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Leveraging Digital Communication Technology to Reduce Stunting: Evidence from the e-HDW Application in Bengkalis District, Riau Province - Indonesia

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Abstract - Stunting remains a critical public health issue in Indonesia, particularly in underdeveloped areas such as Bengkalis District. This study aims to analyze the effectiveness of communication strategies—specifically the implementation of the e-HDW (Human Development Worker) application—in reducing stunting prevalence, grounded in the Diffusion of Innovation theory and Health Belief Model to understand technology adoption and behavior change processes. This research applied a descriptive qualitative case study approach involving structured questionnaires, interviews, and documentation. Informants included local government officials, healthcare workers, and Human Development Cadres (KPM). The main outcome measured was the effectiveness of the e-HDW communication tool in increasing knowledge and adoption of stunting prevention behavior at the community level. The results indicate that the e-HDW application facilitated real-time nutrition monitoring and enhanced cross-sector collaboration, contributing to a measurable decline in stunting prevalence from 21.9% (2021) to 12.6% (2024). This supports previous findings that digital health interventions can significantly improve public health outcomes when combined with community-based communication strategies. The findings align with the theoretical framework, showing that communication agents like KPM accelerated technology adoption and behavior change. In conclusion, the e-HDW app is not merely a technical tool but an effective communication platform that fosters awareness, behavioral change, and inter-agency coordination. This study highlights the strategic role of communication technology in public health interventions and suggests replicability for similar contexts across Indonesia.

Keywords: Stunting; Bengkalis; e-HDW; Digital Health Communication; KPM;

Introduction

To guarantee human well-being, economic prosperity, and environmental preservation, the Sustainable Development Goals (SDGs) have established the 2030 agenda to change the world by addressing the various issues that humanity faces. (Pradhan et al., 2017)The five pillars of the National Strategy are as follows: (1) Commitment and vision of leadership; (2) National campaigns

and behavior change communications; (3) Convergence of central, local, and village programs; (4) Food security and nutrition; and)5) Monitoring and evaluating. The National Stunting Prevalence Acceleration Team (TP2AK – *Tim Percepatan Pencegahan Anak Kerdil*) of the Indonesian government spearheaded the initiative.

Although achieving the Sustainable Development Goals (SDGs) target by 2030 is the primary objective, the formation of these five pillars serves as a guide for stakeholders implementing the step of accelerating stunting prevalence acceleration and reducing stunting prevalence in Indonesia. supporting data or scientific evidence based on personal observations or the results of other research studies. The formulation of this research problem is always based on real conditions and objectively scientifically.

This article focuses on the stunting cases that occurred in Bengkalis Regency, this area is one of the 3T (underdeveloped, frontier, and outermost areas). Therefore, one idea that can be used is paying for stunt training for cadres as extension agents, mothers of childbearing age, and health promotion programs for prospective brides and grooms at least three months before marriage.

These initiatives can help raise awareness about the importance of proper nutrition and early intervention in preventing stunting. By forming a team to collect data on prospective brides and grooms and improving the existing recording system, we can gather valuable information that will help reduce the prevalence of stunting.

This will allow for targeted interventions tailored to the specific needs of the community. In addition, promoting quality education through community engagement and collaboration is critical to addressing stunting. Through partnerships with schools, parents, and community members, we can create an enabling environment that prioritizes education and provides resources for children's cognitive and physical development through partnerships with schools, parents, and community members. Thus, stunting prevention efforts involve not only the health sector, but also the education sector and the community at large. This cross-sector collaboration can increase the effectiveness of programs aimed at reducing stunting prevalence in the community. This holistic approach does not necessarily contribute to reducing stunting prevalence and improving children's overall well-being and prospects (Prendergast & Humphrey, 2014).

As a whole, lowering the prevalence of stunting has been a top priority through interventions such as physical therapy for stunting, health promotion programs, community service, and using technology like the e-HDW app. This application was first launched in mid-2020, precisely in May 2020 by Abdul Halim Iskandar, as Minister of Villages, Development of Disadvantaged Regions, and Transmigration of Indonesia.

The application functions as a work aid for Human Development Cadres (KPM) and is only available on the Android platform (Khobibah, 2022). The use of technology plays an important role in monitoring health and progress in each region. The implementation of the e-HDW application in Bengkalis Regency can be an effective tool for monitoring and tracking the nutritional status of children identified as at risk. Based on the article Bunyamin (2024) about Local Government Efforts in Overcoming Stunting in Riau Province: A Study in Rokan Hulu Regency stated the difficulty of assessing the implementation of the convergence of stunting prevention programs in the district (Bunyamin et al. 2024).

This is because the regional apparatus organization (OPD) still has sectoral egos and socialization is not optimal. As a result, many people do not understand the stunting prevention program as a whole. In some places, the hampered socialization is caused by late information, information that is disconnected from socialization, and difficult demographic conditions in the area. This is a picture of Riau Province (Bappeda Bengkalis, 2025).

This application can provide real-time data that can be used for targeted interventions and timely support. Not only that, the existence of the e-HDW application also facilitates coordination and collaboration for government agencies to act quickly. Bengkalis Regency can make significant progress in combating stunting and promoting quality education. for children (Rahmawaty, 2018). Based on data, Bengkalis district has succeeded in reducing the prevalence of (Arfiyansyah, 2022)**.** In the national target, the reduction in stunting prevalence is also 14% in 2024. So that at the world level, Indonesia is ranked 27th out of 154 countries that have stunting data. Nationally, the prevalence of stunting in Indonesia in 2023 is 21.5%. This figure only decreased by 0.1% from the previous year

which was 21.6%. Meanwhile, the decline continues to occur in Bengkalis Regency (dinke5_admin, 2023).

Table 1. Indonesia & Bengkalis District Stunting Data

Tahun	Indonesia	Bengkalis District
2021	24.4	21.9
2022	21.6	18.56
2023	21.5	15.61
2024	19.8	12.62

Source: Indonesiabaik.id & Dinkes.riau.go.id

This intervention was declared effective in reducing the prevalence of stunting in Bengkalis Regency. The intervention should focus on providing stunting prevention training to cadres and mothers of childbearing age who implement health promotion programs for prospective brides and grooms before marriage. In addition, efforts need to be made to form a team to record prospective brides and grooms and improve the recording system to monitor the prevalence of stunting effectively. Through these efforts, it aims to overcome chronic nutritional problems due to stunting, where the child's height does not match his age (Rizal & van Doorslaer, 2019). These initiatives will contribute to reducing the prevalence of stunting, improving the nutritional status of children, and ultimately improving their overall well-being. To achieve equitable and high-quality education in Indonesia, it is important for the government to actively engage parents and businesses.

This can be achieved by encouraging collaboration between schools, parents, and communities to strengthen the quality of education. In addition, the government must prioritize effective management of school resources, including infrastructure, policies, and human resources.

In addition, the government must instill credibility and capacity in managing the education sector to gain public trust. Unfortunately, they can ensure that one child in Indonesia has access to good education and equal opportunity to sell their profits. In addition, government officials, bureaucrats, and practitioners must undergo a fundamental change in mindset and demonstrate their commitment to improving education. They must actively combat corruption, implement consistent and effective education policies, and strive to realize a comprehensive and sustainable education system. Through these efforts, the Indonesian government can take significant steps in reducing the prevalence of stunting and promoting quality education for all children.

The implementation of educational technology initiatives in ASEAN countries requires consideration of economic development, infrastructure, and policies. Each country in the region faces unique challenges and preferences when adopting educational technology.

Theoretical Framework

This study is grounded in the concept of health communication, which examines how information related to health behaviors is produced, transmitted, and interpreted within a community. Health communication emphasizes the importance of message clarity, credibility, and accessibility in influencing behavioral change. In the context of digital transformation, health communication increasingly relies on digital platforms to expand the reach and effectiveness of health messages. The e-HDW application functions as a digital communication tool that facilitates real-time data sharing, enables targeted messaging about nutrition, and strengthens interactions between cadres, health institutions, and families. By integrating digital communication into community-based health programs, the e-HDW system supports more responsive and participatory communication processes, making it an essential component in stunting-prevention strategies.

The first theoretical lens used in this study is Diffusion of Innovation (DOI) Theory. This theory explains how an innovation is communicated through certain channels over time among members of a social system. DOI begins with the introduction of an innovation, followed by the role of change agents, and finally adoption by the community. In this study, the e-HDW application is positioned as the innovation introduced to improve stunting monitoring and prevention. KPM act as change agents responsible for disseminating information, promoting the innovation, and guiding families in its utilization.

Meanwhile, the community, especially households with toddlers, serve as the adopters of the innovation. Key factors affecting adoption—such as relative advantage (e-HDW's ability to provide real-time, accurate health data), compatibility (alignment with existing Posyandu routines), complexity (ease of use by cadres and families), and observability (visible improvements in children's nutrition)—are central in explaining why the e-HDW was increasingly accepted in Bengkalis Regency.

The second theoretical perspective is the Health Belief Model (HBM), which focuses on individual perceptions that motivate health-related behaviors. HBM includes several key constructs: perceived susceptibility (awareness of a child's risk of stunting), perceived severity (understanding of long-term developmental impacts), perceived benefits (belief that using e-HDW helps prevent stunting), perceived barriers, cues to action, and self-efficacy. The e-HDW application supports these constructs by providing families with concrete, visual growth-monitoring data, personalized recommendations, and alerts that act as cues to action.

For example, when toddlers' measurements indicate abnormalities, the system triggers follow-up communication from cadres, which increases parental perception of risk and encourages timely behavioral changes. Thus, the features of e-HDW help reshape parental beliefs and reduce barriers to adopting healthier childcare practices.

Finally, this theoretical framework guides the qualitative case-study approach used in this research. The study explores how communication processes, digital innovation adoption, and changes in health perceptions interact to influence the reduction of stunting prevalence in Bengkalis Regency. Data were collected through questionnaires, interviews, observations, and documentation involving the National Population & Family Planning Board (BKKBN), the Health Office, KPM, Village Institutions, Health-Center Officers, and community members involved in Posyandu activities. By connecting health communication, DOI, and HBM, this research provides a comprehensive understanding of how digital communication technologies can strengthen community health interventions.

Material and Methodology

This research approach uses a descriptive method with a qualitative approach. The descriptive method is defined as a problem-solving procedure that is investigated by describing the state of the subject / object of research. (a person, institution, community and others). This method is not limited to the collection and compilation process of data, but also includes the analysis and interpretation of the data itself so that it will provide an adequate interpretation of the facts in the field.

These special considerations, for example, are people who are considered to know and master the topic to be studied, making it easier for researchers to explore the objects or social situations to be investigated. In this study, the methods used to collect data are by observation, interviews, and documentation. The data analysis technique used in this study is the spiral model initiated by Creswell (2018), namely using the stages of organizing data, making memos, classifying codes into themes, developing interpretation assessments and data presentations. This research was conducted by interviewing several authorities involved in managing stunting, namely the social services and health services in Bengkalis Regency. Additionally, the team had the opportunity to hold a focus group discussion with relevant agencies.

Result and Discussion

This study also applies the concept of health communication, which closely intersects with the growing system of digitalization. Health communication not only focuses on delivering messages about healthy behavior but also examines how these messages are encoded, disseminated, interpreted, and acted upon by individuals and communities. In the digital era, this process is strengthened through technologies such as the e-HDW application, which enables faster, more accurate, and data-driven communication about nutrition, sanitation, and stunting prevention.

Integrating health communication with digital systems shifts traditional one-way messaging toward a more participatory communication model. Through platforms like e-HDW, cadres and families are not only recipients of information but also active contributors of data and decision-making. This aligns with frameworks such as the Health Belief Model and Diffusion of Innovation, where behavior change is influenced by the quality, clarity, and accessibility of information. Thus,

digital health communication creates a more effective and responsive system to support community-level behavior change in stunting prevention.

The e-HDW application is a digital platform designed to monitor and improve children's nutrition and health. Parents, caregivers, and health service providers can use this app to find out about their children's nutrition, growth patterns, and health status during that time. It helps parents and caregivers make informed decisions about their child's diet. The application provides recommendations and guidelines that are set for good feeding. By using the E-HDW application, families can monitor their children's nutritional intake and ensure a balanced nutritional intake.

First, the synergistic and collaborative efforts with a multi-sectoral approach involved in this activity have provided quite satisfactory results. Whenever every department public service with various stakeholders—such as health professionals, government, and communities—working together synergistically through the application to combat stunting. The use of the e-HDW Application is the result of a collaborative effort involving various stakeholders such as health workers, government, and communities. These stakeholders work together synergistically to combat stunting by utilizing the features and recommendations provided by the E-HDW application.

They collaborate to ensure the implementation of effective preventive measures, such as promoting a healthy and clean lifestyle, ensuring access to nutritious food, and providing education on the right way (Inggriani, 2022).The practice of providing free feeding to children who are detected as stunted during. This is also welcomed by mothers and families. Posyandu becomes a magnet for the community to check their toddlers. Where visitors to posyandu in Bengkalis Regency continue to increase not only for underprivileged families but also for wealthy families. This causes KPS data collection in each sub-district to be more effective and efficient.

Elaboration of stunting prevention is a priority for local governments and other stakeholders. Implementation of the program and how the e-HDW application helps this initiative. Stunting prevention is a top priority for local governments and other stakeholders involved in this project. They are aware of the long-term economic losses and negative health impacts caused by stunting and therefore they prioritize efforts to address this issue (Suratri, 2023; Yesicha, 2023). The e-HDW app plays a critical role in this initiative, as it provides an easy-to-use platform to monitor and improve children’s nutrition and health. Parents, caregivers, and health service providers can access the app and receive personalized recommendations and guidelines to develop better diets. In addition, the e-HDW app facilitates the implementation of various interventions, such as encouraging exclusive breastfeeding, promoting a diverse and nutritious diet, and advocating for proper complementary feeding practices (Hadi, 2021; Mediani, 2020).

This is an interesting thing found in Bengkalis Regency where the synergy is coordinated by the Secretariat of the Stunting Reduction Acceleration Team. Through reports via E-HDW which will provide a signal that there are indications of stunting findings. The team then coordinates with related agencies such as the Social Affairs Office, Health Office, BKKBN, Regional Development Planning Board (Bappeda), Family Potential Development Agency (DPPKB), and the Fisheries Office. They will follow up to provide free food assistance for children for 3 months.

Getting started with the E-HDW application

The problem of stunting is very important to solve, because it can disrupt the potential of human resources and is related to the level of health, even child mortality. Stunting is a condition characterized by a lower height for children of the same age. Simply put, stunting is a term that refers to growth problems in children. Inadequate nutrition during a child's growth period is the main cause of stunting. Stunting is a condition in which a baby in the first 1000 days of life experiences long-term malnutrition and causes stunted brain development and child growth (Susanti, 2022; Nurjazuli. 2023).

As a result, stunted babies grow shorter than the standard height of toddlers throughout their lives due to chronic malnutrition. However, it should be noted that short stature is not always a sign of stunting, while short stature is not necessarily a sign of stunting. Stunting is a disorder of growth and brain development in children caused by a lack of psychosocial stimulation, repeated infections, and poor nutritional intake. A child who suffers from stunting has a length or height that is shorter than his age. The intelligence level of stunted children will not be optimal. Children who suffer from stunting are also at risk of decreased productivity in the future and are more susceptible to disease.

Strategies to Overcome Stunting. It should be noted that stunting cannot always be avoided or corrected in the first thousand days of life. So, interventions to prevent stunting can be done until the baby is two years old. Every policy maker, from the central to the village level, must understand their role and responsibility in dealing with stunting through sensitive nutrition and specific nutrition interventions, which are carried out to achieve targets in the first 1000 days of a child's life from birth to 23 months (Arfiyansyah 2022).

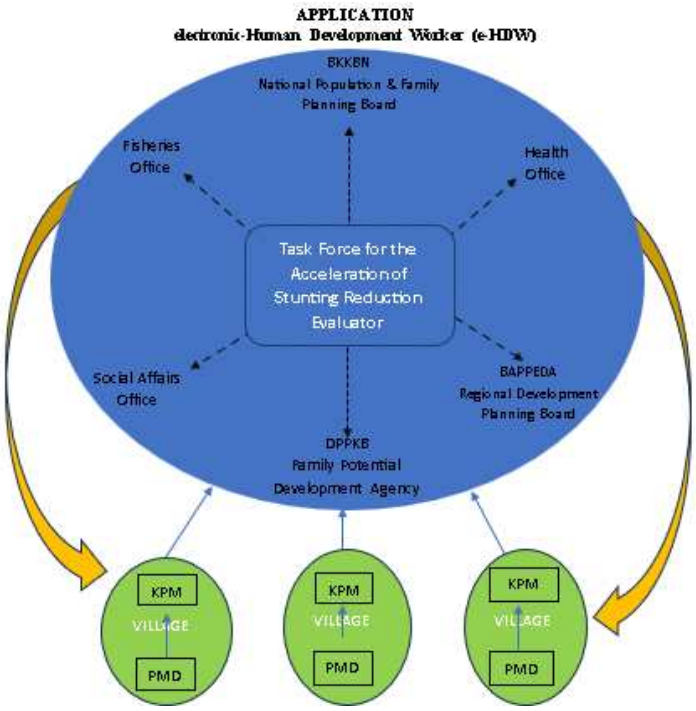
Role-HDW Overcoming Stunting in Bengkalis Regency

Specific nutritional interventions are usually carried out by the health sector. One of the tasks of the health office is to monitor nutritional conditions through the use of an application known as ePPGBM, which stands for Community-Based Electronic Nutrition Recording and Reporting. The e-HDW application is a community-based digital system for recording and reporting nutritional data. It allows nutrition officers and cadres at Posyandu to input individual measurements, such as children's weight and height, which are then processed into nutritional status automatically. This digital approach replaces manual recording and provides faster, more accurate, and consistent information. The data generated from the application supports health centers and policymakers in monitoring nutrition problems and evaluating program performance. With real-time and reliable information, decision-makers can plan and implement targeted interventions to improve children's nutritional conditions at both the community and regional levels.

With the available information, community nutrition management activities can be carried out quickly, accurately, regularly, and sustainably for each village in Bengkalis Regency. This technical guideline can improve the knowledge and skills of Puskesmas nutrition officers in conducting nutrition surveillance by changing nutrition recording and reporting into community-based data. This will meet the expectations of various parties for the availability of information on nutritional status and the achievement of community nutrition development targets and targets in an area quickly, accurately, regularly, and sustainably, as well as positive impacts related to health.

Although sensitive nutrition interventions are usually carried out by other sectors, the Bengkalis Regency government collaborates with the private sector, civil society organizations, universities, experts, religious organizations, professional organizations, development partners, and other policy makers to accelerate the implementation of this nutrition improvement program. Therefore, policy makers must work together well and reliably to obtain optimal results. This strategy is implemented at all levels of government and involves various government and non-government institutions, such as the private sector, communities, and the community.

Figure 1. Reporting Workflow From the e-HDW App In Bengkalis District



Source: Processed Researcher, 2024

One of the responsibilities of the Bengkalis Regency stunting reduction acceleration team is to organize, synergize, and evaluate the implementation of stunting reduction acceleration in a convergent, integrated manner, and involving cross-sectors in the Bengkalis Regency government. The Stunting Reduction Acceleration Team (TPPS) is an important effort made by the local government to ensure that the stunting prevention and reduction intervention activity plan is implemented jointly between OPDs responsible for services and non-governmental institutions. The Regent, as the primary authority, delegates responsibility to the Regional Government Agency (OPD) in charge of community and village empowerment to plan mobilization activities. Actions are taken by the Stunting Control Task Force after the e-HDW application is monitored. Addressing the district, facilitating, coordinating, and providing consultations related to the acceleration of stunting reduction are the tasks assigned to them. Delegation to OPDs includes: Efforts to handle, prevent the population, and incentives for family planning by the Population Control Service, such as prospective brides, pregnant women, toddlers, and the availability of family data.

The government has established a National Strategy for Accelerating the Prevention of Stunting with the aim of accelerating the reduction of stunting throughout the country through nutritional interventions, health interventions, planning and budgeting, and social assistance based on five pillars:(Arifin et al., 2023). The third pillar, which includes convergence, coordination, and consolidation of central, regional, and village programs, as well as the role of parties, aims to increase convergence through coordination and consolidation of programs and activities and parties. (Admministrator Desa Badamita 2024).

Convergence actions to reduce stunting in Bengkalis Regency are carried out through the implementation of eight (eight) convergence actions; (1) Situation Analysis; (2) Activity Plan; (3) Stunting Discussion; (4) Regent Regulation on Village Role; (5) Development of Human Development Cadres; (6) Data Management System; (7) Measurement and Publication of Stunting Data; and (8) Annual Performance Review.

Planning, budgeting, implementation, monitoring, and evaluation of programs or activities are the eight steps of convergence. Convergence actions are carried out through specific nutrition interventions, activities that directly address stunting such as food intake, (Ayub et al., 2022)infections, maternal nutritional status, infectious diseases, and environmental health) and sensitive (efforts to prevent and reduce nutritional problems indirectly, which are usually carried out by non-health sectors).

The target of the First 1000 Days of Life (HPK) Household can access the services of 20 nutritional quality indicators that can be accessed by the entire family. Actions were taken by the Control Task Force after the e-HDW application was monitored.

Bengkalis Regency is a regency of twelve regencies/cities in Riau Province with the lowest and very high stunting rate. The Deputy Regent of Bengkalis conveyed seven achievements that have been achieved by Bengkalis Regency.

The success in prevalence stunting in Bengkalis Regency is inseparable from the strong synergy and commitment across all levels of the regional government. *First*, there is solid and directed cooperation demonstrated through the full support of the Regent, Vice Regent, and Regional Secretary as the Chair of the TPPS, as well as the active involvement of all relevant regional apparatus (OPD). Intensive supervision and collaboration are also carried out by Forkopimda, vertical agencies, sub-district heads, village heads, and urban village heads, who collectively play a role in accelerating the reduction of stunting.

Second, coordination among parties is facilitated regularly through coordination meeting forums and stunting discussions, which serve as spaces for collective program discussion and problem-solving. *Third*, the local government also launched the flagship program *"Dana Bermasa"* which enables the implementation of interventions down to the grassroots level, namely villages and target families.

Fourth, the issuance of Regent Regulation Number 24 of 2021 concerning the Role of Village Government in the Prevention and Mitigation of Stunting serves as a legal basis that strengthens village involvement. *Fifth*, the designation of villages and sub-districts as focus locations for sensitive and specific nutrition interventions through the Regent's Decree No. 663/KPTS/IX/2022 has become a strategic step in strengthening target objectives.

Sixth, Bengkalis Regency also formed a number of field assistants, consisting of 19 Family Planning Field Instructors (PLKB), 33 members of the Proud Family Planning Team, 136 KPM, and 978 Family Assistance Teams (TPK). These cadres play an active role in mentoring, socialization, and education for families at risk of stunting.

Seventh, as a form of direct support for vulnerable families, the local government also provides supplementary food (PMT) and integrated social assistance. These various efforts overall reflect a structured, participatory, and sustainable convergent approach in addressing stunting at the local level.

A number of concrete actions have been taken by the Bengkalis District Government to accelerate the reduction of stunting, reflecting a strong commitment to integrated, data-driven, and community-based approaches. *First*, the designation of focus intervention areas (lokus) was formalized through the Regent's Decree Number: 663/KPTS/IX/2022, which established specific villages and sub-districts as priority locations for targeted stunting interventions. *Second*, substantial budget allocations have been made to support these efforts. In 2022, the Bengkalis Regional Budget (APBD) allocated approximately IDR 28.89 billion for stunting reduction programs. This allocation increased significantly in 2023 to IDR 39.22 billion, excluding additional special financial assistance amounting to IDR 1 million per sub-district, village, and sub-district administrative unit.

Third, stunting coordination meetings (*rembuk* stunting) have been consistently conducted not only at the district level but also across 11 sub-districts and 136 villages, ensuring alignment and commitment across all levels of governance. *Fourth*, the legal framework supporting village-level engagement was strengthened through the issuance of Regent Regulation Number 24 of 2021, which explicitly defines the role of village governments in preventing and managing stunting in an integrated manner. *Fifth*, capacity-building efforts were also prioritized. The local government facilitated coaching and training for 136 KPM, 518 Integrated Health Posts (Posyandu), 978 Family Assistance Team (TPK) cadres, and 155 community-based institutions across villages and sub-districts. These grassroots actors serve as the front line in implementing stunting prevention and intervention programs.

Moreover, the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration (Kemendes PDTT) has actively supported these initiatives through national policy. A key innovation is the launch of the e-HDW 2.0 application—a digital platform designed to strengthen convergence efforts by enabling KPM to detect stunting issues in real-time and facilitate the development of community-based intervention proposals. This tool empowers village governments and communities to take a more active and informed role in addressing stunting at the local level.

Who uses e-HDW?

KPM are selected community cadres who demonstrate concern for local development and are committed to contributing to human development at the village level, especially in monitoring and facilitating the convergence of stunting reduction. KPM plays a role in inviting community and institutional participation in the planning process, implementing activities and monitoring. KPM also needs to coordinate with program actors and other institutions such as village midwives, other health center officers (nutritionists, sanitarians), PAUD teachers and village officials or institutions.

In Bengkalis there are 136 KPM according to the number of villages, 136 Villages, 11 Sub-districts. KPM are village residents who are selected through village deliberations to assist the village government in facilitating village communities to plan, implement and supervise human resource development activities in the village. More specifically, KPM facilitates the implementation of integrated prevention and reduction of stunting at the village level. KPM come from the community itself such as Posyandu cadres, PAUD teachers, and other cadres in the village. The Regent/delegates authority to OPDs responsible for community and village empowerment affairs to provide guidance to KPM through the village government.

The purpose of KPM coaching is to ensure that KPM mobilization in all villages in Bengkalis district runs well and KPM performance can be optimal in accordance with their duties and roles. The steps that need to be taken by the district/city government so that KPM coaching runs well include: (1) Determination of KPM tasks in implementing the integration of prevention and reduction of stunting at the village level; (2) Identification of resource availability and KPM financing operations; (3) Development of an incentive system based on improving KPM performance; (4) Synergizing the performance of KPM with the Service Office (OPD) related to efforts to prevent and reduce stunting; (5) The e-PPGBM (electronic Community-Based Nutrition Recording and Reporting) application by the Ministry of Health

E-PPGBM is monitoring the growth of toddlers as part of the minimum service standards that must be carried out in the region. The nutritional status of the community in general is a data requirement in the region to find out how big the nutritional problem is in the area as a basis for planning activities and evaluating performance and what interventions will be carried out by stakeholders. Given the importance of this data, an accurate recording and reporting system is needed that describes each individual.

The integrated nutrition information system or Integrated Nutrition Information System is an integrated system to find out the nutritional status and performance of the program, which can be used to identify problems, needs and as a material for decision making and community nutrition program policies. Integrated Nutrition Information System is used to record and report nutritional data, both target data for each individual, nutritional status through the e-PPGBM module, PMT data sourced from the APBN and from the APBD, making PMT distribution administration through the PMT Distribution module and also aggregate performance coverage as a routine report through the Routine Report (Sigizi) module.

To facilitate the use of integrated nutrition and its modules, it is necessary to create an Integrated Nutrition Information System guidebook that is comprehensively related to nutritional surveillance: (1) Benefits of e-PPGBM Application; (2) Obtain individual target data; (3) Knowing the nutritional status of individuals quickly and accurately; (4) Quickly identify malnourished toddlers who need to be referred or treated; (4) Knowing toddler growth; (5) Monitoring supplementary feeding (PMT); (6) Answering nutritional indicators. The aim of Integrated Nutrition is to obtain information on individual nutritional status and nutrition program performance quickly, accurately, regularly and sustainably for the preparation of nutritional planning and policy formulation (Soekatri, Sandjaja, and Syauqy 2020; Untari 2020).

Explaining the impact and results of using the e-HDW application in combating stunting. The use of the e-HDW application in combating stunting has shown significant impacts and positive results in Bengkalis Regency. The application has contributed to increasing awareness and understanding of the causes and effects of stunting among the community. As a result, there has been a significant increase in the implementation of a healthy and clean lifestyle, as well as the implementation of proper feeding practices.

This has led to a decrease in the prevalence of stunting in children in the district. The e-HDW application also plays an important role in improving stakeholder coordination and collaboration. Through the application, data and information on stunting prevalence, nutritional status, and feeding practices are collected and monitored in real time. This allows for timely interventions and targeted support to children and families at risk of stunting. The e-HDW application also facilitates the evaluation and assessment of the effectiveness of various interventions and programs implemented to combat stunting.

In Bengkalis there are 136 Human Development Cadres according to the number of villages, 136 villages, 11 sub-districts. KPM are village residents who are selected through village deliberations to assist the village government in facilitating village communities to plan, implement and supervise human resource development activities in the village. More specifically, KPM facilitates the implementation of integrated prevention and reduction of stunting at the village level. KPM come from the community itself, such as Posyandu cadres, PAUD teachers, and other cadres in the village

In delivering information and messages at the lowest level, field officers must provide clear information about where it comes from so that it can be accounted for, because the source of the message is the credibility of the source that can be accounted for. KPM increases community and institutional participation in the planning, implementation, and monitoring of activities. KPM must also collaborate with other people involved in the program and other institutions, such as village midwives, other health center officers (nutritionists and sanitarians), PAUD teachers, and village institutions or staff. Maternal and child health, integrated nutrition counseling, sanitation and clean water, social protection, and early childhood education are the five stunting prevention service packages. The purpose of developing the e-HDW application and application guide is to assist operations in the field and function as a handbook for KPM.

According to research (1) Stunting is a growth disorder in children caused by malnutrition in the first 1000 days of life. Counseling is needed to educate mothers regarding prevention so that no more children experience stunting.

Discussion

Despite the success of the e-HDW application in combating stunting, challenges and future directions must be acknowledged. Some of the challenges faced are ensuring sustainable funding and resources for the continued operation and maintenance of the application, overcoming access barriers, such as limited internet connectivity in remote areas, and ensuring the relevance and effectiveness of the application in different cultural contexts. In addition, ongoing research and evaluation are needed to continuously improve the functionality and effectiveness of the e-HDW application. These challenges can be addressed by strengthening partnerships with relevant stakeholders, advocating for increased funding and support from government and non-government organizations, and conducting regular assessments to identify areas for improvement and innovation.

The application can be a key tool in combating stunting, with its potential to reach a large number of users and provide personalized, data-driven solutions. This makes it easier for workers to assist reporters in preventing and managing stunting appropriately. They criticized the government for creating multiple applications with the same reporting data. In conclusion, the e-HDW application has played a significant role in combating stunting and improving the overall health and nutrition status of children in the district. It has the potential to be scaled up and implemented in other areas. The E-HDW application has proven to be a valuable tool in addressing stunting and improving children's health in the district. Bengkalis Regency can be a role model for other regions.

However, it is important to acknowledge the challenges and future directions of e-HDW applications. Some of the challenges faced include ensuring sustainable funding and resources for the operation and maintenance of the application, overcoming access barriers such as limited internet connectivity in remote areas, and ensuring the relevance and effectiveness of the application in different cultural contexts (Widyaningsih et al., 2022). In addition, ongoing research and evaluation are needed to continuously improve the functionality and effectiveness of the E-HDW application. These challenges can be addressed by strengthening partnerships with relevant stakeholders, encouraging increased funding and support from government and non-governmental organizations, and conducting regular evaluation and review to identify areas for improvement and innovation. The

e-HDW application has the potential to be a key tool in combating stunting and improving children's health and nutrition (Suryana & Azis, 2023).

In addition, ongoing research and evaluation are needed to continuously improve the functionality and effectiveness of the E-HDW application. These challenges can be addressed by strengthening partnerships with relevant stakeholders, encouraging increased funding and support from government and non-governmental organizations, and conducting regular evaluation and review to identify areas for improvement and innovation. The e-HDW application has the potential to be a key tool in combating stunting and improving children's health and nutrition (Beal et al. 2018;Rahman, Rahmah, and Saribulan 2023).

The e-HDW application has shown promising results in overcoming stunting and improving children's health and nutrition in Bengkalis District (Nurjanah et al., 2024). The e-HDW application has the potential to be expanded and modified in other areas, making Bengkalis District a model for other areas (Zulianda et al., 2020). Family function, knowledge and attitudes are very important for children's nutritional status. These three things are related to each other, so that advice on nutrition is not only given to mothers. It also involves the extended family where children and mothers live and are cared for together (Rachmawati et al., 2021).

The e-HDW application has the potential to significantly improve the overall health and well-being of children in the district. In conclusion, the e-HDW application has a provaluable tool in addressing stunting and improving children's health in Bengkalis District. As a result, other districts can look to Bengkalis District as a model to implement similar initiatives and improve children's health and nutrition outcomes in their respective areas (Hasanah, Aryani, and Effendi, 2023; Sevilla, Nugroho, and Turymshayeva 2024).

Successful implementation and replication of the e-HDW application in other areas depends on addressing a number of challenges, including sustainable funding and resources, access barriers, cultural sensitivity, and ongoing evaluation and refinement. In conclusion, while the e-HDW application has shown promising results in addressing stunting and improving children's health and nutrition in Bengkalis District, it is important to acknowledge the challenges that need to be addressed for its successful implementation and replication in other areas (Suryana, 2023; Titaley, 2019; Sudigyo et al. 2022). The e-HDW application has shown potential as a valuable tool in addressing stunting and improving children's health and nutrition outcomes, especially in Bengkalis District (Samonte et al., 2018).

The implementation of the e-HDW application in Bengkalis Regency has shown high effectiveness in reducing stunting rates. The use of this application not only functions as a monitoring tool, but also as a digital-based health education and communication media that directly targets target households.

Cross-Sector Collaboration and Community Acceptance are the points of success. The success of the implementation of the e-HDW application cannot be separated from the involvement of various stakeholders such as the Health Office, BKKBN, KPM, and the community. This collaboration accelerates the process of monitoring nutritional status and increases community participation, especially through Posyandu. This coordination model is in line with the principle of program convergence in the National Strategy for Stunting Reduction.

Human Development Cadres (HCD) play a key role in disseminating information, motivating target families, and bridging technology with grassroots communities. The role of HCD as a change agent accelerates the adoption of applications, in accordance with the principle of Diffusion of Innovation. Interpersonal interactions carried out by HCD build trust and strengthen community understanding.

Based on the Health Belief Model, the e-HDW application helps improve the perception of stunting risks and the benefits of preventive measures. People who previously did not understand the importance of 1000 HPK are now starting to implement healthy eating patterns and good sanitation. This success can be seen from the increase in maternal participation in nutritional counseling and utilization of Posyandu services. This changes their behavior and nutritional awareness.

Measurable Effectiveness and Challenges of Implementing Stunting Reduction are shown from data showing the prevalence of stunting from 21.9% in 2021 to 12.6% in 2024 in Bengkalis Regency. However, challenges remain, such as limited internet access in remote areas and the need to improve

digital literacy. These challenges need to be addressed with ongoing training for KPM and strengthening infrastructure support.

By combining the development communication approach and digital technology, the e-HDW application has proven to be an effective innovation. Bengkalis Regency can be an example of the success of technology-based communication in public health policy. Thus, it can be said that the e-HDW application has the potential to contribute significantly to improving children's health and nutrition outcomes in various regions if implemented and repeated effectively while addressing the specific challenges and considerations unique to each region. It is hoped that the program that is implemented can be a role model and comparison for other districts in Riau and Indonesia.

Despite the program's success in reducing stunting, one key insight emerged from a KPM's statement during a focus group discussion (FGD): many women expressed frustration over their inability to afford nutritious food for their children, while at the same time, male family members particularly fathers were still able to spend money on cigarettes. This paradox highlights a critical behavioral and cultural barrier that undermines stunting prevention efforts.

This observation suggests that economic constraints are not solely structural but are also influenced by household spending priorities and gender-based decision-making patterns. Therefore, future government interventions should not only focus on increasing access to nutritious food but also address harmful consumption behaviors, such as tobacco use, that directly or indirectly compromise family nutrition.

To strengthen the program's impact, it is recommended that stunting prevention strategies integrate behavioral change communication (BCC) targeting fathers. These campaigns should emphasize the consequences of prioritizing non-essential spending (e.g., cigarettes) over children's nutrition and well-being. Public health messaging could be embedded within local health services, Posyandu sessions, or digital platforms like e-HDW to reach both men and women in the household.In parallel, policy-level interventions—such as stricter tobacco control regulations, targeted sin taxes, or conditional cash transfers (CCTs) linked to household nutritional behavior—could provide stronger incentives for families to redirect spending toward children's health. By aligning health communication with broader social protection and fiscal policies, the government can more effectively tackle the root causes of nutritional neglect in stunting-prone households.

Conclusion

The health services and programs implemented by Posyandu in Bengkalis District have proven effective in increasing community participation in health initiatives, particularly in stunting prevention. The presence of the Human Development Cadre Task Force (KPM) as facilitators and evaluators plays a central role in data collection, monitoring, and inter-agency coordination, especially when immediate action is needed. Strong synergy between the community, KPM, and government institutions has been the key to program effectiveness.

The use of the e-HDW application as a digital reporting tool enables real-time monitoring of children's nutritional status, allowing for timely and targeted interventions. This technology also supports more focused health communication strategies, enhancing public awareness about balanced nutrition and proper parenting practices. Active community involvement through Posyandu activities creates a supportive environment for community-based health interventions.

However, insights from the field reveal that household financial decisions particularly the prioritization of non-essential spending such as cigarettes over children's nutrition remain a significant behavioral barrier. To address this, future government programs should integrate behavior change communication targeting fathers, aiming to shift spending priorities toward child well-being. Combining stunting prevention with broader efforts in tobacco control and family-centered health education can further strengthen the program's impact. Therefore, the combination of communication technology, cadre involvement, community engagement, and behavioral reform offers a comprehensive and replicable strategy for reducing stunting prevalence across regions.

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