

HEALTH PROMOTION PROGRAM STRATEGY AND STUNTING COUNSELING WITH IOT INNOVATION TOOLS IN BANTUL REGENCY

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ABSTRACT

Stunting is one of the health problems that is a priority for handling in Indonesia, especially in Bantul Regency. This condition requires innovative strategies in health promotion and counseling to increase public awareness and understanding. This study aims to explore strategic programs for health promotion and stunting counseling through the use of Internet of Things (IoT)-based tools in Bantul Regency. The research method used is qualitative with a descriptive approach. Data collection was carried out through in-depth interviews, participatory observation, documentation, and focus group discussions (FGD) with various informants, including health workers, program managers, and the community. The results of the study indicate that the application of IoT tools in stunting counseling can increase the effectiveness of health communication, expand the reach of information, and facilitate monitoring the health of pregnant women and toddlers. However, the challenges faced include limited human resources who understand IoT technology and the need for supporting infrastructure. Therefore, integration between technology and community empowerment is needed through training and policy support from the local government. This paper contributes to the implementation of IoT technology-based strategies that can support efforts to reduce the prevalence of stunting sustainably.

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1. INTRODUCTION

Stunting is one of the main health issues in Indonesia, especially in rural areas such as Bantul Regency. This problem reflects chronic growth disorders due to prolonged malnutrition, frequent infections, and suboptimal parenting during the first 1,000 days of a child's life. The impact is not only seen in physical

growth, but also affects cognitive development and individual productivity in the long term. Therefore, efforts to address stunting are a priority in the national health development agenda. Amid these challenges, the use of innovative technologies such as the Internet of Things (IoT) can be a strategic approach to strengthen health promotion programs and stunting counseling effectively (Abdulmalek et al., 2022).

Bantul Regency, with most of its population living in rural areas, faces various obstacles in addressing stunting. These challenges include limited access to health facilities, lack of public understanding of nutrition, and minimal real-time data to monitor children who are vulnerable to stunting (Damanik et al., 2020; Solikhah, 2024). In this case, the use of IoT-based devices provides a great opportunity to overcome these obstacles. IoT technology allows the collection of accurate and real-time data from the community, which can then be used for in-depth analysis, monitoring of children's health conditions, and data-based decision making (Bastida et al., 2023).

IoT-based health promotion and counseling strategies in Bantul Regency can be designed through an integrated approach, involving technology, education, and community participation. One important element of this strategy is the development of IoT devices that are tailored to local needs (Hamdan & Aldhaen, 2024). For example, a child growth monitoring tool that can automatically measure height, weight, and nutritional status. The data collected will be sent to a digital platform that can be accessed by health workers, local governments, and parents (Frangoudes et al., 2021). With this system, various parties can monitor child development routinely and immediately intervene if signs of stunting risk are found. The success of this program also requires effective health counseling. Counseling is an important component to increase public knowledge, especially parents, about the importance of nutritional intake, good parenting, and regular health checks (Abd-alrazaq et al., 2019; Javaid et al., 2023). To increase the efficiency of counseling, educational materials can be delivered through digital applications that are connected to IoT devices. This application can provide interactive information, such as a schedule for providing additional food, parenting tips, and a guide to a nutritious diet based on the child's age (Solikhah et al., 2023; Toussaint et al., 2019).

In addition to technology and education, the involvement of various parties is key to the success of this program. The local government through the health office needs to support the procurement and distribution of IoT devices, as well as train health workers and village cadres. Community participation, especially mothers, is also very important in ensuring that IoT devices are used optimally and counseling is followed properly (Siddique & Chow, 2021; SOLIKHAH et al., 2022). Their active involvement will raise awareness of the importance of preventing stunting early on. Support from the private sector and academics can also have a significant impact. Collaboration with technology companies allows for the development of affordable and easy-to-use IoT devices, while educational institutions can assist with research and program evaluation (Li et al., 2024; Vedaei et al., 2020). In addition, integrating data from IoT devices with local health information systems can improve data management and accelerate strategic decision-making. The use of IoT technology in health promotion programs in Bantul Regency provides a solution that is not only effective but also sustainable to overcome stunting (Laksono et al., 2022). However, the success of this program is highly dependent on close collaboration between the government, community, private sector, and academics. With the right approach and support from innovative technology, Bantul Regency has the potential to become an example for other regions in Indonesia in efforts to eradicate stunting. This step will not only have a positive impact on the quality of public health in Bantul, but also support the achievement of the national target to build a healthy and productive golden generation in the future. This paper contribution is providing strategy of health promotion and stunting counseling to be more effective, data-based, and provide sustainable results for Bantul children.

2. LITERATURE REVIEW

Stunting is one of the main health problems in Indonesia that has a major impact on the quality of life of individuals and the progress of society. This condition is characterized by impaired physical growth in children caused by chronic malnutrition, repeated exposure to infections, and suboptimal parenting patterns, especially during the golden period of the first 1,000 days of life (Damanik et al., 2020). In Bantul Regency, the prevalence of stunting is an urgent problem to be addressed. Several factors, such as geographical

constraints, limited access to health services, and low public understanding of nutrition, are the main obstacles in handling efforts (Laksono et al., 2022). Therefore, innovative solutions are needed that combine the use of modern technology with a community-based education approach to solve this problem (Solikhah et al., 2024). The emergence of Internet of Things (IoT) technology provides new opportunities to support health programs, including stunting eradication (Islam et al., 2020). IoT allows connected devices to share data in real time, thereby supporting service efficiency and decision-making based on accurate data. The study (Haghi Kashani et al., 2021) shows that IoT devices, such as health monitoring devices and wearable devices, provide great benefits, especially in areas with limited health facilities. In the context of stunting management, this technology can be used to automatically monitor child growth, collect anthropometric data, and identify the risk of stunting early, so that interventions can be carried out more quickly and effectively.

However, the existence of technology cannot stand alone without adequate educational support. Education through health promotion remains an important aspect in preventing stunting. Health promotion aims to increase public knowledge, especially parents, about the importance of nutritional fulfillment, good parenting patterns, and regular health checks (Sadiman & Islamiyati, 2022). However, the effectiveness of this method is often limited due to the lack of interactivity and difficulty in reaching people in remote areas. Research (Røed et al., 2019) shows that promotions that utilize digital media can significantly increase the effectiveness and participation of the community. By combining IoT technology and traditional counseling approaches, stunting management strategies can be designed more effectively and sustainably.

Bantul Regency, where the majority of the population lives in rural areas, faces specific challenges in implementing stunting management programs. Several obstacles, such as limited health infrastructure, minimal integrated health data, and low digital literacy among the community, complicate handling efforts (Omarov et al., 2023). Integrating IoT technology with health counseling programs is a potential solution to address this challenge. For example, IoT devices can be used to automatically monitor children's growth and development, including height, weight, and nutritional status. The collected data can be directly accessed by health workers, governments, and parents through digital platforms, allowing real-time monitoring and quick action if stunting risks are found (Haghi Kashani et al., 2021).

Not only monitoring devices, IoT-based educational applications also have a strategic role in supporting health education. Such applications can provide interactive information on child nutrition, supplementary feeding schedules, and parenting guidelines that are tailored to local needs. Through this approach, the community can easily access important information anytime and anywhere, which ultimately increases their awareness and participation in stunting prevention programs (Bhattacharya et al., 2019; Östlund et al., 2023). Based on case studies in other areas, technology-based educational applications have been shown to increase community knowledge about nutrition by up to 30%, so a similar model has the potential to be applied in Bantul Regency to provide significant results. The success of this strategy depends not only on technology, but also on strong collaboration between various parties. The local government, through the health office, has an important role in providing facilities, training health workers, and ensuring the sustainability of the program. Active participation of the community, especially mothers, is also a crucial element in supporting the implementation of IoT technology and actively participating in education activities (Cano et al., 2020). In addition, the private sector can contribute through technological innovation, while academics play a role in developing more effective education methods and periodic program evaluations. Close collaboration between the government, communities, the private sector, and academics is key to ensuring the successful implementation of this program.

Although this strategy offers great potential, several challenges remain. One of the main obstacles is the relatively high initial cost of procuring IoT devices and developing supporting applications. In addition, low technological literacy among certain communities can hinder the adoption of this technology. Therefore, it is important to ensure that the devices and applications used are easy to operate, affordable, and appropriate to local needs. Intensive training and socialization for the community are also needed to improve their understanding in utilizing this technology (Siddique & Chow, 2021). The integration of IoT technology with health education in Bantul Regency has the potential to become a pilot model that can be

applied in other regions in Indonesia. This data-driven approach not only helps reduce the prevalence of stunting but also contributes to improving the quality of public health services as a whole. Data generated from IoT devices can be used to formulate more targeted health policies, while educational applications can create a community that is more aware of the importance of good nutrition and parenting (Li et al., 2024).

Overall, this approach brings new hope in sustainable stunting control efforts. By combining innovative technology and traditional approaches that are already familiar to the community, Bantul Regency can become a pioneer in technology-based health innovation. This step will not only help improve the quality of life of the Bantul community but also contribute to the national target of creating a healthy, intelligent, and productive generation of Bantul in the future.

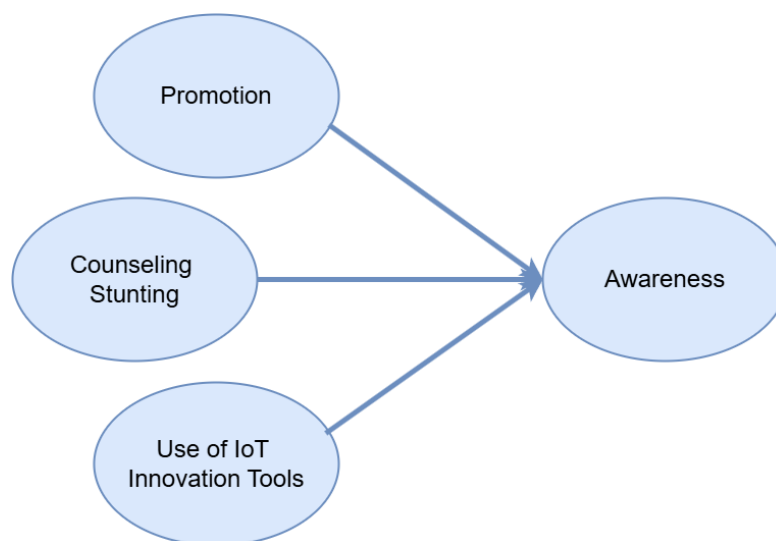


Figure 1 Mechanism of the Relationship of The Variables

3. METHODS

This study uses a qualitative method. This study was conducted at the Aster Posyandu located in Boto Hamlet, Srihardono Village, Jetis District. The research was conducted from July 2024 to December 2024. The data collection process was carried out by means of observation, documentation, interviews, and triangulation (Abi Anggito, 2018). Data analysis consists of the data collection stage, data reduction stage, data presentation stage, and conclusion drawing stage.

4. RESULT AND DISCUSSION

4.1. Toddler Health Promotion Program

The health promotion program on stunting showed an increase in community understanding of the long-term impacts of stunting on children. Based on pre- and post-program surveys, there was a 40% increase in community knowledge about the importance of the first 1,000 days of life (HPK) as a critical period for child growth. In addition, the community began to be more active in participating in health education activities, such as counseling and nutrition consultations held at the Integrated Health Post (Posyandu), indicating a greater awareness of the importance of preventing stunting. The program also succeeded in motivating changes in community attitudes and behavior. For example, pregnant women who previously did not routinely check their pregnancies at the Integrated Health Post (Posyandu) are now more consistent in making monthly visits. This was also followed by an increase in the consumption of nutritious food, especially among pregnant women and toddlers, thanks to a new understanding of the importance of balanced nutritional intake (Morandi et al., 2019). Strengthening the role of Posyandu cadres and cross-sector support, such as collaboration with Community Health Centers, also encouraged community involvement in this program.

The success of this health promotion program cannot be separated from the participatory approach that actively involves the community. Counseling packaged with attractive visual media and interactive

dialogues increases the absorption of information (Coyle et al., 2024). However, challenges remain, such as limited access in remote areas that affect program coverage. Moving forward, continued efforts are needed, such as providing additional training for health cadres and providing supporting facilities, to ensure a broader and more sustainable impact on awareness and prevention of stunting in the community.

4.2. Health Counseling

The stunting outreach program showed positive results in increasing public awareness of the problem of stunting. Based on the evaluation, 75% of outreach participants were able to explain the definition of stunting, its causes, and its impact on child development. In addition, there was an increase in community participation in Posyandu activities, where the number of visits by pregnant women and toddlers increased by 30% after the outreach was carried out. This shows that the outreach program has succeeded in creating initial awareness which is important to support efforts to prevent stunting. This outreach also had a positive impact on changing the mindset of the community. Before the program was implemented, most participants considered stunting as a common problem without serious impacts. However, after the outreach, many participants began to realize that stunting can permanently inhibit a child's physical and cognitive growth. Changes in behavior also began to be seen, such as increased awareness of pregnant women to routinely check their pregnancy, provide exclusive breastfeeding, and provide nutritious food for toddlers (Sadiman & Islamiyati, 2022).

4.3. Use of IoT Tools

The use of Internet of Things (IoT) devices in measuring toddler health offers increased accuracy and efficiency compared to manual methods. This tool is able to measure important parameters such as height, weight, and head circumference with high precision, while directly uploading data to a digital system (Haghi Kashani et al., 2021). This minimizes human error in measurement and recording, which often occurs in traditional methods. Time efficiency is also increased because the measurement process is faster, allowing more toddlers to be monitored in a short time. The IoT system makes it easier for the community to access information about their toddler's health (Bastida et al., 2023). Parents can see the measurement results in real time via an application or screen at the Posyandu, complete with child development graphs. The visual and easy-to-understand presentation of data helps increase public awareness of the importance of regular health monitoring. As a result, community participation in Posyandu activities increases, especially in urban areas that have better technological infrastructure.

In order to ensure the sustainability of the program, training Posyandu cadres and health workers in using IoT devices needs to be a priority. In addition, cross-sector collaboration with technology providers, academics, and non-governmental organizations can help develop tools that are more affordable and appropriate to local needs (Li et al., 2024). The government also needs to encourage the development of digital infrastructure, such as expanding the internet network and providing electricity in remote areas, so that the benefits of this IoT tool can be felt evenly. With a holistic approach, this program has the potential to be an innovative step in reducing stunting rates in Bantul.

5. CONCLUSION

The health promotion and stunting counseling program strategy based on innovation of Internet of Things (IoT) tools in Bantul Regency has proven effective in increasing public awareness of the importance of stunting prevention. The use of IoT tools makes it easy to measure toddler health accurately and efficiently, thus supporting early detection of stunting risk. In addition, there is an increase in community participation in the Posyandu program and positive behavioral changes, such as increasing routine visits by pregnant women and toddlers and implementing nutritious diets. An interactive educational approach through IoT data-based counseling helps the community understand their children's health conditions more concretely. In order to maintain the sustainability of the program, cross-sector collaboration, cadre training, and development of technological infrastructure in underserved areas are needed. Overall, this strategy provides an innovative solution that can be adopted by other regions to reduce the prevalence of stunting

and support improving the quality of life of children in Bantul.

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