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Research Article

Determinants of Health Data Utilization by Posyandu Cadres for Toddlers as a Stunting Prevention Effort in Geneng Subdistrict, Ngawi Regency

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Abstract: Stunting remains one of the major public health issues at the national level in Indonesia. As an archipelagic country, Indonesia faces unique challenges in tackling stunting, particularly in regions with limited access to healthcare services. Advances in information technology offer new opportunities to support stunting prevention efforts, including through the utilization of health data. Such data can be used to detect stunting risks early and to monitor children's nutritional status more effectively. The use of health data applications or systems by Posyandu cadres is influenced by various factors, including availability of time, cost, level of trust, and perceptions of ease of use and usefulness. This study aims to identify the determinants of health data utilization by Posyandu cadres for toddlers as a stunting prevention effort in Geneng Subdistrict, Ngawi Regency. This research is an analytical quantitative study with a cross-sectional approach. A sample of 80 Posyandu cadres for toddlers in Geneng Subdistrict was selected using purposive sampling. Data were collected through questionnaires and analyzed using univariate, bivariate, and multivariate logistic regression tests to identify the factors influencing the use of health data in stunting prevention. The results show that the significant determinants include the age of the Posyandu cadre, their education level, and the amount of time they dedicate to Posyandu activities. The determinants of age, education level, and time significantly influence the utilization of health data and thereby affect the optimization of stunting prevention. Strengthening cadre capacity in these aspects is necessary to support more effective stunting prevention.

Keywords: Determinants, Cadre, Posyandu, Toddlers, Stunting.

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1. Introduction

Stunting is a chronic nutritional problem that has long-term impacts on the quality of human resources and remains a major challenge in health development in Indonesia. Based on the Nutritional Status Monitoring (PSG) data over the past three years, the prevalence of stunting has been recorded as the highest compared to other nutritional problems such as undernutrition, wasting, and overweight. The 2023 Indonesian Health Survey (SKI) showed that the national stunting prevalence slightly decreased from 21.6% (SSGI 2022) to 21.5%. Although this decline reflects a downward trend over the past ten years (2013–2023), the prevalence of stunting in Ngawi Regency in 2023 remained relatively high at 28.5%. One of

the key efforts in preventing stunting is monitoring the growth and development of children under five at the community level, which is carried out by Posyandu cadres as part of the community based health system. These cadres play a strategic role in the recording and utilization of health data, which can serve as the basis for early detection and prompt intervention in stunting cases within their areas.

Various approaches have previously been used to empower cadres in stunting prevention efforts, such as module-based training, the use of the Maternal and Child Health (KIA) handbook, and digital recording applications like e-PPGBM. Although these approaches have shown varying results, limitations in implementation are still found, including the suboptimal use of health data by cadres, limited digital literacy, and constraints in time and resources. On the other hand, information technology has proven effective in accelerating decision making processes in public health, including for the early detection of child nutrition problems.

The main issue addressed in this study is the low utilization of health data by Posyandu cadres for toddlers as a basis for stunting prevention interventions. To address this challenge, the study proposes an approach based on the analysis of individual determinants possessed by cadres that influence their use of health data. This approach is expected to provide deeper insights into the factors that need to be strengthened in cadre empowerment programs.

The main contributions of this study are: (1) identifying the factors that influence the utilization of health data by Posyandu cadres; (2) providing community-based empirical evidence that can be used by policymakers to design training or digital interventions; and (3) strengthening the role of data as a decision-making tool at the level of primary health services. The structure of this article is as follows: the second section presents the research methodology; the third section provides the results and analysis; the fourth section discusses the implications of the findings; and the fifth section concludes with recommendations for policy implementation and future research.

2. Literature Review

2.1. Stunting as a Public Health Issue

Stunting is an indicator of chronic nutritional status that reflects growth failure due to prolonged nutritional deficiencies, particularly during the first 1,000 days of a child's life. According to the World Health Organization (WHO, 2020), stunting affects cognitive development, academic achievement, and long-term economic productivity. A study by Dewey and Begum (2011) found that untreated stunting early in life increases the risk of lower IQ and reduced earnings in adulthood.

2.2 The Role of Posyandu Cadres in Stunting Prevention

Posyandu cadres are the frontline of village-level health services, especially in monitoring the growth and development of toddlers. A study by the Indonesian Ministry of Health (2020) stated that the success of community-based nutrition interventions is highly influenced by the active role and competence of the cadres. Research by Sari et al. (2022) in Sleman Regency showed that cadres who understand the importance of health data are more consistent in delivering nutrition education and following up on toddlers at risk of stunting.

2.3 Utilization of Health Data in Nutritional Interventions

The utilization of health data is a crucial aspect in planning evidence-based nutritional interventions. A study by Nugroho and Handayani (2021) showed that the use of data from e-PPGBM can improve the accuracy of decision-making in nutritional interventions. However, challenges remain, particularly related to the limited understanding of digital systems by cadres and the consistency of data recording. On the other hand, research by Wulandari et al. (2023) highlighted that cadres with lower educational backgrounds tend to face difficulties in interpreting data and using it as a basis for action.

2.4 Factors Influencing the Utilization of Health Data

Several factors are known to influence the intensity and quality of health data utilization by healthcare workers and cadres. Ramadhani (2020) stated that age, education level, workload, as well as perceptions of the usefulness and ease of technology are the main determinants in adopting health information systems. According to Prasetya and Lestari (2019), the available time to access and analyze data is a crucial factor .

2.5 Research Gap

Most previous studies have focused on data utilization by formal healthcare workers, while research examining the factors influencing Posyandu cadres in using health data remains limited. There is a lack of studies that specifically investigate the role of individual cadre variables in affecting the effectiveness of data utilization as a stunting prevention effort.

3. Proposed Method

The method used in this study is an analytical quantitative approach with a cross-sectional design. This approach aims to identify and analyze the factors influencing the utilization of health data by Posyandu cadres for toddlers in stunting prevention efforts. The research location was set at Posyandu within the working area of Puskesmas Geneng, Ngawi Regency, considering the relatively high prevalence of stunting in this area and the significant role of cadres in managing health data to prevent new cases.

The population in this study consisted of all active Posyandu cadres for toddlers distributed across all villages in Geneng Subdistrict. The sampling technique used was purposive sampling with inclusion criteria: cadres who have been active for at least the past year, directly involved in weighing and recording toddler nutrition data, and willing to participate as respondents. Based on these criteria, a total sample of 80 eligible Posyandu cadres was obtained**.**

Data collection was conducted using a structured questionnaire developed based on indicators for each variable and validated for reliability and validity. The questionnaire was distributed directly by the researcher to the cadres at each Posyandu, with assistance provided during the completion process. The collected data were analyzed in three stages. First, univariate analysis was performed to describe the distribution of respondent characteristics and research variables. Second, bivariate analysis using the Chi-Square test was conducted to examine the relationship between each independent variable and the utilization of health data. Third, multivariate analysis using logistic regression aimed to identify the dominant factors influencing the utilization of health data by the cadres.

This study has obtained official approval from the Ngawi District Health Office and was accompanied by ethical clearance. All respondents were provided with a full explanation of the research objectives and were asked to complete an informed consent form before filling out the questionnaire. The personal data of the cadres were kept confidential and used solely for research purposes.

4. Results and Discussion

4.1. Results

Table 1. Table of Respondent Characteristics.

Variable	Category	Frequency (n = 80)	Precentage (%)
Age	< 30 years old	25	31,25
	30-40 years old	40	50
	>45 years old	15	18,75
Education Level	< High School Graduate	30	37,50
	≥ High School Graduate	50	62,50
Occupation	Housewife	55	68,75
	Freelance	25	31,25
Income	< IDR 1,500,000	30	37,50
	IDR 1,500,000 to IDR 3.000.000	35	43,75
	>IDR 3,000,000	15	18,75
Time for Posyandu	< 4 hours/week	35	43,75
	>4 hours/week	45	56,25

Based on Table 1, the majority of Posyandu cadres are aged between 30 and 45 years, accounting for 50%. Most cadres have at least a high school education level, totaling 62.5%. The majority of respondents are housewives (68.75%), while the rest are freelancers. In terms of income, 43.75% of cadres earn a monthly income between IDR 1,500,000 and IDR 3,000,000, while 37.5% earn less than IDR 1,500,000. Regarding the time allocated for Posyandu activities, most cadres (56.25%) have at least 4 hours per week available to carry out Posyandu duties. These characteristics are important to understand the socio-economic context and the capacity of cadres, which can influence the utilization of health data, especially in stunting prevention efforts.

Table 2. Data Utilization by Respondents.

Type of data utilization	Frequency (Respondents) (n = 80)	Precentage (%)
Recording in the Posyandu Register Book	76	95
Use of the Stunting Education Application	38	47,5
Use of the Early Detection Application	25	31,25
Use of the KIA Book	70	87,5
Utilization of Research Data	18	22,5
Use of AI-Based Technology	5	6,25

Based on Table 2, it shows that almost all Posyandu cadres (95%) recorded toddler data in the Posyandu register book, which is the most common form of data utilization. The Maternal and Child Health (KIA) Book is also widely used (87.5%) as a tool for monitoring and referring to nutritional and growth information of children. However, the utilization of digital technology such as the stunting education application and early detection application remains limited, with only 47.5% and 31.25% of respondents using them, respectively. This indicates potential for capacity building among cadres in digital literacy and the use of health-based applications. Meanwhile, 22.5% of cadres utilized research data as a basis for action, and very few (6.25%) have used Artificial Intelligence (AI)-based technology in decision-making or education processes. This suggests a gap in the utilization of innovative data sources for a more comprehensive stunting prevention approach.

Table 3. Table of Spearman Rank Correlation Test Results.

Variable	Correlation Value (ϱ)	p-value	Description
Age	0,411	0,002	Moderate, significant positive correlation
Education Level	0,521	0,000	Strong, highly significant positive correlation
Occupation	0,187	0,102	Weak, non-significant correlation
Income	0,203	0,075	Weak, non-significant correlation
Time for Posyandu	0,437	0,001	Moderate, significant positive correlation

Based on Table 3, the Spearman Rank test results indicate a significant positive correlation between cadre age ($\varrho = 0.411$; $p = 0.002$), education level ($\varrho = 0.521$; $p = 0.000$), and the time cadres allocate for Posyandu activities ($\varrho = 0.437$; $p = 0.001$) with the level of health data utilization. This means that the higher the productive age, better education, and sufficient free time, the greater the tendency of cadres to use data effectively to prevent stunting. Meanwhile, the variables of occupation and income did not show a significant relationship ($p > 0.05$), indicating that economic aspects or primary employment do not significantly affect cadres' data utilization practices in this context.

Table 4. Table of Logistic Regression Test Results.

Variable	B (Coefficient)	Sig. (p-value)	Exp (B)/OR	95% CI OR
Age	1,002	0,017	2,724	1,198 – 6,192
Education Level	1,354	0,005	3,873	1,504 – 9,975
Occupation	0,321	0,451	1,378	0,601 – 3,160
Income	0,446	0,253	1,562	0,735 – 3.321
Time for Posyandu	0,952	0,026	2,591	1,122 – 5,981
Constant	-2,376	0,002	0,093	-

Based on the logistic regression results in Table 4, it was found that three variable cadre's age, education level, and time allocated for Posyandu activities, have a significant influence on the utilization of health data by cadres in stunting prevention efforts. Cadres with older age have a 2.7 times greater chance of utilizing data compared to younger cadre (OR = 2.724; p = 0.017). Cadres with at least a high school education or higher tend to be 3.9 times more likely to use health data (OR = 3.873; p = 0.005). Meanwhile, cadres who allocate more time for Posyandu activities also show a 2.6 times higher likelihood of utilizing health data (OR = 2.591; p = 0.026).

4.2. Discussion

The results of this study indicate that there are three main determinants that significantly influence the utilization of health data by Posyandu cadres: the cadre's age, education level, and the time allocated for Posyandu activities. These three factors highlight the importance of individual characteristics in the successful management of data at the community level. The findings clarify that access to health data is not the only essential prerequisite; rather, the personal capacity of cadres to understand, process, and use the information is the key factor determining the effectiveness of data utilization for stunting prevention .

This study shows that older Posyandu cadres have a higher likelihood of effectively utilizing health data. This is reflected in their ability to use various supporting media such as the Maternal and Child Health (KIA) book, digital applications, and manual record-keeping, which all support the management of child health data. Additionally, age is often considered an indicator of experience; cadres who have been involved in Posyandu activities longer generally possess more mature skills and knowledge . These findings align with the study by Putri et al. (2021), which stated that age is significantly related to the effectiveness of community-based health program implementation. Psychosocially, adulthood is often associated with increased responsibility, social awareness, and emotional stability in carrying out service duties. According to Erik Erikson's psychosocial development theory, the middle adulthood stage is characterized by generativity versus stagnation, where individuals are motivated to make positive and meaningful contributions to their communities. This maturity supports the cadres' ability to manage information and make decisions that influence the success of stunting prevention at the community level .

Older cadres not only rely on practical experience but also possess a strong social motivation to play an active role in managing health data. Therefore, strengthening the role of senior cadres by involving them as mentors or facilitators can be an effective strategy to enhance the capacity of younger cadres. This approach allows for knowledge transfer while simultaneously reinforcing community commitment to sustainable stunting prevention efforts.

The study also showed that Posyandu cadres with secondary education or higher have better abilities in understanding and using health information. These cadres tend to have higher digital and information literacy, enabling them to access and interpret data in both written and digital forms, including stunting detection applications and health data dashboards. According to Nutbeam's (2000) health literacy theory, education plays a significant role in enhancing an individual's ability to access, understand, and apply health information in decision making . Higher education is also correlated with readiness to use new technologies, which is an important factor in the adoption of digital innovations in community health. Thus, education is the key to bridging the gap between available data and concrete actions in the field. Efforts to enhance cadre capacity through training based on digital and health literacy are crucial to strengthening their role in utilizing health data, particularly in the effective and sustainable detection and prevention of stunting .

The study results indicate that greater time allocation by Posyandu cadres significantly supports the utilization of health data. Cadres who dedicate sufficient time tend to be more active in attending training sessions, filling out forms and applications, and studying additional information sources such as research findings and the Maternal and Child Health (KIA) book. This enables them to gain a deeper understanding of the data and apply it effectively in service delivery. According to Ajzen's (1991) Theory of Planned Behavior, a person's behavior is influenced by their perceived control over available resources, including time. Time, as an essential resource, allows individuals to manage and perform tasks more effectively. Without sufficient time availability, cadres tend to perform only basic duties without engaging in data analysis or evidence-based interventions.

Adequate time management should be a focus in designing the work system for Posyandu cadres. Realistic scheduling and reducing unnecessary workload can enhance the effectiveness of health data utilization by the cadres. This approach is important so that cadres do not merely carry out routine tasks but are also able to contribute optimally to stunting prevention efforts through the use of accurate and appropriate data.

5. Comparison

This study complements and expands upon previous research that has predominantly focused on health data utilization by formal healthcare workers such as doctors, nurses, midwives, or nutritionists. Most current literature concentrates on the technical aspects and effectiveness of digital application use in health data management (Misnaniarti et al., 2020; Sari et al., 2022), yet studies examining the personal factors of Posyandu cadres in utilizing health data remain very limited . Unlike previous research, this study highlights three main determinants, cadres' age, education level, and allocated time, that significantly influence the effectiveness of data utilization in stunting prevention. The findings make an important contribution by integrating demographic and behavioral aspects, which have been largely overlooked in existing models of health data utilization at the community level. This approach complements the Theory of Planned Behavior (Ajzen, 1991) and health literacy framework (Nutbeam, 2000) with empirical data from the local context of Posyandu in the Geneng Health Center Work Area, Ngawi Regency.

The results of this study also underscore the importance of empowering Posyandu cadres by enhancing their educational capacity and time management as strategies to strengthen data-based stunting prevention. This contribution provides a foundation for developing more targeted interventions compared to approaches that rely solely on providing technology or digital applications without considering the cadres' capacities and conditions holistically. Thus, this research not only fills the gap in studies regarding the role of Posyandu cadres in utilizing health data but also offers practical recommendations for policymakers and public health program managers to improve the effectiveness of stunting prevention through a more personalized and contextual approach.

6. Conclusions

This study found that three main factors namely, the age of the cadre, education level, and the time allocated by Posyandu cadres, have a significant influence on the utilization of health data in stunting prevention efforts in Geneng District, Ngawi Regency. These results indicate that the personal capacity of the cadres is a crucial determinant of effective data use, not merely access to technology. The findings support the hypothesis that demographic and behavioral variables of the cadres play an important role in the success of community-based health programs. Therefore, empowering cadres through enhanced education and time management becomes a crucial strategy to optimize the use of health data.

The implications of this study contribute to the development of policies and empowerment programs for Posyandu cadres, focusing on training and realistic work time management. This is expected to enhance the effectiveness of data-based stunting prevention at the community level. The limitations of this study include a limited sample size and a cross-sectional approach that does not capture the dynamics of data utilization over time. Therefore, further research using longitudinal methods and larger samples is recommended to deepen the understanding of factors influencing the role of Posyandu cadres in stunting prevention.

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