Methods For Development Mobile Stunting Application: A Systematic Literature Review

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Abstract

Stunting is a growth disorder in children. Stunting is one of the indicators of failure to thrive in toddlers caused by a chronic lack of nutritional intake in the first 1,000 days of life, from a fetus to a child aged 23 months. The object of this review is to review the current literature and help researchers find out what methods have been used in the development of stunting prevention applications. In a systematic search of the literature using quality databases including SpringerLink, ScienceDirect, and IEEE Xplore. The article included in this review is a stunting prevention application information system by describing the methods most often used by researchers in making the stunting prevention application information system. There were 41 results based on the exclusion of titles and abstracts, based on the introduction and exclusion of conclusions there were 35 results, so we included 12 results for the full-text exclusion in the final analysis.

Keywords: Stunting, Application, Methods, System Information, Systematic Literature Review

1. Introduction

Stunting is a failure in physical and mental growth that results in chronic or recurrent malnutrition [1], [2]. Stunting has the potential to have far-reaching consequences that impact a lifetime. The prevalence of malnutrition is directly related to the contribution of malnourished children to education [1]. In addition, the growing body of evidence on the importance of considering children's development and education in the early years has emphasized efforts to find ways to improve developmental outcomes and readiness for development [3]. The learning environment that is conducted at home has been proven to be capable of predicting not only competence in early childhood, but also the final results of elementary school [4].

Thus, supervision of children's health is so important in the development of children, families, communities, and the future of the population [5]. Previous studies on factors related to stunting have shown that parental education, age of child development, birth order development, lack of sanitation facilities, breastfeeding period, the occurrence of diarrhea, and wealth index have a relationship with stunting[6], [7]. Similarly, structured and healthy visits to children develop a strong bond between health care providers and children and their families, anticipate planning-related actions in prevention such as proper observation, screening, anticipatory direction, pregnancy, and counseling [5]. In 2014 there were 462 million underweight adults, 2 billion were deficient in micronutrients, and 1.9 billion were overweight (obese)[8].

Stunting cases usually start in the womb and increase, at least during the first 2 years of birth. The first 1000 days between the design and the second birthday of a child are a very important window of opportunity in the intervention [9]. The question is whether improvement in nutrition after the first 1000 days can provide recovery in growth and reduced cognitive development related to early malnutrition. Here is evidence from observational studies [10] - [12]. Length and height are the best predictors of stunting. Stunting is defined as length or height at age >2 SD under the population median reference [2].

Understanding long-term performance after childhood malnutrition is so important because better treatment, fortunately, results in more malnourished children surviving into adolescence and adulthood [13]. Stunting is a bad result of malnutrition during pregnancy and early childhood [14]. The stunting condition is only identified when the baby is 2 years old, this is known by the indicator of body length/age or height/age according to WHO (World Health Organization) by looking at the z-score value below the standard deviation [15]. In general, by 2020, 149 million children aged <5 years are predicted to be malnourished, with marked geographic variations in different regions of the world[16], [17].

The WHO reviews that stunting is a form of malnutrition that occurs predominantly among children under five years of age and it is generally predicted that around 161 million children under five years of age have been affected by stunting [18]. The stunting rate under the age of 5 years is the main health parameter in general. Goal 2 Target 2.2 of the Sustainable Development goal, among other goals of similar interest, has the goal of eliminating all
forms of malnutrition by 2030, with stunting under the age of 5 predicted to be reduced to an internationally agreed target by 2025 and then will be eliminated in the next 2030 [19].

Factors that influence the death of children under five years of age are socioeconomic, biological, and demographic factors. Socioeconomic factors can result in the death of eroticism in children, for example, extraction of milk teeth, cutting of the uvula, cutting of eyebrows at birth, and cutting of female genitalia which is closely related to socioeconomic and culture. Biological factors mainly refer to information on the fertility of the mother and the number of children that have been born, focusing on the family level rather than the children. Demographic factors influence death both endogenously and exogenously, for example, birth problems that are difficult to control and prevent and exogenous deaths that can be anticipated through immunization, public health measures, and the presence of antibiotic treatment [20]. With the existence of technological innovation, it can provide a solution to eliminating subjectivity, increasing reproducibility, and also providing information with a higher level of description. There have been several advances in automated food intake tracking systems. For example, several devices have been proposed to track and manage weight loss by recording intake using a mobile device [21] - [23].

A very common symptom of stunting is a decrease in physical and cognitive development, which can have long-term negative consequences [24]. Stunting is also an obstacle for children to reach their physical and mental potential [25]. In addition, in the early years, stunting has various irreversible long-term effects on cognitive function, brain development, and various health problems, although children receive environmental improvements and physical growth to catch up at an older age [26] - [28]. Although there were 10 evidence-based nutrition interventions implemented within 90% coverage, only 20% were achieved in reducing stunting [29]. Despite concerted efforts, the prevalence of malnutrition remains especially high in low- and middle-income countries, and efforts to reduce malnutrition have been slow [30].

For example, families with low incomes may have difficulty obtaining food, which can lead to malnutrition in children. In some cases, linear growth can stop due to other diseases, so these concomitant events can result in profoundly negative developmental outcomes [31]. Apart from that, there are many obstacles in the diagnosis of stunting, including a long period and a lot of money, and there are still many challenges that need to be addressed when we carry out observations at both the central and regional levels. In some cases, the planned program runs quite well, but there are several obstacles and, in some cases, monitoring is often neglected due to the large amount of data and not being properly organized [32].

Too many women, children, and young people around the world still have little or no access to essential and good quality health and education services, clean air and water, adequate sanitation, and good nutrition. They face violence and discrimination, cannot fully participate in society, and face other obstacles to achieving their human rights [33]. As a result, as the Millennium Development Goal (MDG) era draws to a close, annual mortality rates remain very high: 289,000 maternal deaths, 2.6 million stillbirths, 5.9 million deaths in children under five years of age, including 2.7 million newborn deaths, and 1.3 million adolescent deaths[34], [35]. Below is the percentage of millions of young lives that are at risk worldwide due to waste. Among them are Africa, Asia excluding Japan, Latin America and the Caribbean, and Oceania excluding Australia and New Zealand[36], [37].

![Figure 1](https://doi.org/10.29207/joseit.v2i2.5288)

**Figure 1.** Percentage of wasted children under 5, by region of the United Nations, 2018
In Asia and Oceania, waste puts nearly one in ten children under 5 years of age at increased risk of death. For the Asia and Oceania region, approximately 1 in 10 children under the age of 5 years of age with an increased risk of death are lost.

Figure 3. Percentage of children under 5 years of age affected by waste, by country and subregion of the United Nations, 2020 [38]

Country data are the most recent survey estimates available between 2010 and 2020. With the exception that older data is shown (2000–2009) where it is denoted by an asterisk (*) and only data before 2000 are available, a footnote is used, indicating no recent data. This subregional estimate does not take into account the impact of COVID-19, as a collection of household survey data on child height and weight has been limited from 2020 due to physical distancing measures with only four national surveys with some field work in 2020 included in JME databases; thus, the JME forecast is based almost entirely on data collected before 2020. East Asia excluding Japan. Oceania does not include Australia and New Zealand. The North American subregional estimate is based only on data from the United States. There are no estimates available for the European, Australian, and New Zealand subregions due to inadequate population coverage [14].

2. Review Method

2.1 Research Questions

Research questions play an important role in making decisions about search, data extraction, and analysis strategies. The following are research questions that have been identified in the following way:
Table 1. Research Questions and Descriptions

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RQ1. What methods are used in Android-based stunting prevention applications?</td>
<td>Find out the methods used to make stunting prevention applications.</td>
</tr>
<tr>
<td>RQ2: What methods are used the most by researchers for Android-based stunting prevention applications?</td>
<td>Find out the popular methods used in making Android-based prevention applications while at the same time assisting researchers in choosing the most relevant methods related to Android-based stunting prevention applications.</td>
</tr>
</tbody>
</table>

2.2 Data sources and search procedure
Source of data obtained from search databases such as SpringerLink, ScienceDirect, and IEEE Xplore. The search focused on terms from research questions and terms commonly used related to application-focused stunting information systems.

2.3 Inclusion and Exclusion Process
Inclusion criteria are general characteristics of research subjects in the target population and in the affordable population. Researchers must be careful so that the selected criteria follow the research problem. Exclusion criteria are criteria that can make the object unusable in research.

a. Inclusion criteria: The available paper format must be in full text. Published from 2018 to 2022, and should be based on size estimates.

b. Exclusion Criteria: paper whose criteria do not meet the requirements based on the inclusion above.
The results of this phase are 41 papers.

2.4 Quality assessment
Articles are taken from quality databases related to journals and conferences using the keyword 'Stunting Application' from 2018 to 2022.

Figure 4. PRISMA flow diagram

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2.5 Data extraction
The author developed the data extraction procedure considering the purpose of the data that the researcher will review. Data extraction is carried out in the form of:

<table>
<thead>
<tr>
<th>NO.</th>
<th>Data Extraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Publish year</td>
</tr>
<tr>
<td>2</td>
<td>Empirical data with valid and reliable provisions</td>
</tr>
<tr>
<td>3</td>
<td>Method used</td>
</tr>
</tbody>
</table>

2.6 Data Synthesis
The process of data synthesis means that the data are compiled and then the answers are concluded according to the research questions. In this case, data synthesis was carried out by reviewing the literature.

3. Results and Discussion
The results of the review are then presented in the form of answers to research questions.

3.1 What methods are used in Android-based stunt prevention applications? [RQ.1]

Android-based development methods
Table 3 lists the various Android-based development methods. The statistical results of the approaches show that the prototyping method is the most used. Each approach has its prerequisite conditions and characteristics according to which they are used. Table 3 lists various Android-based development methods. The statistical results of the approach show that the prototyping method is the most widely used.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Usage Statistics</th>
<th>Cited Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterfall</td>
<td>16.67%</td>
<td>[39][40]</td>
</tr>
<tr>
<td>Prototyping</td>
<td>25%</td>
<td>[41][42][43]</td>
</tr>
<tr>
<td>System Development Life Cycle</td>
<td>8.33%</td>
<td>[44]</td>
</tr>
<tr>
<td>Unified Modeling Language (UML)</td>
<td>8.33%</td>
<td>[45]</td>
</tr>
<tr>
<td>A-Cross Sectional</td>
<td>16.67%</td>
<td>[45][46]</td>
</tr>
<tr>
<td>Experimental Study</td>
<td>8.33%</td>
<td>[48]</td>
</tr>
<tr>
<td>Fast (Framework for the Application of System Techniques)</td>
<td>8.33%</td>
<td>[49]</td>
</tr>
<tr>
<td>Approximate String-Matching</td>
<td>8.33%</td>
<td>[50]</td>
</tr>
</tbody>
</table>

Android-based software development
Table 4 lists the statistical details of Android-based software development. The following is a variety of software development used, including Java Development Kit (JDK), Android Software Development Kit (SDK), Android Studio, Hypertext Preprocessor (PHP), My Structured Query Language (MySQL), and Statistical Program for Social Science (SPSS). Software that is very often encountered is the Java Development Kit (JDK), Android Studio, Hypertext Preprocessor (PHP) and My Structured Query Language (MySQL).

<table>
<thead>
<tr>
<th>Software Development</th>
<th>Usage Statistics</th>
<th>Cited Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Java Development Kit (JDK)</td>
<td>22.22%</td>
<td>[39][40][41][45]</td>
</tr>
<tr>
<td>Android Software Development Kit (SDK)</td>
<td>11.11%</td>
<td>[40][41]</td>
</tr>
<tr>
<td>Android Studio</td>
<td>16.67%</td>
<td>[41][42][45]</td>
</tr>
<tr>
<td>Hypertext Preprocessor (PHP)</td>
<td>16.67%</td>
<td>[41][45][49]</td>
</tr>
<tr>
<td>Microsoft Excel</td>
<td>5.55%</td>
<td>[44]</td>
</tr>
<tr>
<td>My Structured Query Language (MySQL)</td>
<td>16.67%</td>
<td>[41][45][49]</td>
</tr>
<tr>
<td>Statistical Program for Social Sciences (SPSS)</td>
<td>11.11%</td>
<td>[46][47]</td>
</tr>
</tbody>
</table>
The number of research publications in the given years

Table 5 provides the number of published research articles on the estimated effort of an Android-based development method over a predetermined period. The distribution of the articles shows that researchers are working to increase the estimated effort using a variety of new methods.

Table 5. Division of Research Publications Over Years

<table>
<thead>
<tr>
<th>Electronic Sources/Databases</th>
<th>Index</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal of Physics: Conference Series</td>
<td>Conf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Ieee Xplore</td>
<td>Q1</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Atlantis Press</td>
<td>Q2</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Bmc Pediatrics</td>
<td>Q2</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Macedonian Journal of Medical Sciences</td>
<td>Q3</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Pediatrics Indonesiana</td>
<td>Q4</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Malaysian Journal of Medicine and Health Sciences</td>
<td>Q4</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Jurnal Manajemen Kesehatan Indonesia</td>
<td>Sinta 2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Journal Of Computing And Information Systems</td>
<td>Sinta 3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Matrix : Jurnal Manajemen Teknologi Dan Informatika</td>
<td>Sinta 3</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total of results Publications</td>
<td></td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

3.2. What methods are used the most by researchers for Android-based stunting prevention applications? [RQ.2]

Table 6 shows which methods are used most frequently in the development of Android-based stunting applications. In the first place, there is the most widely used prototyping method with a total of 3 and usage statistics of 42.85%, and the waterfall method and cross-sectional method with a total of 2 and usage statistics of 28.57%.

Table 6. Final list of Android-Based Development Methods

<table>
<thead>
<tr>
<th>Methods</th>
<th>Total</th>
<th>Usage statistics</th>
<th>Cited Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototyping</td>
<td>3</td>
<td>42.85%</td>
<td>[41][42][43]</td>
</tr>
<tr>
<td>Waterfall</td>
<td>2</td>
<td>28.57%</td>
<td>[39][40]</td>
</tr>
<tr>
<td>A Cross-Sectional</td>
<td>2</td>
<td>28.57%</td>
<td>[46][47]</td>
</tr>
</tbody>
</table>

4. Conclusions

The literature review concluded that a large number of studies have been conducted on methods to reduce stunting symptoms. The distribution of research over the years is quite significant. The learning approach to the Android-based development method used is the prototyping method with 3 journals, the waterfall with 2 journals, and Cross-Sectional with 2 journals. Most studies use the prototyping method. Software widely used in the mobile-based stunting application development method includes the Java Development Kit (JDK), Android Studio, Hypertext Preprocessor (PHP), and My Structured Query Language (MySQL). A further review reveals that there is still a lack of development of Android-based stunting applications between 2018 and 2022.

Acknowledgments

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References


Knowledge and Attitude in Preventing Stunting of Teenagers,” 2022.
