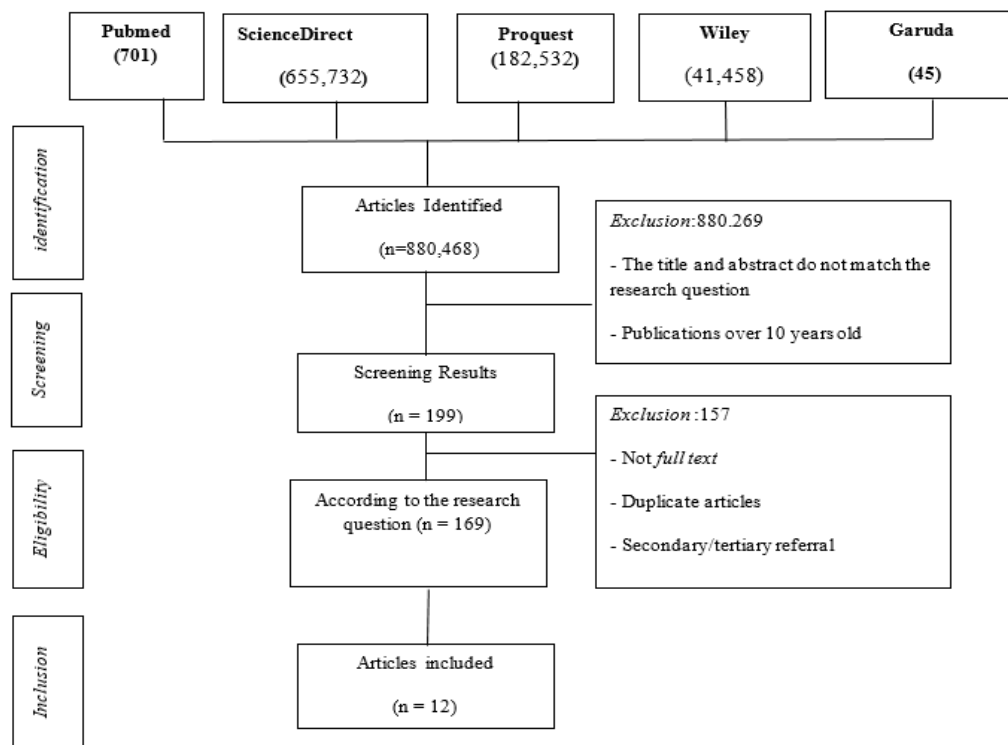


Figure 1: PRISMA flowchart

4. DISCUSSION

The purpose of this review is to map the types of applications used to prevent stunting. Based on a qualitative and quantitative descriptive study, 12 articles were obtained. This review reports that there are several apps that can be used to prevent stunting. In this day and age, app-based health has increased and can be used directly by clients making it easier to access important health information.

Educational media is very important for maternal and child health, especially in reducing the prevalence of stunting. Providing education in the digital era is expected to be more efficient online such as stunting applications, so there is a need for recent research related to stunting applications as a step to accelerate early detection of stunting events.²¹ The emergence of this stunting information system development is very helpful in overcoming problems that arise related to the process of entering and reporting data accurately, precisely, quickly, and correctly.²² This stunting application is a milestone in the birth of an information system that can minimise data processing errors and reporting delays so that problems related to nutritional problems can be minimised and help mothers of toddlers understand about stunting during child development.²³

There are several stunting apps in use today that can monitor child growth and development. The use of stunting applications in the form of diagnostics and education was developed according to the instructions of paediatricians and nutritionists, where this application is packaged in the form of providing a distribution of sociodemographic characteristics that can be seen from parental education, maternal employment status, school-age children's diet, and the prevalence of stunting in school-age children.⁸ Suchana programme which is one of the largest applications for global nutrition interventions that can be used to monitor the nutritional status of children.¹⁰ A stunting application built using the Code Igniter 4 framework and MySQL database.¹¹

To develop intelligent software for early detection has also been developed for early detection of stunting in toddlers based on anthropometry.¹⁸ Android-based applications that are developed and effective in improving health services because they are easy to use, wide use in obtaining information, and easy to carry anywhere,¹³ besides that the use of android applications in educational methods serves as an effort to prevent stunting with a care, love, and care approach can increase the knowledge of posyandu cadres.¹⁹ The results of a previous study revealed that android applications are effective in increasing knowledge and attitudes towards stunting if carried out systematically and continuously.²⁴ The results of other studies that have a significant impact on the level of knowledge of cadres after education using stunting mobile with a gain-score value of 0.45 so that the use of stunting mobile carried out has moderate effectiveness in increasing knowledge.²⁵ Based on the results of this review, it can be concluded that the use of applications can be an effort that can be developed to prevent stunting.

5. CONCLUSION

Android-based applications are media that can be used comprehensively so that they become effective media to prevent stunting.

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Conflict of Interest

The authors declare that there is no potential conflict of interest in connection with the research, writing, and/or publication of this article.

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