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Stunting Prevention Strategies through the Development of the SiPenTing Application (Sistem Preventif Stunting) in Bondowoso Regency

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Abstract

Purpose: This study aims to address the challenge of stunting prevention by developing and implementing the SiPenTing application as a digital technology solution to support local communities.

Method: A descriptive qualitative approach was employed, utilizing Focus Group Discussions (FGDs) to gather insights and feedback from stakeholders, including local government officials, village midwives, and mothers participating in integrated service posts.

Practical Application: The SiPenTing application facilitates stunting prevention efforts by streamlining communication, providing educational resources, and enhancing monitoring capabilities for both health professionals and community members.

Conclusion: The development and implementation of the SiPenTing application in Taman Village, Bondowoso Regency, highlights the transformative potential of digital technology in addressing public health challenges, particularly in preventing stunting. This initiative serves as a model for similar interventions in other regions.

Introduction

Stunting remains a critical global issue, attracting significant attention due to its widespread impact on public health. It is widely regarded as a nutritional disorder that serves as a key indicator of chronic malnutrition over an extended period (Rahmad et al., 2013). According to (Fadilah et al., 2020), stunting is characterized by the failure of growth in children, leading to height deficits relative to their age.

Stunting is a global nutritional disorder affecting 148,2 million children (22,3%) worldwide in 2022 highlighting persistent public health challenges despite significant progress over the last two decades (WHO, 2023). Despite this progress, the high global stunting prevalence remains a significant concern for human security, prompting the United Nations (UN) to focus on stunting as a critical issue within the Sustainable Development Goals (SDGs). Specifically, SDG 2, which aims for Zero Hunger, includes a target (2.2) to end all forms of malnutrition, including the stunting prevention in children under five by 2030 (UN, n.d.). However, the 2022 global stunting rate still far exceeds the SDG target of 13.5% (88.9 million children), as established by the (WHO, 2023).

Stunting is a multifactorial problem, influenced by a range of complex, interconnected factors. (Stewart et al., 2013) identified several food-related factors contributing to stunting, including poor-quality food, inadequate feeding practices, and a lack of food and water safety. Furthermore, research by (Yanti et al., 2020) underlined the roles of maternal knowledge, parenting practices, nutritional intake, low birth weight (LBW), and socioeconomic factors in the prevalence of stunting. (Ernawati, 2020) also identified several additional contributing factors, such as poor maternal nutrition, inadequate parenting, short stature of parents, insufficient exclusive breastfeeding, poor environmental sanitation, and maternal anemia during pregnancy. These findings highlight the multifaceted nature of stunting, which cannot be attributed to a single cause but rather to a complex interplay of factors.

According to (WHO, 2023), Asia is home to the majority (52%) of the world's stunted children, and Indonesia is facing significant challenges in addressing this issue. In Indonesia, stunting remains a critical concern, with a prevalence of 21,6 % in 2022, still exceeding the national target of 14 % (Lestari, 2023). Within Indonesia, East Java province has also seen a decrease in stunting rates, with the 2022 prevalence standing at 19.2%, down from 23.5% in 2021, though still above the national target (Munira, 2023). Bondowoso Regency in East Java exhibits one of the highest stunting rates in the country at 32%, this rate significantly exceeds both the provincial and national averages. (SSGI, 2022), necessitating targeted interventions. In response, the Bondowoso Regency government has implemented various policies to combat stunting, including designating nine sub-districts, including Grujugan Sub-district, as focus areas for stunting reduction (Muhaimin, 2023).

In response to these issues, several programs have been initiated, including a women's school focused on preventing child marriage and a collaboration with the Bondowoso Regency government and Health Office through the Women's School PKH program. These programs aim to enhance knowledge and awareness among community members, particularly mothers, regarding stunting prevention. However, these efforts have faced challenges, particularly the reliance on conventional media, such as printed books and modules, which have limited reach and impact.

The need for more creative and easily accessible educational resources has grown in the setting of the digital age. Audio-visual media, which have been shown to be highly effective in enhancing knowledge among community health volunteer and the broader community (Alfi et al., 2022), offer significant potential in addressing these challenges. To address this issue, the SiPenTing application was developed as an innovative, accessible digital tool for stunting prevention. This mobile application leverages audiovisual media, interactive articles, and chatbots to educate and assist communities, health workers, and

integrated health post cadres in early detection and stunting prevention. By linking users with local healthcare facilities, SiPenTing offers a holistic approach to tackling stunting in Bondowoso Regency and beyond. The SiPenTing (Stunting Preventive System) application is a digital platform based on information technology designed to unite, analyze, and provide education on stunting prevention in an integrated manner, with an operational focus in Grujugan District, Bondowoso Regency. The SiPenTing application includes audiovisual features, articles, and chatbots to offer guidance on stunting prevention in Bondowoso Regency, East Java. This project aims to empower the community with accessible knowledge and tools for stunting prevention. Through the SiPenTing application, the initiative seeks to enhance awareness, improve early detection, and strengthen the collaboration between health workers and families, ultimately contributing to the reduction of stunting prevalence in Bondowoso Regency.

Method

This Community service initiative adopts a descriptive qualitative approach to gain a comprehensive understanding of the local context and needs in Bondowoso Regency. Focus Group Discussion (FGDs) are employed as the primary data collection method, enabling in – depth exploration of community challenges and opportunities in addressing stunting prevention. Facilitators, including students and lecturers, guide discussions to ensure active participation and alignment with research objectives. This method, as supported by (Putra, 2020), is particularly effective in capturing diverse perspectives and identifying practical solutions.

During the FGD sessions, the participants—comprised of community members, students, and lecturers—act as facilitators, guiding the discussions and promoting an open exchange of ideas. The role of the facilitators is critical in ensuring that the discussions are productive and aligned with the research objectives, as noted by (Indrizal, 2014). The FGDs are designed to promote active participation among the community, encouraging them to share their experiences, concerns, and suggestions. This participatory approach ensures that the collected data is rich, contextually relevant, and reflective of the real-life challenges the community faces in addressing stunting.

Moreover, the FGD process is structured to assist the community service team in identifying and analyzing key issues related to stunting. The systematic nature of the FGD methodology ensures that the data collection process remains focused on pertinent themes and issues, providing a clear understanding of the local context (Ernada et al., 2022). This approach allows the community service team to obtain insights into the specific needs of mothers and children in Taman Village, as well as to identify potential solutions for stunting prevention.

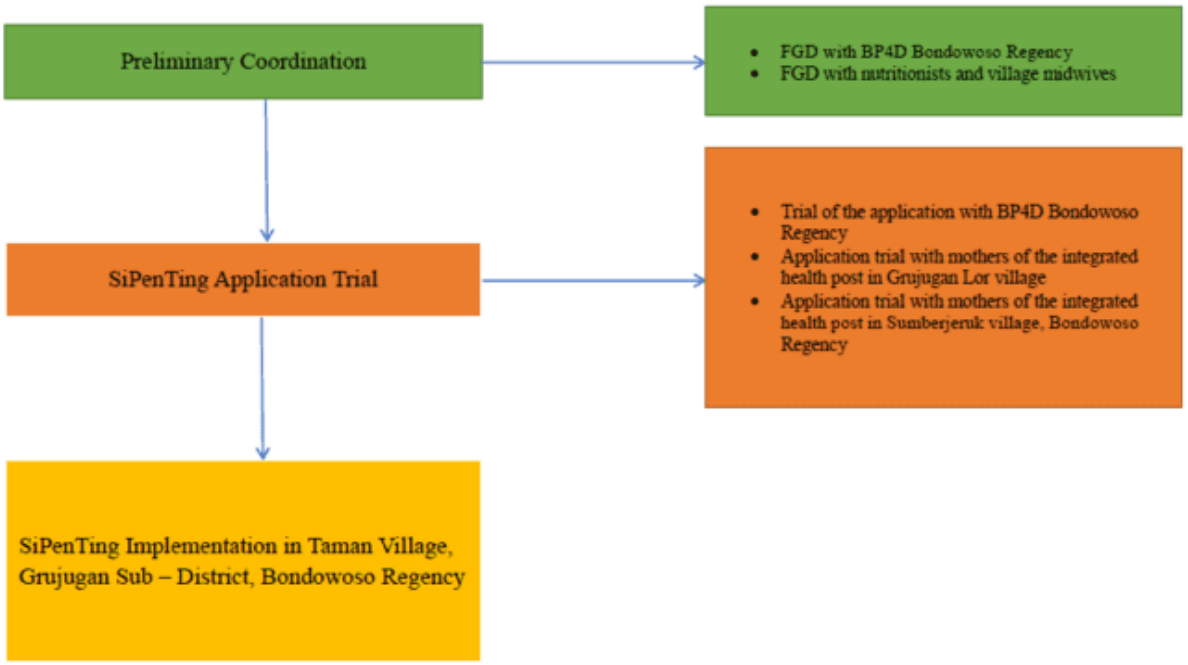
The program, implemented between April and November 2024, targets mothers and children utilizing services at local health centers and integrated health posts (Posyandu) in Bondowoso Regency. Activities are conducted collaboratively by lecturers and students from the faculty of social and political scieces (FISIP) and the Faculty of Computer Science (FASILKOM) at the University of Jember. FGDs are complemented by the introduction of the SiPenTing applicatioin, an interactive platform designed to enhance stunting prevention efforts.

This interdisciplinary initiative combines social science expertise in community mobilization with technological innovations in digital health solutions. The Faculty of Social and Political Sciences conducted a comprehensive assessment of local socio – cultural factors contributing to stunting, while the Faculty of Computer Science developed the SiPenTing application, ensuring that it aligns with user needs and local infrastructure. The Faculty of Public Health (FKM) contributes to providing a knowledge base related to maternal and child health, as well as relevant nutritional indicators to monitor the risk of stunting. The faculty also compiles educational content in the application, such as a guide to

healthy eating patterns for toddlers, the importance of exclusive breastfeeding, and stunting prevention measures based on local health data.

The community service process includes FGD, application planning, application testing, evaluation, implementation, and launching as shown in Figure 1.

Figure 1. Stages of community service activities



The following section outlines the stages of implementing community service activities focused on stunting prevention through the development of the SiPenTing application in Bondowoso. The accompanying flowchart provides a visual representation of each stage in the process, and the description of these stages is as follows:

1. *Preliminary Coordination*

   The initial phase of the project involves extensive planning for the development of the SiPenTing application. During this phase, the community service team from Universitas Jember engaged in Focus Group Discussions (FGDs) with key stakeholders, including the Bondowoso Regency BP4D (Regional Development Planning Agency). The discussion focused on identifying needs, key challenges related to stunting, and expectations for the development of the SiPenTing application. Each FGD lasted for two hours, starting with mapping local conditions, followed by exploration of application-based solutions, and ending with implementation recommendations. These discussions were aimed at aligning the objectives of the project with the needs and expectations of the local government. Additionally, the team conducted separate FGDs with nutritionists and village midwives to further refine the implementation strategy for the SiPenTing application, ensuring that it addresses the specific challenges related to stunting prevention in the region.

2. *SiPenTing Application Trial*

   Following the preliminary coordination, the next phase involved testing the SiPenTing application to assess its functionality and effectiveness. The community service team from Universitas Jember conducted a series of trials with the BP4D of Bondowoso Regency to evaluate the application's technical performance and to ensure its suitability for deployment in the region. Subsequently, a second round of

trials was conducted with the target beneficiaries: mothers attending the Integrated Health Service Posts (Posyandu) in Grujugan Lor Village and Sumberjeruk Village, Bondowoso Regency. The trial process includes orientation to posyandu mothers and village midwives regarding the use of the application, simulating the use of application features. Each trial session lasts for three hours, involving hands-on training and a Q&A session.

3. *Implementation*

The final stage of the project involved the full-scale implementation of the SiPenTing application in Taman Village, Grujugan Sub-district, Bondowoso Regency. This phase marked the official launch of the application, making it available for use by the broader community. The implementation was carried out by the community service team from Universitas Jember as a demonstration of the application's readiness for widespread use. The team's goal was to ensure that the application would be accessible to the target population, particularly mothers and caregivers, and to provide a platform for continued education, consultation, and resources related to stunting prevention. Data obtained from application usage is analyzed to identify the effectiveness of features in increasing public awareness and accelerating health interventions.

Result

The community service activities were executed in three primary stages. The first stage involved conducting a Focus Group Discussion (FGD) with key stakeholders, including the Bondowoso District BP4D, nutritionists, village midwives, and integrated health post cadres. The FGD sessions involved 16 participants, including 3 stakeholders from BP4D Bondowoso Regency, 3 nutritionists, 5 village midwives, and 5 integrated health post cadres who represent the primary stakeholders in stunting prevention efforts. The facilitators ensure that all audience voices are heard by providing opportunities to express opinions in turns to ensure inclusiveness. This collaborative session aimed to align the objectives of the project with local development goals and gather input on the potential implementation of the SiPenTing application.

The second stage focused on the application trial, wherein the community service team conducted testing in collaboration with the Bondowoso District BP4D, village midwives, and mothers from the Integrated Health Service Posts (Posyandu). The FGD sessions also involved 21 participants, including 7 stakeholders from BP4D Bondowoso Regency, 3 village midwives, 6 mothers from the integrated health service posts (Posyandu). Each audience can express their opinions in turn by providing criticism and suggestions in the SiPenTing application trial activity. The purpose of this stage was to assess the application's functionality and gather direct feedback from the target beneficiaries to ensure its usability and relevance to the community.

The third and final stage involved the full implementation of the SiPenTing application in Taman Village, Grujugan Sub-district, Bondowoso Regency. This stage involved 30 participants from PKH aid recipient mothers and mothers from the integrated health service post in Taman Village, and 3 PKH Bondowoso Regency. This stage marked the application's deployment for use by mothers attending the Integrated Health Service Posts in the village, providing them with tools for education, consultation, and stunting prevention.

The community service activities began with the BP4D of Bondowoso Regency. (Figure 2). In this activity, coordination was carried out regarding the explanation and description related to the partners' needs.

Figure 2. FGD (Focus Group Discussion) between the community service team and BP4D Bondowoso

The image above captures the Focus Group Discussion (FGD) held between the community service team and the Bondowoso District BP4D in preparation for community service activities. This FGD took place on May 16, 2024, in the BP4D Auditorium, Bondowoso Regency. The session was led by Mrs. Dra. Hj. Farida, M.Si, Head of BP4D Bondowoso, and Mr. Roni Setiaji, a researcher and developer at BP4D Bondowoso. Attendees included representatives from the Bondowoso District Health Office, the Bondowoso District Social Office, the Bondowoso District Communication and Information Office (Kominfo), staff from the Jambesari Community Health Center, Grujugan Community Health Center, the Taman Village Head, Taman Village Posyandu cadres, and members of the community service team from Universitas Jember.

During the discussion, the community service team, in collaboration with FGD participants, explored the development and enhancement of the SiPenTing application. Following an introduction to the application, the participants provided valuable input on its functionality and potential features. The intended development of the SiPenTing application is aimed at aligning it with the SIBUBA application, which is the Mother and Baby Information System initiated by KOMPAK (Community and Service Collaboration for the Welfare Partnership of the Australian Indonesian Government) in Bondowoso Regency. The SIBUBA application aims to reduce maternal and infant mortality rates (KOMPAK, 2021). In comparison, the SiPenTing application, developed by the community service team from Universitas Jember, is designed to support mothers in identifying whether their children are affected by stunting and to provide educational services related to stunting prevention and nutrition through consultations with midwives. This initiative represents a novel advancement in health service information systems, particularly in the context of stunting prevention.

One of the key innovations of the SiPenTing application is its focus not only on pregnant women but also on prospective brides who are planning to have children. This inclusion is intended to raise awareness about the importance of nutrition and health prior to conception. Additionally, the SiPenTing application serves as an informational resource, providing guidance on appropriate foods for meeting children's nutritional needs.

The FGD also focused on the addition of several new features to the SiPenTing application. These features were designed to improve the application's usability and effectiveness in stunting prevention. Notable new features include:

1. A chatbot for real-time interaction and support.
2. A nutrition calculator focused on detecting stunting in children.
3. A nutrition inspiration feature that provides recommendations and guidelines for preparing nutritious meals using available food ingredients.
4. A child profile management feature, which allows mothers to manage profiles for

multiple children, particularly useful for households with more than one child.

The inclusion of these features is intended to strengthen the educational role of the SiPenTing application while facilitating the early detection of stunting. By providing quick access to critical information and practical tools, these features aim to empower mothers to take proactive measures in preventing stunting and improving their children's long-term health outcomes.

Another key topic discussed during the FGD was the simplification of the SiPenTing application to ensure its accessibility and ease of use for the community. The goal is not only to streamline the application's functionality but also to ensure that it is user-friendly, particularly for mothers and caregivers with limited technological literacy. The simplification process includes several key changes:

1. The registration and login process has been simplified to allow users to sign up and log in using basic identifiers, such as phone numbers, National ID numbers (NIK), or date of birth, eliminating the need for email or password credentials.
2. The input of age data has been modified to allow for the use of the date of birth, which automatically calculates age, providing ease of use for age-based assessments.
3. The application now supports multiple accounts or profiles on a single device, which is especially beneficial for households with more than one child.
4. Limited access features have been incorporated, allowing designated parties, such as health officers, BP4D Bondowoso Regency, and Kominfo, to input relevant data and access the application's database. Furthermore, the University of Jember team is granted monitoring access to track application usage and ensure its effective implementation.

These simplifications are intended to maximize the usability and accessibility of the application, ensuring that it serves as a practical tool for the community, particularly for those with limited technological experience.

Following the coordination with BP4D Bondowoso Regency, the community service team also held an additional FGD with nutritionists and village midwives. In this session, the team, in collaboration with the health professionals, focused on refining the design of the SiPenTing application. Discussions included the development of formulas for calculating nutritional intake, as well as the creation of nutrition and stunting calculators. Additionally, the meeting addressed the scheduling of health service posts and consulted on the use of hemoglobin levels as one of the key indicators for stunting prevention, particularly for pregnant women.

Figure 3. FGD (Focus Group Discussion) between the community service team with nutritionists and village midwives

The image above documents the Focus Group Discussion (FGD) between the community service team from Universitas Jember and nutritionists and village midwives. This FGD was conducted at the Jambesari Health Center Auditorium on June 3 and 26,

2024, and was attended by Mrs. Adriana, a nutritionist from the Sumbersari Health Center, as well as the midwives from the Jambesari Health Center.

The main objective of this FGD was to discuss the design and development of the SiPenTing application, focusing specifically on the nutritional components necessary for stunting prevention. The discussion began with an exploration of the appropriate formulas for calculating nutritional intake—a critical element for developing both the nutrition calculator and the stunting calculator features of the application. This initial phase aimed to ensure that the app would provide accurate and reliable assessments based on scientifically grounded data.

Furthermore, the FGD provided a platform to review and suggest improvements for the nutrition calculator and stunting calculator features. In addition to these technical aspects, the session also included discussions on the scheduling of Integrated Health Service Posts (Posyandu) and consultations regarding the role of hemoglobin levels as a significant indicator of stunting risk for pregnant women. These discussions were essential in refining the application to include relevant health metrics and data that could be used by community health workers and mothers to monitor and address stunting risks.

Following the completion of the FGD, the community service team proceeded with the development of the SiPenTing application, ensuring that it incorporated the health calculation formulas and recommendations provided by the nutritionist from Jambesari Health Center, as well as references from relevant literature.

The next phase of the project will involve conducting another Focus Group Discussion (FGD) to trial the SiPenTing application. This trial phase aims to evaluate the functionality of the application and to gather feedback from key stakeholders, including health professionals and community members, to further refine the app for broader use.

Figure 4. FGD (Focus Group Discussion) between the community service team and the Bondowoso Regency government

The image above documents the Focus Group Discussion (FGD) held to review the trial of the SiPenTing Application, conducted on July 31, 2024, at the BP4D Bondowoso Hall. This meeting was attended by key stakeholders, including representatives from the Bondowoso District Health Office, the Bondowoso District Social P3AKB Office, the Bondowoso District Community and Village Empowerment Office, the Bondowoso District Communication and Information Office (Kominfo), as well as the Head of the Jambesari Subdistrict Health Center, the Head of the Grujugan Subdistrict Health Center, midwives from the Grujugan Subdistrict Health Center, the Head of Taman Village, Taman Village officials, and Posyandu Cadres from Grujugan Subdistrict, Bondowoso District.

The primary objective of this FGD was to facilitate a comprehensive trial of the SiPenTing Application. The session commenced with a training session on the application, during which the stakeholders were introduced to its functionalities and features. Following the demonstration, the participants were invited to provide feedback, input, and suggestions for further development of the application.

Based on the discussions during the FGD, several recommendations were made to improve the application's features. Notably, feedback focused on enhancing the nutrition calculator, stunting calculator, Posyandu schedule, and the registration process within the application. These suggestions were carefully reviewed, and the community service team committed to incorporating these improvements in the next iteration of the application, in line with the guidance provided by the stakeholders from the Bondowoso Regency government.

Following the revisions based on the input from the FGD with the BP4D Bondowoso, the community service team from Universitas Jember continued with further trials of the SiPenTing Application. The subsequent trial was conducted with mothers from the Integrated Health Services (Posyandu) in Grujugan Lor Village on October 7, 2024, at 08:00 AM WIB. This phase aimed to assess the user experience and gather further insights into the application's effectiveness from the end-users.

Figure 5. Trial of the SiPenTing Application with the Mothers of Posyandu in Grujugan Lor Village

The image above provides documentation of the SiPenTing application trial conducted with mothers from the Integrated Health Service Post (Posyandu) in Grujugan Lor Village. The trial session was attended by 20 mothers from Posyandu in the village. During the trial, the community service team from Universitas Jember gathered valuable feedback from the participants regarding the nutrition calculator feature of the application.

The feedback revealed a calculation error within the nutrition calculator, which was identified when the application was tested directly on the mobile phones of the participating mothers. This error highlighted the need for further refinement of the application's functionality to ensure its accuracy and reliability in assessing nutritional intake.

In response to this feedback, the community service team undertook immediate improvements to address the identified error in the nutrition calculator. These adjustments were made prior to conducting the second trial of the SiPenTing application. The second trial was held with mothers from Posyandu in Sumberjeruk Village on October 28, 2024, at 09:00 AM WIB. This session aimed to assess the effectiveness of the improvements and gather further feedback from the community to ensure the application's readiness for broader implementation.

Figure 6. Trial of the SiPenTing Application with the Mothers of Posyandu in Sumberjeruk Village

The image above illustrates the SiPenTing application trial conducted with mothers from the Posyandu in Sumberjeruk Village. Following the second trial, the community service team from Universitas Jember did not observe any errors or discrepancies in the application's functionality. This outcome signifies that the SiPenTing application is fully operational and ready for widespread use by the Posyandu mothers.

Subsequently, the community service team proceeded with the implementation of the SiPenTing application in Taman Village, located in Grujugan District, Bondowoso Regency. This stage of the project marked the culmination of a series of preparatory steps, including initial coordination and application testing. After completing these development processes, the team moved forward with the full deployment of the application in the target community, ensuring that the application was accessible and functional for the Posyandu mothers in the village.

Taman Village, situated within Grujugan Sub-district, is one of the major contributors to the region's stunting prevalence. Several factors, including inadequate sanitation, poor environmental conditions, and limited community knowledge about healthy living practices, exacerbate the situation. Research by Hendrawati et al. (2022) indicates that the general population in Taman Village lacks sufficient understanding of clean and healthy living practices, which contributes to the persistence of stunting and other diseases, such as diarrhea, intestinal infections, and gastrointestinal disorders (Salamung et al., 2019). Furthermore, low awareness regarding essential aspects of maternal and child health, such as the importance of balanced nutrition during the first 1,000 days of life, exclusive breastfeeding, immunization, and early detection of stunting, is prevalent. This issue is further compounded by poverty and a culture of early marriage, which often leads to unpreparedness for pregnancy and childbirth, thereby increasing the risk of stunting (Eriyanti & Makmur, 2019). Thus, stunting in Taman Village presents a significant public health challenge.

Figure 7. Implementation of the SiPenTing Application with the Mothers in Taman Village

The image above shows the implementation of the SiPenTing application with the mothers in Taman Village on November 12, 2024, at 09:00 WIB. This activity was accompanied by members of the Family Hope Program (PKH) and attended by 30 PKH aid

recipient mothers and mothers from the integrated health service post in Taman Village. In this activity, the SiPenTing application can already be widely utilized, especially in Taman Village, in an effort to reduce the stunting rate in Bondowoso Regency.

Discussion

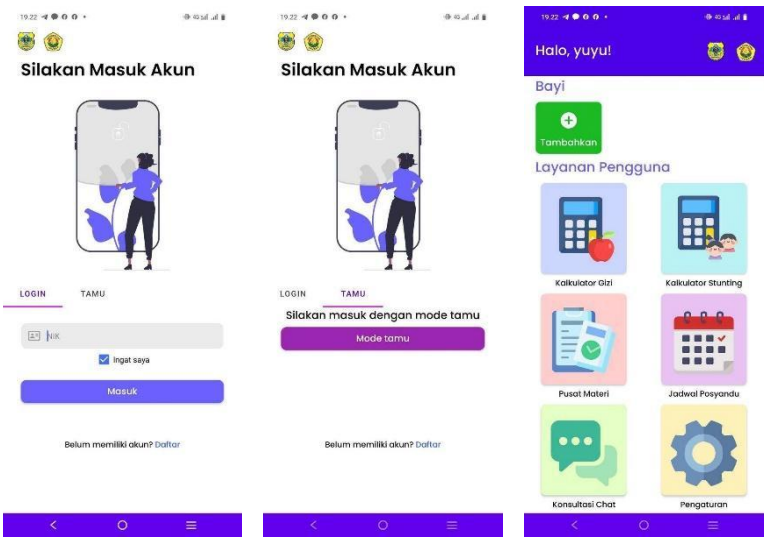
The high prevalence of stunting in Bondowoso Regency, particularly in Taman Village, poses a significant challenge to achieving sustainable development goals. Stunting in this region is not merely a consequence of nutritional deficiencies but is deeply influenced by a range of interconnected factors, including social, economic, and cultural aspects. These multifaceted contributors make stunting a complex and persistent issue in Indonesia, with profound implications for human capital, economic growth, and the nation's future prosperity.

The persistence of stunting in Indonesia has escalated it to a national urgency, as it undermines the country's human development potential. Addressing this issue is critical not only for improving public health but also for promoting broader social and economic stability. Consequently, tackling stunting requires a comprehensive approach that goes beyond addressing immediate nutritional needs to include long-term solutions that encompass various determinants, including education, healthcare access, and socioeconomic development.

In response to this urgent issue, the community service team from Universitas Jember has implemented a preventive strategy in Bondowoso Regency. This initiative is centered on the development of an innovative software platform known as SiPenTing (Stunting Preventive System). The SiPenTing application is designed to provide a technological solution to the stunting problem by offering educational resources, nutritional guidance, and early detection tools to the local community. Through this application, the community service team aims to raise awareness, empower mothers, and facilitate the early identification of stunting in children, thus helping to reduce the prevalence of stunting in the region.

The innovation of the SiPenTing application development is in accordance with relevant national initiatives such as Presidential Regulation (PerPres) Number 72 of 2021, concerning the strategy for accelerating the reduction, monitoring, evaluation, and reporting of stunting. The development and implementation of the SiPenTing application was a multistage process, involving collaborative efforts and extensive consultations with local stakeholders, including health professionals, community leaders, and government officials. After conducting a series of Focus Group Discussions (FGD), the community service team successfully developed the application, incorporating feedback from these discussions to ensure that the platform was both relevant and effective for the target audience. The application features a user-friendly interface, with specific tools designed to educate mothers about the importance of nutrition during the critical stages of child development and to provide interactive consultations for stunting-related concerns.

Figure 8. SiPenTing Application Features



The SiPenTing application interface is designed to provide users with a seamless and accessible experience. The image above illustrates the application's interface and its key features. On the left side, the login page is shown, where users can log in using their NIK (Nomor Induk Kependudukan) and a username. The use of NIK for registration is specifically tailored for residents of Bondowoso Regency, facilitating local governance oversight and enabling evaluation, monitoring, and intervention efforts by the Bondowoso government to address the stunting issue. This localized approach ensures that interventions are accurately targeted at those most in need.

In contrast, the center image displays the guest mode option. This feature allows users who are not residents of Bondowoso to access certain functionalities of the application without the need for prior registration. In guest mode, users can utilize the nutrition calculator, stunting calculator, and access the resource center. This feature ensures that essential tools for stunting prevention are available to a wider audience, including those outside the targeted region, further promoting awareness and education on stunting prevention.

The right side of the image highlights the core features of the SiPenTing application. The application incorporates five key features designed to provide comprehensive support for stunting prevention:

1. Nutrition Calculator: A tool that calculates and provides nutritional recommendations for children and pregnant women to promote healthy growth.
2. Stunting Calculator: A diagnostic tool designed to assess the risk of stunting in children based on various health parameters.
3. Resource Center: A hub for educational materials, including articles, videos, and other resources related to child nutrition and stunting prevention.
4. Posyandu Schedule: A feature that provides information on local integrated health service posts (Posyandu), ensuring that users are aware of upcoming health check-ups and nutritional assessments for their children.
5. Chat Consultation: A feature that allows users to communicate with healthcare professionals or midwives for personalized guidance on stunting prevention and maternal health.

Additionally, the settings feature enables the updating of maternal health data, which is essential for monitoring and detecting stunting in pregnant women. By incorporating these features, the SiPenTing application aims to facilitate both education and early intervention in the fight against stunting.

The innovative nature of the SiPenTing application has received positive responses

from various stakeholders. This is evidenced by the team's dedication when conducting interviews during the initial implementation activities with village midwives and mothers at integrated health posts in Bondowoso Regency. They revealed that stunting is a major problem that needs to be prevented. Based on the results of interviews with mothers, 30% of mothers agreed that there is a need for high awareness in preventing stunting. This figure shows strong support for the potential of the SiPenTing application to improve the health of local nutritional communities. The University of Jember community service team has shown a clear commitment to addressing the stunting crisis through this technological innovation, which has the potential to significantly improve the quality of maternal and child health in the region.In ensuring collaboration and sustainability, this application is operated by the Bondowoso Regency Government. While the University of Jember assists technically in terms of sustainable development, such as adding new features according to community needs. This effort is made to ensure that the application remains relevant to the challenges of technology and evolving health policies.

Figure 9. Interview regarding the response to the development of the SiPenTing Application with village midwives and mothers from the posyandu

Conclusion

The SiPenTing application, developed as part of a community service initiative by Universitas Jember, represents a crucial innovation in the ongoing effort to combat stunting in Bondowoso Regency. Given that Bondowoso is one of the regions with the highest stunting rates in East Java and across Indonesia, the application serves as a timely and effective intervention.

By leveraging technology, the SiPenTing application provides a comprehensive and practical approach to monitoring maternal and child health. It facilitates easy access to nutritional information, health post schedules, and consultation features, which are integral to preventing stunting. These features help both healthcare workers and community members obtain necessary information and communicate about stunting prevention strategies.

Beyond stunting prevention, this community service activity exemplifies how digital tools can be utilized to address public health challenges. The SiPenTing application serves as a model for the application of technology in healthcare, proving that innovation in the form of accessible digital solutions can address both local and global health issues. Furthermore, the SiPenTing application aligns with national health targets, particularly those aimed at reducing the prevalence of stunting, thus contributing to sustainable development goals. It is hoped that the application will play a vital role in improving maternal and child health in Bondowoso Regency and support broader national efforts in tackling malnutrition and stunting.

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Reference

Al-Rahmad AH, Miko A, Hadi A. Kajian stunting pada anak balita ditinjau dari pemberian ASI eksklusif, MP-ASI, status imunisasi dan karakteristik keluarga di Banda Aceh. Jurnal Kesehatan Ilmiah Nasuwakes. 2013;6(2):169-184. http://surl.li/wpobgn

Ernawati, A. (2020). Gambaran Penyebab Balita Stunting di Desa Lokus Stunting Kabupaten Pati. Jurnal Litbang: Media Informasi Penelitian, Pengembangan dan IPTEK, 16(2), 77–94. https://doi.org/10.33658/jl.v16i2.194

Eriyanti, L.D., & Makmur, M.H. (2019). Membangun Desa Bebas Stunting Melalui Pemberdayaan Perempuan dan Anak (Seri Luaran). Jember: Lembaga Penelitian dan Pengabdian Masyarakat (LP2M) Universitas Jember

Fadilah, S. N. N., Ningtyias, F. W., & Sulistiyani, S. (2020). Tinggi badan orang tua, pola asuh dan kejadian diare sebagai faktor risiko kejadian stunting pada balita di kabupaten Bondowoso. Ilmu Gizi Indonesia, 4(1), 11. https://doi.org/10.35842/ilgi.v4i1.148

Indrizal, E. (2014). Diskusi Kelompok Terarah. Jurnal Antropologi: Isu-Isu Sosial Budaya, 16(1), 75. https://doi.org/10.25077/jantro.v16i1.12

Lestari, T. R. P (2023). Stunting di Indonesia : Akar Masalah dan Solusinya https://berkas.dpr.go.id/pusaka/files/info_singkat/Info%20Singkat-XV-14-II-P3DI-Juli-2023-196.pdf

Lucy, Dyah, Hendrawati., Toetik, Koesbardiati., Myrtati, Dyah, Artaria. (2022). Strategy Handling of Stunting Based on the Guidebook for Toddler Development in Bondowoso Regency, East Java. Biokultur, 11(1):45-54. doi: 10.20473/bk.v11i1.32242

Munira, S. L. (2023). Hasil Survei Status Gizi Indonesia (SSGI) 2022. https://ayosehat.kemkes.go.id/materi-hasil-survei-status-gizi-indonesia-ssgi-2022

Muhaimin, Z (2023). 9 Kecamatan di Bondowoso Penderita Stuntingnya Masih Tinggi https://banyuwangi.viva.co.id/peristiwa/2217-9-kecamatan-di-bondowoso-penderita-stuntingnya-masih-tinggi?page=1

Putra, D. P. B. P. (2020). Pengembangan Desa Wisata Carangsari Dan Partisipasi Masyarakat Lokal. Jurnal Masyarakat Dan Budaya, 22(2), 1–15. https://doi.org/10.14203/jmb.v22i2.838

Stewart, C. P., Iannotti, L., Dewey, K. G., Michaelsen, K. F., & Onyango, A. W. (2013).

Contextualising complementary feeding in a broader framework for stunting prevention. Maternal & Child Nutrition, 9(S2), 27–45. https://doi.org/10.1111/mcn.12088

Salamung, N., Haryanto, J., & Sustini, F. (2019). Faktor - Faktor yang Berhubungan dengan Perilaku Pencegahan Stunting pada saat Ibu Hamil di Wilayah Kerja Puskesmas Kabupaten Bondowoso. Jurnal Penelitian Kesehatan Suara Forikes, 10(4), 264 - 269. http://dx.doi.org/10.33846/sf10404

United Nations (N.d) Sustainable Development Goals, Goal 2 : Zero Hunger. https://www.un.org/sustainabledevelopment/hunger/

Vinci, A. S., Bachtiar. A., & Parahita, G, I. (2022) Efektivitas Edukasi Mengenai Pencegahan Stunting kepada Kader : Systematic Literature Review. Jurnal Endurance : Kajian Ilmiah Problema Kesehatan, 7(1), (66 - 73) http://doi.org/10.22216/endurance.v7il.822

WHO, UNICEF & World Bank (2023) Levels and Trends in Child Malnutrition https://www.who.int/data/gho/data/themes/topics/joint-child-malnutrition-estimates-unicef-who-wb

Yulia, Tutik, Nurfia., Saptono, Hadi., Enggal, Chairyadi, Mulyono. (2022). Pendampingan literasi masyarakat dalam penanganan stunting dan wasting di desa besuk kecamatan klabang kabupaten bondowoso. As-Sidanah : Jurnal Pengabdian Masyarakat, doi: 10.35316/assidanah.v4i2.200-211

Yanti, N. D., Betriana, F., & Kartika, I. R. (2020). Faktor Penyebab Stunting Pada Anak: Tinjauan Literatur. REAL in Nursing Journal, 3(1), 1. https://doi.org/10.32883/rnj.v3i1.447

Zuhri Ernada, S. E., Dody Molasy, H., Dwi Eriyanti, L., Nur Budiman, B., & Dewi Safitri, B. (2022). The Prevention of Child Marriage Through The Women's School To Improve Quality of Life (Sekoper PKH) In Mengen Village, Bondowoso Regency. Devotion : Journal of Research and Community Service, 3(14), 2652–2658. https://doi.org/10.36418/dev.v3i14.323