

EDUCATIONAL GAMES AS AN INNOVATIVE HEALTH EDUCATION STRATEGY FOR STUNTING PREVENTION: A LITERATURE REVIEW

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ABSTRACT

Background: Stunting is a significant public health issue in Indonesia, with a prevalence of 21.6% in 2022. It is primarily caused by chronic nutritional deficiencies, recurrent infections, and lack of psychosocial stimulation. One innovative and effective approach in stunting prevention education is the use of educational games as interactive and engaging learning tools. However, comprehensive studies on the effectiveness of educational games in the context of stunting prevention are still limited.

Methods: This study employed a literature review approach using the PCC framework (Population, Concept, Context). The population included mothers. The concept was the use of educational games, and the context was stunting prevention. Articles were sourced from databases such as PubMed, ScienceDirect, Google Scholar, and manual searching. Inclusion criteria included original research published in the last five years, open access, and relevance to educational games in health education.

Results: Eight articles were reviewed, revealing a variety of games used, including snakes and ladders, puzzles, simulation games, board games, and mobile educational apps. Most studies reported significant improvements in participants' knowledge and engagement after game-based interventions. Educational games were found to be more effective than conventional educational methods. Implementation challenges included limited technological access, low digital literacy, scarce resources, and the need for cultural adaptation.

Conclusion: Educational games have the potential to be effective, enjoyable, and sustainable tools for health education in stunting prevention. To maximize effectiveness, local adaptation, facilitator training, and the development of context-specific media are essential. Games not only increase knowledge but also foster active participation and interest among communities, especially mothers and adolescents, in stunting prevention efforts.

Keywords: Educational games, Stunting, Health education

INTRODUCTION

Stunting is a condition of impaired growth and development in children caused by chronic malnutrition, recurrent infections, and inadequate psychosocial stimulation. This condition significantly affects children's physical and cognitive development, ultimately impacting the quality of human resources in the future (Ministry of Health, Republic of Indonesia, 2023). According to the 2022 National Nutrition Status Survey, the prevalence of stunting in Indonesia remains high, reaching 21.6% (SSGI, 2022). Therefore, stunting prevention has become a national priority through various strategies, including community-based nutritional education.

Innovation in health education methods is essential to enhance the effectiveness of information delivery, particularly in the context of stunting prevention. One emerging approach is the use of educational games as an interactive learning medium. These games are designed to convey health messages in a more practical and user-friendly manner, encouraging participants to be more enthusiastic, engaged, and active in the learning process (Anggraeni et al., 2023). Educational games are expected to improve public knowledge and participation in preventing stunting.

Several studies have demonstrated the effectiveness of educational games in improving health knowledge. For instance, Alfiah et al. (2021) developed DEKAZI

Games, a web-based interactive educational tool aimed at enhancing children's nutritional knowledge in the digital age. The study reported an 18% increase in students' knowledge following the intervention, highlighting the tool's effectiveness. Similarly, Arini (2023) designed an early stunting education program at adolescent health posts using online game media. The results showed that game-based education effectively disseminated information about stunting.

The use of educational games as a health education medium has proven effective in enhancing awareness and understanding of balanced nutrition and stunting prevention. Therefore, the development and implementation of such innovations should be continuously promoted as part of a comprehensive strategy to address stunting issues in Indonesia.

METHODS

This study employed a literature review approach consisting of six stages, beginning with the identification of the research question: "How are game-based innovations applied as a health education medium for stunting prevention?" The review followed the PCC framework, with the Population being mothers, the Concept being educational games, and the Context being stunting prevention. Article searches were conducted through various databases including PubMed, ScienceDirect, Google Scholar, and manual handsearching techniques. Article selection was based on inclusion criteria: original research published within the last five years, full-text availability, open access, and relevance to the use of games in stunting-related health education. Articles deemed irrelevant or not meeting these criteria were excluded during the selection process.

RESULTS AND DISCUSSION

RESULTS

This review analyzed eight studies focusing on game-based innovations as health education media for stunting prevention. The types of games used varied. Two studies utilized *snakes and ladders* games (Mulianingsih et al., 2021; Rahmatullah et al., 2024), one study developed a *puzzle game simulation* (Sari & Nurannisa, 2023), and two others used *simulation games* and *board games* (Muharyani et al., 2025; Salamoon et al., 2023). One study employed general educational games to stimulate child development (Harsono et al., 2023), one combined a quiz-style game (*Ranking 1*) with a nutrition demonstration (Ifroh & Permana, 2021), and another introduced a mobile-based educational game application (Sosanya et al., 2024).

The target populations in these studies varied, including pregnant women (Mulianingsih et al., 2021; Rahmatullah et al., 2024), mothers of children aged 0–24 months (Muharyani et al., 2025; Sari & Nurannisa, 2023), young mothers and adolescents (Ifroh & Permana, 2021; Salamoon et al., 2023), adolescent mothers in rural Nigerian communities (Sosanya et al., 2024), and mothers of toddlers (Harsono et al., 2023). Overall, pregnant women and mothers of young children were the most frequently targeted populations, aligning with key stunting prevention strategies from early life.

All analyzed studies showed positive and significant outcomes in improving participants' knowledge and awareness of stunting prevention through educational games. Five studies used a pretest-posttest design and found statistically significant increases in knowledge scores post-intervention (Ifroh & Permana, 2021; Muharyani et al., 2025; Mulianingsih et al., 2021; Rahmatullah et al., 2024; Sari & Nurannisa, 2023). Simulation games, puzzles, and snakes and ladders were particularly more effective than conventional educational media

such as videos or booklets. Additionally, Harsono et al. (2023) and Salamoon et al. (2023) reported increased interest and active participation among respondents. Sosanya et al. (2024) demonstrated that a mobile game app designed for teenage mothers was more effective than verbal training in enhancing understanding of infant and child feeding practices.

DISCUSSION

Health education is a learning process aimed at empowering individuals and communities to maintain and improve their health status. In Indonesia, health education is defined as a participatory community empowerment effort, rooted in local social and cultural potential and supported by pro-health public policies (Marlina & Ismainar, 2021). Educational interventions are key to increasing public understanding of stunting and fostering preventive behaviors. The selection of appropriate educational media is critical, especially those offering enjoyable and interactive learning experiences, such as educational games (Rahmuniyati et al., 2023).

Educational Games in the Context of Stunting Prevention

Educational games offer a strategic and innovative way to convey health messages, especially in the context of stunting prevention. These games are interactive, engaging, and foster active participation (Sindi et al., 2023). Compared to traditional methods such as lectures or leaflets, game-based education is more easily accepted by young mothers, pregnant women, and children due to its simplicity and appeal (Pradipta et al., 2020). This is supported by studies that compared games with conventional education methods. For instance, Widita Muharyani et al. (2025) found the *EMPASI SEHATI* simulation game to be more effective than educational videos in improving maternal knowledge on complementary feeding and stunting. Similarly, Sari & Nurannisa (2023) found puzzle games

superior to booklets in increasing mothers' understanding of nutrition and feeding patterns. Sosanya et al. (2024) also showed that their *BabyThrive* mobile game led to better outcomes than verbal training among adolescent mothers. These findings confirm that educational games are not only effective but also more engaging than passive learning methods.

Barriers and Challenges in Implementing Game-Based Education for Stunting Prevention

Despite their proven effectiveness, several challenges hinder the implementation of educational games in real settings. Key issues include limited financial and technological resources, as well as a shortage of trained facilitators (Yusuf, 2023). Harsono et al. (2023) and Sosanya et al. (2024) reported that access to technology and low digital literacy among rural populations, especially young mothers, limit the use of digital games. Budiarto et al. (2024) also emphasized that digital literacy remains low in many Indonesian villages, posing a challenge to tech-based health interventions.

To overcome these challenges, developers can design digital games that function offline. A successful example is *MANTRA* (Maternal and Neonatal Technologies in Rural Areas), an offline mobile educational game designed for low-literacy rural users. Mueller et al. (2020) showed that *MANTRA* significantly improved maternal and neonatal health knowledge, highlighting the importance of context-sensitive technology.

Other limitations include the physical and logistical demands of certain games. For instance, large-scale games like snakes and ladders or puzzles require physical materials that may be difficult to transport, replicate, or maintain, especially in remote areas (Mulianingsih et al., 2021; Sari & Nurannisa, 2023). Additionally, games such as board games or interactive quizzes require facilitators with not only content knowledge but also facilitation skills (Ifroh & Permana, 2021;

Salamoon et al., 2023). This presents a barrier in areas where trained facilitators are scarce, particularly at the community level.

To address these issues, Rahmawati et al. (2024) recommend training local health workers or community cadres to serve as independent facilitators. Community empowerment through such training is more sustainable than relying on external experts. Another suggested solution is the development of modular and portable games that are easier to deploy in various local contexts. Careful planning, needs assessment, and culturally appropriate design are essential for successful implementation.

Some studies also emphasized the need for cultural and educational adaptation of game content. For example, Muharyani et al. (2025) and Salamoon et al. (2023) noted that simulation and board games may be too complex for low-literacy participants. Therefore, game design should follow a participatory and iterative approach. Soekmono et al. (2021) employed a three-phase R&D framework: (1) preliminary research to understand user needs, (2) iterative development and prototyping, and (3) validation of game elements. This process is especially relevant in stunting-related game development, as it ensures that content is understandable and culturally aligned. By adapting language, visuals, and interaction styles, game-based health education becomes more accessible and impactful.

CONCLUSION

This review demonstrates that the use of educational games as a medium for stunting prevention is effective in enhancing public knowledge and awareness, particularly among pregnant women and mothers of young children. Various types of games such as *snakes and ladders*, simulation games, and mobile applications were found to be more effective than conventional educational media in

delivering stunting-related information. Educational games not only improve knowledge but also foster active participation and interest among participants. However, real-world implementation faces several challenges, including limited resources, technological barriers, and differences in participants' cultural and educational backgrounds. Therefore, innovative approaches that are adaptable to local conditions and efforts to strengthen facilitator capacity are essential to ensure the effectiveness and sustainability of game-based educational interventions.

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