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Logistic regression analysis to identify factors contributing to stunting cases

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ABSTRACT

Stunting is a condition characterized by impaired growth and development in children, caused by various factors such as poor nutrition, infections, and a lack of psychosocial stimulation. Indonesia is one of the Asian countries with a high prevalence of stunting. The increasing stunting rates have raised concerns about the nation's future generation. The aim of this study is to identify the factors contributing to stunting cases, particularly in Karangtengah Village, Sumberjo Village, Kumpulrejo Village, Kutoharjo Village, Krajankulon Village, and Sarirejo Village in Kaliwungu Subdistrict, Kendal Regency, using a logistic regression approach. The variables in this study include stunting status as the dependent variable, while the independent variables are gender, low birth weight (LBW), child disease history, marital status, maternal education, maternal height, pregnancy status, ANC history, maternal phone usage duration, maternal anemia history, child intake and nutrition, and hygiene and environmental conditions. Based on the analysis results, it was found that only the duration of maternal phone usage significantly influenced the occurrence of stunting in children, with a tendency value of 0.071.

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INTRODUCTION

Stunting is a growth and development disorder in children caused by several factors, including poor nutrition, infections, and lack of psychosocial stimulation (Putri & Rong, 2021). Children with stunting do not have a weight that aligns with the standard for their age. Their cognitive potential may not be fully realized due to damage to the brain. Short stature relative to their age can result from prolonged nutritional deficiencies and/or recurrent illnesses (Torlesse et al., 2016). Stunting, or malnutrition in early childhood starting from the womb, leads to chronic undernutrition. According to research reports. Research reports (Black et al., 2013) indicate that in low- and middle-income countries, maternal and child malnutrition includes both undernutrition and the growing issues of overweight and obesity. Although low body mass index, a marker of maternal undernutrition, has significantly declined over the past 20 years, it remains prevalent in Africa and Asia.

Indonesia, as one of the Asian countries, has a high prevalence of stunting. The Global Nutrition Report 2016 reported that the prevalence of stunting in Indonesia ranks 108th out of 132 countries. Indonesia is also one of the 17 countries facing a double burden of nutritional issues, encompassing both overnutrition and undernutrition (IFPRI, 2016). In Southeast Asia, Indonesia has the second-highest prevalence of stunting, after Cambodia. The Indonesian government continues to make efforts to accelerate the reduction of stunting rates. The stunting rate in Indonesia decreased from 24.4% in 2021 to 21.6% in 2022, according to the 2022 Indonesian Nutrition Status Survey (SSGI) results.

The results of the Indonesian Nutrition Status Survey (SSGI) are used to measure the stunting target in Indonesia. Previously, the SSGI was conducted every 3 to 5 years, but starting in 2021, the survey is conducted annually. According to the SSGI from the Ministry of Health, the prevalence of stunting among children under five in Central Java reached 20.8% in 2022. Central Java ranked 20th nationally in terms of stunting prevalence. There are 18 regencies/cities with stunting prevalence above the provincial average, while the remaining 17 regencies/cities fall below the average stunting prevalence in Central Java. Brebes Regency has the highest stunting prevalence in Central Java at 29.1%, according to the 2022 SSGI, an increase of 2.8 percentage points from the 2021 SSGI result of 26.3%.

The high increase in stunting rates has raised concerns about the future generation of Indonesia. The assessment of this high stunting rate is based on the World Health Organization (WHO) standard, which defines stunting prevalence as being under 20%. The high stunting rates in Indonesia continue to be monitored, studied, and efforts are being made to accelerate its reduction. In August 2017, the central government issued the National Action Plan (RAN) for stunting management, emphasizing convergence activities at the national, regional, and village levels, with priority given to specific nutritional interventions and nutrition-sensitive interventions during the first 1,000 days of life (HPK) until the child reaches 6 years old. The RAN for stunting management is built on five pillars, with the third pillar being the achievement of sectoral convergence. The implementation of the National Action Plan, outlined in the Regional Action Plan (RAD), aims to accelerate the prevention of stunting through health promotion strategies, including advocacy, social support, and community empowerment. WHO's standard for stunting prevalence must be below 20%. The Ministry of Health is conducting specific interventions in two main ways: nutritional interventions for mothers before and during pregnancy, and interventions for children aged 6 months to 2 years. To achieve the target of reducing stunting to 14%, a reduction of 3.8% annually for two consecutive years is required. This effort must be coordinated by BKKBN (National Population and Family Planning Board) in collaboration with other ministries and agencies.

Several factors are suspected to contribute to the increase in stunting rates, including inadequate consumption of deworming medication (Hermawan et al., 2023) (Adrizain et al., 2024), the provision of animal-based protein (Hermawan et al., 2023), Housing conditions, marital status, mother's employment status, child's age, and breastfeeding practices (Supadmi et al., 2024), and the socioeconomic status of the parents (Adrizain et al., 2024). Among the various factors, further study is needed, particularly regarding the influence of each factor on the increase or decrease in stunting cases. This needs to be aligned with several programs that have been implemented by the government. In the future, this can serve as a reference for decision-making in addressing stunting cases.

Muhammadiyah is one of the organizations actively supporting efforts to reduce stunting in Indonesia. One of the concrete steps taken by Muhammadiyah is the active involvement of Aisyiyah extension workers in the community, providing counseling and assisting in the reduction of stunting rates. Kendal Regency is one of the areas in Central Java with a primary focus on stunting reduction. This is particularly carried out by Aisyiyah in two subdistricts: Kaliwungu and Kaliwungu Selatan. Several activities have been undertaken as preventive measures against

stunting, including socialization for pregnant women, demonstrating and providing the B2SA menu (Varied, Nutritious, Balanced, and Safe), public campaigns (such as planting katuk leaves, seedling production, and fish farming), and interactive activities (such as playing with APE toys, consultations, and other games). Although several steps have been taken, stunting cases have not yet decreased, especially in Kendal Regency. Therefore, further research and analysis are needed to explore the factors contributing to stunting in this region, so that future efforts can more effectively reduce stunting cases.

Although aggregate data from Kendal Regency suggest a lower stunting prevalence (7.79% according to the 2024 e-PPGBM), disparities remain at the village level. Several villages in Kaliwungu Subdistrict report rates above the WHO threshold, justifying their selection as the focus of this study. The six villages (Karangtengah, Sumberjo, Kumpulrejo, Kutoharjo, Krajankulon, and Sarirejo) are considered priority areas that have received multiple interventions without achieving optimal outcomes (Kutnadi, 2024).

In addition to structural and nutritional factors, behavioral changes (particularly in parental digital device use) have emerged as important variables in parenting effectiveness. (McDaniel & Coyne, 2016) introduced the concept of technoference to describe how technology interrupts parent-child interactions. A systematic review by (Knitter & Zemp, 2020) found that excessive parental use of mobile devices reduces emotional closeness and responsiveness, negatively affecting children's psychosocial development, a key dimension in stunting prevention. While international studies have recognized the negative impact of digital distraction on parenting quality, research in the Indonesian context remains limited. Given the increasing digital penetration in rural communities, it is crucial to examine whether parental digital behavior influences caregiving quality and contributes to stunting.

Addressing stunting should not be done solely through a qualitative approach using interview methods (Priyono, 2020), as it only provides insights from one perspective, typically that of the interviewer's intended focus. The resolution of stunting issues is also approached through descriptive analysis to identify the key factors that can reduce stunting rates in a given area. This descriptive approach can only depict the stunting conditions in a specific area but cannot determine the magnitude of the influence of each factor contributing to the reduction of stunting rates in the region. Logistic regression analysis is an approach that can be used to examine the influence and likelihood of an event occurring (Agustina et al., 2017). Through the logistic regression analysis approach, it is expected to identify the most significant factors influencing the reduction of stunting cases in specific areas, particularly in Karangtengah Village, Sumberjo Village, Kumpulrejo Village, Kutoharjo Village, Krajankulon Village, and Sarirejo Village within Kaliwungu Subdistrict. In addition to identifying factors that affect the reduction of stunting, logistic regression can also determine the likelihood of stunting rates decreasing, as influenced by its determining factors.

Numerous studies on stunting have been conducted to reduce the number of stunting cases in Indonesia. Qualitative analysis approaches have been employed to examine parenting patterns, food availability, and mothers' knowledge in reducing stunting in a given region. Additionally, descriptive approaches (Saputri & Tumangger, 2019) have also been used to identify the determinants of stunting reduction. Descriptive analysis has also revealed that socioeconomic factors influence the reduction of stunting rates. However, several approaches have yet to effectively determine the factors influencing stunting reduction and assess the likelihood of reducing stunting rates by examining its causal factors. This study proposes the use of logistic regression analysis to identify the factors influencing stunting in a specific region. Furthermore, the logistic regression analysis is also expected to estimate the likelihood of reducing stunting rates based on the impact of these influencing factors.

RESEARCH METHOD

Study Design and Data

This study was conducted by interviewing all mothers with children aged 1-5 years who were identified as stunted based on data from community health workers (Kader) in Karangtengah Village, Sumberjo Village, Kumpulrejo Village, Kutoharjo Village, Krajankulon Village, and Sarirejo Village, Kaliwungu Subdistrict. The data in this study is primary data obtained by distributing questionnaires to the respondents who were the focus of this research. The data collection technique used a non-probability sampling method, specifically purposive sampling. Based on the data from the community health workers, a total of 40 respondents were identified.

Research Variables

The variables used in this study include the stunting incidence variable as the dependent variable, which is calculated using children's weight and height through a z-score approach based on WHO (Supadmi et al., 2024). The independent variables in this study include Gender (Hamal et al., 2021), Low Birth Weight (LBW) (Hamal et al., 2021), Child's Medical History (Pibriyanti et al., 2019), Marital Status, Maternal Education (Hamal et al., 2021), Maternal Height (Ika Purnamasari, Fitri Widiyati, 2022), Pregnancy Status (Suryaningsih et al., 2022), Antenatal Care (ANC) history (Wardita et al., 2021), Maternal Mobile Phone Usage Duration (Rahayu Z et al., 2022), Maternal Anemia History (Ratnawati Purwitaningtyas & Intan Azkia Paramitha, 2024), Child Nutrition (Ismawati et al., 2020) (Rohman et al., 2025) and Dietary Intake (Oktavianisya et al., 2021), as well as Hygiene and Environmental Conditions (Lobo et al., 2019).

Data Analisys

The data analysis in this study employs binary logistic regression analysis. Binary logistic regression is a statistical analysis used to determine the independent variables that influence the dependent variable (Dwi et al., 2024). In this case, the analysis aims to identify the variables affecting stunting incidents in Kaliwungu Subdistrict, Kendal.

RESULTS AND DISCUSSIONS

Based on Table 1, it can be seen that the total number of respondents in this study is 40 people. The majority of respondents are aged 31-40, accounting for 52.5%, with the most common level of education being junior high school graduation, at 55.5%. Most respondents have a history of planned pregnancy status and a routine ANC history. The duration of mothers using mobile phones is most frequent, at 70.0%. All respondents have no history of anemia.

Table 1. Characteristics of respondents

Characteristics	Result
Age	
21-30	14 (35.9%)
31-40	21 (52.5%)
41-50	5 (12.5%)
Education	
Finished elementary school	2 (5.0%)
Finished middle school	22 (55.0%)
Finished high school	9 (22.5%)
Collage	7 (17.5%)
Pregnancy status	
Unplanned	6 (15.0%)
Planned	34 (85.0%)
History of ANC	
Irregular check-up	9 (22.5%)
Routine check-up	31 (77.5%)
Duration of mothers using mobile phones	
Infrequently	12 (30.0%)

Characteristics	Result
Frequently	28 (70.0%)
History of anemia in mothers	
Never	40 (100.0%)
Ever	0 (0.0%)

The research results presented in Table 2 show that out of the six variables child's gender, mother's education, pregnancy status, ANC history, duration of mother's mobile phone use, and children's intake and nutrition it was found that the variable that influences the occurrence of stunting, especially in the villages of Karangtengah, Sumberjo, Kumpulrejo, Kutoharjo, Krajankulon, and Sarirejo in the Kaliwungu sub-district, is the variable of duration of mother's mobile phone use.

Table 2. Variables that influence the occurrence of stunting

Variable	Stunting Cases		p-value
	No	Yes	
Child's gender			
Girl	13 (32.5%)	8 (20.0%)	0.166
Son	11 (27.5%)	8 (20.0%)	
Education of mothers			
Collage	5 (12.50%)	2 (5.0%)	0.512
Finished high school	15 (37.5%)	7 (17.5%)	0.061
Finished middle school	3 (7.5%)	6 (15.0%)	0.544
Finished elementary school	1 (2.5%)	1 (2.5%)	
Pregnancy status			
Planned	19 (47.5%)	15 (37.5%)	0.301
Unplanned	5 (12.5%)	1 (2.5%)	
History of ANC			
Routine check-up	17 (42.5%)	14 (35.0%)	0.196
Irregular check-up	7 (17.5%)	2 (5.0%)	
Duration of mothers using mobile phones			
Infrequently	9 (22.5%)	3 (7.5%)	0.035
Frequently	15 (37.5%)	13 (32.5%)	
Children's intake and nutrition			
Yes	3 (7.5%)	1 (2.5%)	0.081
No	21 (52.5%)	15 (37.5%)	

Logistic regression analysis results indicate the influence of several independent variables on the dependent variable, which is assumed to represent a specific health condition or outcome. Based on the p-value obtained and tested at a significance level of 0.05, it was found that only the variable duration of a mother's mobile phone use in the Rarely category contributed significantly to the incidence of stunting in children. The regression coefficient of -2.651 indicates a negative effect, suggesting that mothers who rarely use mobile phones are associated with a reduced likelihood of stunting in their children. This relationship is further supported by the Exp(B) value of 0.071, which demonstrates that mothers who rarely use mobile phones have a substantially lower risk of their children experiencing stunting compared to mothers who frequently use mobile phones.

The findings of this study indicate that the variable mother's intensity in using mobile phones significantly influences the incidence of stunting in children. This result is noteworthy because the aspect of mothers' mobile phone use has rarely been a primary focus in stunting-related research. Most prior literature has concentrated on traditional factors such as nutritional intake (Anggryni et al., 2021), environmental sanitation (Cameron et al., 2021), socioeconomic status (Utami et al., 2019), and maternal parenting styles (Nabuasa, 2024) in relation to stunting. Thus, this study fills a gap in the literature and opens new opportunities to explore the role of technology in mothers' daily lives and its impact on children's nutritional status and growth.

The Relationship Between Mobile Phone Usage Intensity and Mothers' Role as Primary Caregivers

High-intensity mobile phone use among mothers can affect parenting practices, particularly in terms of attention and direct interaction with their children. Previous studies have shown that excessive mobile phone use often reduces a mother's attention to her child's needs, including providing nutritious food, maintaining regular meal schedules, and ensuring optimal psychosocial stimulation. Digital distraction caused by mobile phone usage may result in mothers losing focus on caregiving responsibilities, such as ensuring the child receives age-appropriate nutrition and monitoring their growth and development. This aligns with the concept of "technology-driven distraction," identified in the literature as a key factor weakening mother-child interactions.

Additionally, raising children, particularly during the golden age of development (the first 1,000 days of life), requires mothers to provide full attention to support physical and cognitive growth. Reduced quality of attention and interaction between mothers and children due to excessive mobile phone use can adversely affect children's eating patterns, thereby increasing the risk of stunting. For instance, children might not receive sufficient nutritious meals because their mothers are preoccupied with mobile phones during meal times. This indirectly contributes to chronic nutritional deficiencies, leading to stunting (Nabuasa, 2024).

These findings are consistent with previous international studies that have identified digital distraction as a critical factor influencing parenting quality. (McDaniel & Coyne, 2016) introduced the concept of technoference technology based interference in parent child interactions and found that frequent mobile device use by parents diminishes the emotional responsiveness and engagement necessary for effective caregiving. Similarly, (Knitter & Zemp, 2020) systematic review concluded that high smartphone use among parents is associated with reduced quality of face-to-face interaction and emotional bonding, which are essential for a child's psychosocial development. Given that psychosocial stimulation is a recognized determinant of child nutritional status and stunting prevention, the results of this study reaffirm that digital behavior must be considered in health strategies targeting early childhood growth. These parallels with international literature highlight the need for context-specific approaches to managing digital exposure in parenting, particularly in settings where stunting remains prevalent.

Mobile Phone Use Intensity and Access to Health Information

At a certain level, mobile phone use can serve as a valuable source of health information for mothers, such as through health apps, social media, or health service notifications (Purnamasari et al., 2023). However, high intensity without proper time management often leads to information overload or access to invalid and irrelevant information. Inaccurate or contextually inappropriate information may result in ineffective caregiving practices. For example, mothers who rely on unreliable sources of information might incorrectly implement complementary feeding practices for their children.

Moreover, mothers who frequently use mobile phones for entertainment purposes, such as social media or gaming, may prioritize personal activities over utilizing technology to support healthy parenting practices. In this context, the role of technology-based education becomes crucial to ensure that mothers' mobile phone use is directed towards activities that promote child welfare, such as accessing nutrition education apps or immunization reminders.

Socioeconomic Correlation with Mobile Phone Usage Intensity

Mobile phone usage intensity can also reflect the family's socioeconomic conditions. In families with lower socioeconomic status, mobile phones are often the sole source of entertainment or communication, leading to higher usage duration compared to families with access to alternative entertainment options. This situation can worsen if mothers lack adequate resources or education to understand their children's growth and development needs. Conversely, in families

with higher socioeconomic status, uncontrolled mobile phone use can still reduce the quality of caregiving. However, this risk is relatively lower due to the availability of additional resources, such as household help or better access to healthcare services.

Implications of Study Findings for Stunting Prevention

These findings provide new insights that stunting prevention programs should incorporate the aspect of managing mobile phone use by mothers as part of community health initiatives. Education campaigns on the wise use of technology should be directed at mothers, particularly in areas with high stunting prevalence. Digital health campaigns could focus on optimizing mobile phone use by providing applications with guidelines for infant and toddler feeding, child growth monitoring, and evidence-based parenting tips.

Additionally, community involvement in reducing digital distractions is a key strategy. For example, community-based programs such as mother support groups under Posyandu (Integrated Healthcare Centers) can create discussion spaces on technology-supported parenting and educate mothers about the negative impact of excessive mobile phone use. This approach is crucial to raise mothers' awareness of the importance of balancing technology use with direct interaction with their children.

CONCLUSION

This study underscores the critical yet often overlooked role of maternal mobile phone usage in the broader discourse of stunting prevention. The findings reveal that mothers who rarely use mobile phones are significantly less likely to have children experiencing stunting, suggesting that excessive screen time may interfere with effective caregiving. Specifically, frequent digital distraction may reduce maternal attentiveness during feeding, disrupt emotional bonding, and limit the psychosocial stimulation necessary for optimal child development.

In light of these findings, public health interventions should integrate behavioral strategies aimed at promoting mindful technology use. Educational efforts must not only discourage excessive mobile phone use but also harness digital tools as vehicles for evidence-based parenting. Mobile applications tailored to local contexts (featuring growth monitoring guidance, feeding recommendations, and parenting support) should be developed and widely disseminated.

Moreover, future research should adopt longitudinal and experimental designs to examine causal relationships between mobile phone use and caregiving behaviors. Mixed-method studies could further illuminate how digital habits are shaped by cultural, socioeconomic, and environmental factors. Such multidimensional evidence is essential to inform policy formulation and intervention design.

Ultimately, addressing the behavioral dimensions of digital technology use among caregivers will enhance the efficacy of community-based nutrition programs. It positions mobile technology not as a barrier, but as a potential ally, in advancing child health outcomes—particularly in contexts where stunting remains a pressing public health challenge.

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Since this study is among the first to highlight the influence of mobile phone usage intensity on stunting, further research is needed to explore the causal mechanisms underlying this relationship. Qualitative studies could investigate mothers' experiences with mobile phone use and how it affects their parenting practices. Additionally, quantitative studies integrating other variables, such as maternal education level, internet access, and the types of content accessed, are essential to provide a more comprehensive understanding.

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