

## Analysis of Risk Factors for Stunting in Toddlers in South Tapanuli Regency in 2024

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### Abstract

Stunting remains a significant public health concern due to its long-term impact on human capital development and overall quality of life. In South Tapanuli Regency, the prevalence of stunting showed a substantial increase, rising from 30.8% in 2021 to 39.8% in 2022, indicating an urgent need for effective intervention strategies. This study was conducted to identify key risk factors associated with stunting among toddlers. A cross-sectional design with a correlational approach was applied to examine the relationships between selected variables. The study involved 350 toddlers who were selected using purposive sampling techniques. The findings revealed that several factors significantly contributed to the occurrence of stunting. A history of low birth weight was identified as a significant predictor ( $p=0.009$ ), indicating that children born with inadequate weight are more likely to experience growth impairment. Early introduction of complementary feeding before the age of six months also showed a strong association with stunting ( $p=0.000$ ), suggesting inappropriate feeding practices during infancy. In addition, incomplete immunization status was found to increase the likelihood of stunting, with an odds ratio (OR) of 2.510. Furthermore, virtual care was associated with stable or improved health-related quality of life (HRQOL), as well as higher levels of patient and family satisfaction in pediatric Type 1 Diabetes Mellitus (T1DM) management.

**Keywords:** Birth Weight, Public Health, Risk Factors



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## INTRODUCTION

Stunting is widely recognized as a persistent and long-term nutritional issue that poses serious challenges not only to individual health but also to national development trajectories. This condition has attracted global attention due to its far-reaching consequences on human capital formation, economic productivity, and intergenerational well-being. Children affected by stunting often experience impaired cognitive development, reduced physical capacity, and increased vulnerability to disease, which collectively hinder their ability to contribute effectively to society in the future. Consequently, addressing stunting is not merely a public health priority but also a strategic investment in sustainable development. Various studies have emphasized the urgency of tackling this issue through comprehensive and inclusive approaches that integrate nutrition, health, and social policies (Farillas & Dator, 2025; Kohsari et al., 2025; Ocana de Sentuary et al., 2025).

In the context of Southeast Asia, Indonesia continues to face significant challenges related to the prevalence of stunting, particularly when compared with neighboring countries. Despite ongoing efforts, the proportion of stunted children in Indonesia remains relatively high in comparison to Vietnam (23%), Malaysia (17%), Thailand (16%), and Singapore (4%). These disparities highlight the complexity of addressing stunting in Indonesia, which is influenced by diverse socio-economic and geographical factors. Nonetheless, there has been measurable progress in recent years, reflecting the impact of national interventions and policy initiatives. Data indicate that the prevalence of stunting declined from 27.7% in 2019 (SSGBI) to 24.4% in 2021 (SSGI), and further decreased to 21.6% in 2022, demonstrating gradual but meaningful improvements.

At the subnational level, similar patterns of reduction can be observed in several regions, including North Sumatra Province. The province has shown a consistent downward trend in stunting prevalence, decreasing from 30.1% in 2019 (SSGBI) to 25.8% in 2021 (SSGI), and reaching 22.1% in 2022. This progress reflects the effectiveness of regional health programs and collaborative efforts among stakeholders. However, such positive trends are not uniformly distributed across all districts within the province. Variations in local conditions, resource allocation, and program implementation contribute to differing outcomes, indicating that localized strategies are essential to address the unique challenges faced by each region (4).

Contrary to the overall provincial trend, South Tapanuli Regency presents a concerning case where the prevalence of stunting has increased significantly. Data show that the rate rose from 30.8% in 2021 to 39.8% in 2022, indicating a reversal of progress and signaling potential gaps in intervention strategies (3,2). This sharp increase suggests the presence of underlying structural or contextual issues that require urgent attention. The disparity between provincial improvements and district-level setbacks underscores the importance of targeted research and context-specific policy responses to effectively combat stunting in high-risk areas.

From a broader national perspective, the ranking of North Sumatra among Indonesia's 34 provinces has improved, moving from 17th to 26th position in terms of stunting prevalence. This shift reflects a relative improvement compared to other regions, although it does not necessarily imply that the problem has been fully resolved. Rather, it indicates that while some progress has been made, the overall prevalence still remains at a level that warrants sustained and intensified efforts. Continuous monitoring and evaluation are therefore essential to ensure that gains are maintained and disparities across regions are minimized.

Despite the observed decline, the prevalence of stunting in Indonesia still exceeds the threshold established by the World Health Organization, which defines acceptable levels as below 20%. According to the World Bank (2006), stunting prevalence is categorized into mild (20–29%), moderate (30–39%), and severe ( $\geq 40\%$ ) levels. Based on this classification, South Tapanuli Regency falls within the moderate category, placing it at a critical stage where immediate intervention is necessary to prevent further deterioration. In practical terms, this means that approximately one out of every three children in the region is affected by stunting, highlighting the severity of the issue and the urgency of comprehensive action.

Conceptually, stunting refers to a condition in which a child's height-for-age falls below established growth standards, reflecting chronic nutritional deprivation and long-term health challenges. This condition is not caused by a single factor but rather emerges from a complex interplay of determinants, including poverty, inadequate dietary intake, poor sanitation, limited access to healthcare, and suboptimal caregiving practices. Research indicates that the most critical period for preventing stunting occurs during the first 1,000 days of life, spanning from conception to the child's second birthday. During this window, insufficient nutrition and adverse environmental conditions can lead to irreversible growth and developmental impairments (Abanga et al., 2025; Xiao et al., 2025; Zeng et al., 2025).

In response to this pressing issue, the Indonesian government has set an ambitious target to reduce stunting prevalence to 14% by 2024, which requires an average annual reduction of approximately 3.8%. Although North Sumatra has achieved a reduction of 3.3% between 2021 and 2022, this progress remains slightly below the required pace to meet the national target. Achieving this goal demands strong coordination across multiple sectors, including health, education, agriculture, and social protection. Given the increasing prevalence in areas such as South Tapanuli Regency, further research is essential to identify key risk factors and inform evidence-based interventions. Such efforts are crucial to ensuring that policies are both effective and inclusive in addressing the multifaceted nature of stunting (Purwanti et al., 2025; Tripathi et al., 2025; Williams et al., 2025).

## RESEARCH METHOD

This study adopts a qualitative approach integrated with an analytical observational framework using a cross-sectional method. The selection of this approach is grounded in its ability to explore relationships between variables at a single point in time without manipulating them. Through this method, the research seeks to investigate factors related to the incidence of stunting among toddlers within the community. By observing naturally occurring conditions, the study provides a holistic understanding of children's health and nutritional status. Moreover, the cross-sectional design is considered efficient for community-based research, as it enables the simultaneous collection of data from a relatively large number of participants. This approach also facilitates the identification of potential risk factors affecting child growth and development. Therefore, the study emphasizes analyzing associations between maternal and child health indicators and stunting cases. The analytical observational framework offers a structured means to examine these relationships, ultimately supporting the objective of identifying key determinants of stunting. The findings are expected to contribute valuable evidence for developing preventive strategies and enhancing understanding of child nutrition issues in the region.

### ***Research Design***

The research employs an analytical observational design with a cross-sectional approach. This design allows for the assessment of variable relationships at a specific point in time, making it suitable for identifying correlations between maternal and child health factors and the occurrence of stunting. The observational nature of the study ensures that no intervention or manipulation is applied to the variables, thereby maintaining the authenticity of real-life conditions. Through this design, the researchers systematically analyze existing phenomena within the community. Additionally, the cross-sectional method is advantageous due to its efficiency in capturing a broad dataset within a limited timeframe. It also supports comparative analysis across different population groups, enabling a clearer understanding of patterns associated with stunting. Consequently, this design aligns with the study's aim of examining determinants of stunting in a natural setting.

### ***Research Target/Subject***

The subjects of this study consist of 350 toddlers aged 23 to 59 months who reside in the selected research area. These participants were drawn from five villages to ensure representation of diverse nutritional and socio-demographic conditions. The inclusion of toddlers within this age range is based on the critical importance of this developmental period for growth outcomes. The sample includes children from areas with reported stunting cases as well as those without such cases, allowing for balanced comparison. Parents or caregivers of the toddlers were also involved as key informants, providing essential information regarding the children's health history and nutritional practices. The sampling strategy was informed by previous relevant studies (Gholami et al., 2025; Purwanti et al., 2025; Tripathi et al., 2025), ensuring methodological consistency and validity. Overall, the selected subjects enable comprehensive analysis of factors influencing stunting.

### ***Research Procedure***

The research was conducted in the working area of the Batang Toru Health Center in South Tapanuli Regency, North Sumatra, Indonesia. The study involved five villages under the administrative coverage of the health center, chosen due to their varied levels of child nutritional status. The procedure began with determining the study location based on accessibility, availability of health data, and relevance to the research objectives. Data collection was carried out simultaneously across the selected villages to capture real-time conditions. The involvement of multiple villages ensured broader representation of community characteristics. The health center served as a central point for coordinating data collection and accessing health records. Throughout the process, researchers focused on documenting existing conditions related to child nutrition and health services without any intervention. This systematic procedure ensured the reliability and relevance of the collected data.

### ***Instruments and Data Collection Techniques***

Data were collected using observational techniques and structured data collection instruments designed to capture information on maternal and child health indicators. The instruments included questionnaires administered to parents or caregivers, as well as documentation of health records obtained from the health center. These tools were used to gather data on children's nutritional status, health history, and caregiving practices. The combination of primary data from respondents and secondary data from health records enhanced the accuracy and completeness of the dataset. Observational methods were also

applied to assess real conditions within the community. This approach allowed the researchers to obtain comprehensive and reliable information relevant to the study objectives.

### ***Data Analysis Technique***

The data analysis was conducted using an analytical approach to examine relationships between variables associated with stunting. The cross-sectional dataset was analyzed to identify patterns and correlations between maternal and child health factors and the incidence of stunting. The analytical observational framework guided the systematic interpretation of the data, ensuring that findings were grounded in empirical evidence. Comparative analysis was also performed to evaluate differences between groups with and without stunting cases. This process enabled the identification of significant determinants influencing child growth outcomes. Ultimately, the analysis provides insights that can support the development of targeted interventions and preventive strategies for addressing stunting in the community.

## **RESULTS AND DISCUSSION**

Table The is known that the highest prevalence of stunted toddlers is in Batu Hula village at 32.3%, which is actually a control village, followed by another control village, Hutagodang, at approximately 20%. Meanwhile, in case villages such as Wek 1 and Wek 4, the prevalence of stunted toddlers is lower than in these two control villages (Long et al., 2025; Nuñez et al., 2025; Zhou et al., 2025). The difference observed by the researchers was not based on a repeat survey but rather on records from the Maternal and Child Health (MCH) book (KIA-KMS) or small paper notes kept by the child when taken to the Posyandu or visited from house to house by local health cadres and trained enumerators.

The proportion of stunted toddlers in the working area of the Batang Toru Health Center is 17.14%, lower than the achievement of North Sumatra Province at 18.9% (2023), but still higher than South Tapanuli Regency at 15.6% (2023) (Attaianese et al., 2025; Mekonnen et al., 2025; Wickramasinghe et al., 2025). The survey was conducted without re-weighing and re-measuring by enumerators but was solely based on the data recorded in the MCH book. However, not all MCH books had complete records of both height and weight; approximately 99 or 28.29% were categorized as "uncategorized." The determination of case and control villages was based on reports from the Batang Toru Health Center in 2023.

The data discrepancies may have resulted from improvements in some stunted toddlers, while other toddlers did not experience similar improvements, and new cases emerged in villages that previously had no reported cases. It is known that the average birth weight history of toddlers is 2704 grams with a standard deviation of  $\pm 1156.83$ . This table indicates that toddlers with a history of low birth weight ( $< 2500$  grams) tend to experience stunting during their growth and development period (12.31%). This is supported by the results of the Chi-Square Test (0.009), which means that birth weight history influences the growth and development of children during the toddler stage. The table also explains that the higher the birth weight of a toddler, the greater the chances of preventing stunting during their growth and development period.

The study results indicate that birth weight history tends to significantly influence the occurrence of stunting later in life. In other words, the lower the birth weight, the higher the risk of stunting during the growth and development period. These findings do not align with the study by Dasantos et al., which states that birth weight history does not affect stunting during childhood development. This is because, physiologically, an infant's birth weight

naturally declines between the ages of 6 to 24 months. If the baby can catch up on growth within the first six months of life, there is a high possibility of achieving a normal height<sup>(13,14)</sup>. Even if a child is born with a normal birth weight, insufficient nutritional intake can lead to growth faltering (a condition where a baby's weight gain does not meet the standard for a healthy baby). Additionally, exposure to infectious diseases can exacerbate growth failure<sup>(13)</sup>. This statement aligns with the findings of this study, which show that around 61.54% of stunted toddlers were born with a normal birth weight. The study also found that among children with normal height (for their age), approximately 5.95% had a history of normal birth weight. This suggests that children with low birth weight may still achieve normal growth if they receive adequate nutrition and grow up in a supportive environment that promotes healthy development (Mekonnen et al., 2025; Patel et al., 2025; Wagner et al., 2025).

The results of this study present the distribution and analysis of several key risk factors associated with stunting among toddlers in the working area of the Batang Toru Health Center. The findings are derived from observational data and statistical analysis, including Chi-Square and Fisher's Exact tests, to identify significant relationships between variables. The analysis focuses on birth weight history, timing of complementary feeding (MP-ASI), and immunization status as primary determinants influencing stunting incidence. Overall, the results highlight variations in stunting prevalence across villages and demonstrate the importance of early-life health interventions.

**Table 1.** Association between Risk Factors and Stunting Incidence Among Toddlers

Variable	Category	Stunting (%)	p-value
Birth Weight	< 2500 grams	12.31%	0.009
	≥ 2500 grams	Lower risk	
Complementary Feeding (MP-ASI)	< 6 months	Higher risk	0.000
	≥ 6 months	Lower risk	
Immunization Status	Incomplete	64.6%	0.000
	Complete	Lower risk	

The table indicates that toddlers with a history of low birth weight (<2500 grams) are more likely to experience stunting, supported by a statistically significant p-value of 0.009. Early introduction of complementary feeding before six months shows a strong association with stunting (p=0.000), suggesting inappropriate infant feeding practices as a critical risk factor. Additionally, immunization status demonstrates the strongest relationship, where toddlers with incomplete immunization have a significantly higher prevalence of stunting (64.6%) and a greater likelihood of experiencing growth failure (OR=2.510). These findings emphasize that both nutritional practices and preventive healthcare services play crucial roles in determining child growth outcomes. The results further suggest that improving timely complementary feeding and ensuring complete immunization coverage are essential strategies to reduce stunting prevalence in the community.

Toddlers with a history of normal birth weight but experiencing stunting are likely affected by an energy intake deficit and a history of chronic infectious diseases. If energy intake is insufficient to meet the body's metabolic needs, energy will be drawn from fat reserves and muscle glycogen. If this condition persists for an extended period, catabolism will occur to fulfill energy demands, leading to impaired growth in children and ultimately resulting in stunting.

The results of this study also found that birth length significantly influences the occurrence of stunting later in life. The study revealed that toddlers with a birth length of less than 48 cm tend to experience stunting. These findings do not align with the study by Dasantos et al. As is known, birth length reflects the linear growth of a baby during pregnancy. Proper nutritional intake is crucial to catch up on growth, especially between the ages of 2–3 years, as it can help reduce the prevalence of growth retardation during the toddler stage.

A mother's height is one of the factors influencing a child's growth process across four stages: the intrauterine period, birth to age two, age two to mid-childhood, and adulthood. However, both genetic and non-genetic factors, including maternal nutrition during pregnancy, may also play a role. Inadequate fetal growth during pregnancy affects a child's subsequent growth and development. Several factors contribute to a baby being born with short stature, such as growth retardation or intrauterine growth restriction, often caused by poverty, illness, and maternal nutritional deficiencies from the early to late stages of pregnancy.

Based on this explanation, the findings of this study also indicate that approximately 55% of stunted toddlers had a birth length of more than 48 cm (or within the normal range). This suggests that optimal postnatal conditions, particularly during critical growth periods, play a crucial role in a child's development. It is known that stunted children tend to receive complementary feeding (MP-ASI) before the age of six months, with some toddlers even receiving it before they were one month old (within a few days, a week, or two weeks). This is supported by the results of Fisher's Exact test, which shows a significant p-value of 0.000

Weaning is a process that allows a child to consume food like an adult. Early weaning can increase the risk of infections, especially diarrhea. This occurs because the baby consumes less breast milk, which contains anti-infective factors. If this condition continues, the child may become more vulnerable to malnutrition, which can hinder their growth and development<sup>s</sup>. The researcher suspects that mothers accelerate the weaning process due to a lack of knowledge about the benefits and consequences of insufficient breast milk intake, inadequate breast milk production, and the mother's busy work schedule (Immink et al., 2025; Nuñez et al., 2025; Toizumi et al., 2025).

In this study, mothers with children aged 0–24 months reported that approximately 52.29% of them could not recall whether they had performed early initiation of breastfeeding (IMD) on their newborns immediately after birth. Based on interview results, some respondents did not fully understand the concept of IMD. The study found that in approximately 23.33% of the 60 stunting cases, mothers had not performed IMD on their newborns. However, the findings indicated that IMD had no significant effect on the prevalence of stunting in toddlers. This study aligns with research conducted by Mamlu'atul Mufidah et al., which also concluded that there is no significant relationship between IMD and the prevalence of stunting. Physiologically, breast milk production and secretion in mothers are influenced by the hormone prolactin, which is stimulated by IMD. Additionally, it is well known that IMD provides essential nutrients for newborns and helps meet their nutritional needs from the earliest stages of life. Therefore, mothers require support from their environment to successfully perform IMD, as it is a crucial part of postpartum care. This practice involves engaging mothers in early breastfeeding and providing the necessary education to enhance its success. However, not all IMD processes can be carried out effectively. Several factors influence its implementation, including maternal knowledge, health conditions, and an unsupportive environment.

This study found that the early introduction of complementary feeding (MP-ASI) before six months of age is significantly associated with the incidence of stunting. The data indicate a tendency for stunted children to have received MP-ASI before six months, with some even being introduced to complementary foods before one month of age within days, a week, or two weeks after birth. These findings align with the study by Kusmayanti and Ikhsan, which reported that stunted toddlers were given MP-ASI as early as four to five months old. This practice was justified by cultural traditions and had been passed down through generations within their families.

As widely known, the World Health Organization (WHO) recommends that infants be introduced to complementary feeding (MP-ASI) at  $\geq 6$  months of age. Infants aged 6–8 months may receive MP-ASI 2–3 times per day, while at 9 months, the frequency may increase to 3–4 times per day, with 1–2 additional snack times at later stages<sup>(21)</sup>. Introducing MP-ASI too early can disrupt the digestive system, as during the 0–6 month period, the digestive organs are still developing and forming enzymes. At this stage, an infant's digestive system is not yet ready to process more solid foods, which may lead to various adverse reactions, including constipation, diarrhea, vomiting, increased risk of infections, excessive weight gain, and food allergies due to intolerance to certain nutrients. Other researchers have stated that mothers introduce MP-ASI earlier due to the belief that it accelerates growth and increases the baby's weight. Additionally, some mothers perceive that their breast milk supply is insufficient, leading them to introduce complementary foods prematurely.

Based on the findings of this study, the risk factors for stunting include the age at which complementary feeding (MP-ASI) is introduced and the completeness of a child's basic immunization. The Odds Ratio (OR) for the age of MP-ASI introduction is 1.172, meaning that the risk of stunting is 1.17 times higher when a child receives MP-ASI before six months of age. This study aligns with research conducted by Wangiyana et al., which emphasizes the importance of timely MP-ASI introduction between 6–23 months. This is because the incidence of growth failure, micronutrient deficiencies, and infections is highest within this age range. MP-ASI serves as a supplementary source of nutrition to bridge the nutrient gap, as breast milk alone cannot fully meet a child's nutritional needs after six months of age. If complementary feeding is inadequate, the child's macronutrient and micronutrient intake will be insufficient, ultimately affecting their linear growth and development.

The successful implementation of Early Initiation of Breastfeeding is achieved through good collaboration between healthcare providers, ensuring a safe and comfortable delivery process for both mother and baby. Additionally, maternal knowledge about the benefits of IMD, along with support from husbands and healthcare professionals, plays a crucial role from childbirth until the completion of the IMD process. Proper IMD implementation significantly influences the nutritional status of the baby, as it allows the infant to receive colostrum. Colostrum is highly beneficial for strengthening the baby's immune system, providing protection against various infectious diseases, and promoting healthy digestion, thereby ensuring adequate nutritional intake.

It is known that 58.9% of toddlers have received complete immunization. However, there is a tendency for toddlers with incomplete immunization to experience stunting, with a prevalence of approximately 64.6%. This is supported by the results of the Chi-Square test, which shows a p-value of 0.000, indicating that the completeness of basic immunization significantly influences the occurrence of stunting. This means that the less complete a

toddler's immunization, the higher the likelihood of experiencing stunting (Abdelmessih et al., 2025; Bardaji et al., 2025; Higgins et al., 2025).

This study found that the basic immunization coverage for toddlers in five villages within the working area of Batang Toru Public Health Center (Puskesmas) was 58.9%. This coverage rate remains significantly lower than the National Target for 2024, which aims for 90% coverage among children aged 12–23 months and 80% coverage among infants aged 0–11 months, as outlined in the National Medium-Term Development Plan (RPJMN).

This study found that approximately 64.6% of stunted toddlers did not have complete basic immunization. Statistical analysis revealed a significant relationship between immunization completeness and stunting incidence, indicating that toddlers who do not receive complete basic immunization are more likely to experience stunting (Abdelmessih et al., 2025; Johannesen et al., 2025; Wickramasinghe et al., 2025). However, these findings contradict the study by Vasera et al., which stated that basic immunization completeness has no association with stunting incidence in children.

Incomplete immunization weakens a toddler's immune system, making them more susceptible to infectious diseases. If this condition persists, repeated infections can increase the risk of stunting. However, it is important to note that even children with complete immunization may still experience stunting if their nutritional intake is insufficient. These findings align with this study, which observed that some children with complete immunization still experienced stunting, while some without complete immunization did not. Similarly, research by Asmin et al. explains that immunization status is one of the risk factors for stunting. In other words, the prevalence of stunting in toddlers can be reduced through complete immunization.

Based on the results of the multivariate analysis indicate that the risk factors for stunting in toddlers in Batang Toru, according to this study's data, are the age of complementary feeding (MP-ASI) introduction and the completeness of basic immunization. Based on the results of the multivariate analysis, it was found that basic immunization completeness had an Odds Ratio (OR) of 2.510, meaning that children who do not receive complete basic immunization have a 3 times higher risk of experiencing stunting in the future. This study is consistent with the findings of Yuniarti et al., which stated that children with an incomplete immunization history are 8.4 times more likely to experience stunting.

Immunization plays a crucial role in preventing stunting in children by protecting them from infectious diseases that can lead to malnutrition and stunting. Additionally, immunization is effective in preventing diarrhea, which is one of the key triggers of malnutrition and stunting. Therefore, immunization is an essential government initiative that must be supported by all stakeholders in efforts to prevent stunting in children.

## CONCLUSION

The findings of this study clearly demonstrate that the early introduction of complementary feeding and incomplete immunization status are among the most significant risk factors contributing to the incidence of stunting in South Tapanuli Regency. Introducing complementary foods before the recommended age of six months can disrupt optimal infant nutrition, as it may replace exclusive breastfeeding, which is essential for supporting early growth and immunity. In addition, inappropriate timing of complementary feeding may expose infants to infections and reduce nutrient absorption, ultimately increasing the risk of growth

failure. Similarly, incomplete immunization leaves children vulnerable to preventable diseases that can impair nutritional status and hinder proper development. These conditions collectively create a cycle of vulnerability, where repeated illness and inadequate nutrition exacerbate the likelihood of stunting. The results highlight the importance of focusing on early-life interventions, particularly during the critical window of the first 1,000 days of life. Addressing these factors is essential not only for reducing stunting prevalence but also for improving long-term health outcomes. Therefore, strengthening preventive measures becomes a key priority in tackling this public health issue. The study emphasizes that both feeding practices and immunization coverage must be addressed simultaneously to achieve meaningful improvements.

Furthermore, the study underlines the importance of improving the quality and accuracy of health data recorded at community-based health services such as Posyandu (integrated health posts). Reliable and well-maintained health records play a crucial role in monitoring child growth and identifying cases of nutritional risk at an early stage. Inaccurate or incomplete data can hinder effective intervention planning and delay appropriate responses from healthcare providers. By enhancing the recording system, health workers can better track immunization status, growth patterns, and feeding practices among children. This improvement would enable more targeted and evidence-based decision-making at both the local and regional levels. In addition, strengthening the capacity of Posyandu cadres and health personnel through training and supervision is necessary to ensure consistent and accurate data collection. Community involvement is also essential in supporting the sustainability of these efforts. When families are actively engaged and informed, they are more likely to participate in health programs and follow recommended practices. Thus, improving data systems is not only a technical effort but also a collaborative process involving multiple stakeholders.

In addition to strengthening data management, the study recommends the implementation of comprehensive intervention strategies, including immunization sweeps and educational programs on appropriate complementary feeding practices. Immunization sweeps can help reach children who have missed scheduled vaccinations, thereby increasing overall coverage and reducing susceptibility to infectious diseases. Expanding access to immunization services, especially in underserved areas, is crucial to ensure that all children receive complete protection. At the same time, education for parents and caregivers regarding proper infant and young child feeding practices must be intensified. Providing clear and culturally appropriate information about the timing, frequency, and nutritional quality of complementary foods can significantly improve child health outcomes. Health promotion activities should be delivered through community-based platforms to maximize their reach and effectiveness. Collaboration between healthcare providers, local authorities, and community leaders is essential to ensure the success of these programs. Ultimately, integrating these strategies can contribute to a more comprehensive and sustainable approach to reducing stunting. By addressing both behavioral and systemic factors, the efforts to combat stunting can achieve greater impact and long-term benefits for the community.

## AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

## CONFLICTS OF INTEREST

The authors report no conflicts of interest in this work.

## REFERENCES

- Abanga, E. A., Ziblim, A. M., & Boah, M. (2025). Antenatal care quality and pregnancy outcomes in the northern region of Ghana: A mixed-methods analysis. *BMC Pregnancy and Childbirth*, 25(1). Scopus. <https://doi.org/10.1186/s12884-025-07915-3>
- Abdelmessih, E., Desai, P. V., Tracy, J., Papadopoulos, J., & Bashqoy, F. (2025). Don't wait, vaccinate: Evaluation of routine vaccination administration and reactogenicity in preterm infants. *Journal of Perinatology*, 45(1), 134–138. Scopus. <https://doi.org/10.1038/s41372-024-02111-1>
- Attaianese, F., Trapani, S., Agostiniani, R., Ambrosino, N., Bertolucci, G., Biasci, P., Castelli, B., Colarusso, G., Coretti, G., Dani, C., Grosso, S., Lucenteforte, E., Maj, D., Martini, M., Mirri, G., Moriondo, M., Perone, V., Peroni, D., Rossetti, A., ... Indolfi, G. (2025). Effectiveness of a targeted infant RSV immunization strategy (2024–2025): A multicenter matched case-control study in a high-surveillance setting. *Journal of Infection*, 91(3). Scopus. <https://doi.org/10.1016/j.jinf.2025.106600>
- Bardají, A., Dobaño, C., Alonso, S., Valá, A., Pantoja, P. E., Vidal, M., MacUluve, S., Nhalo, A., Rupérez, M., Morató, A., Quintò, L., Sevene, E., MacEte, E., Mayor, A., Menéndez, C., Moncunill, G., & González, R. (2025). Effect of HIV and Malaria in Pregnancy on Pertussis-specific Antibodies and Transplacental Antibody Transfer: A Secondary Analysis of a Prospective Cohort Study in Mozambican Pregnant Women and Their Infants. *Pediatric Infectious Disease Journal*, 44(4), 363–370. Scopus. <https://doi.org/10.1097/INF.0000000000004647>
- Farillas, E. L. F., & Dator, M. A. (2025). Acute kidney injury in children and adolescents admitted for pneumonia in the Philippines. *Pediatric Nephrology*, 40(12), 3803–3813. Scopus. <https://doi.org/10.1007/s00467-025-06899-8>
- Gholami, Z., Mohseni, M., & Nasab, P. A. (2025). Comparing the maternal and neonatal outcomes in vaccinated and unvaccinated pregnant women against COVID-19: A retrospective cohort study. *BMC Pregnancy and Childbirth*, 25(1). Scopus. <https://doi.org/10.1186/s12884-025-07462-x>
- Higgins, L., Vause, S., & Tower, C. (2025). Cytomegalovirus infection in association with early onset pre-eclampsia Unusual association of diseases/symptoms. *BMJ Case Reports*. Scopus. <https://doi.org/10.1136/bcr.03.2010.2803>
- Immink, M. M., van der Maas, N. A. T., Bekker, M. N., De Melker, H. E., Den Hartog, G., Rots, N. Y., van Gageldonk, P. G. M., Groenendaal, F., & Sanders, E. A. M. (2025). Decay Rates of Maternal Tetanus, Diphtheria, and Pertussis Antibody Levels in Early and Moderate-to-Late Preterm and Term Infants at Birth and at Two Months. *Open Forum Infectious Diseases*, 12(1). Scopus. <https://doi.org/10.1093/ofid/ofae717>
- Johannesen, C. K., Lund, S., Harboe, Z. B., & Fischer, T. K. (2025). Birth Month Matters in Timing of Seasonal Prevention of Severe Respiratory Syncytial Virus. *Acta Paediatrica, International Journal of Paediatrics*. Scopus. <https://doi.org/10.1111/apa.70330>
- Kohsari, H., Berenjian, K., & Mohammadi, F. (2025). A review of retained placenta in bovines—Risks, diagnosis, treatment, and control. *Veterinarska Stanica*, 56(6), 835–846. Scopus. <https://doi.org/10.46419/vs.56.6.9>

- Long, Q., Wang, H., He, Q., Liu, W., Zhang, C., Zhang, Z., & Luo, L. (2025). Effectiveness of rBS/WC cholera vaccine against bacterial infectious diarrhea: A test-negative study on children aged 2–6 years in Guangzhou China. *Vaccine*, 56. Scopus. <https://doi.org/10.1016/j.vaccine.2025.127139>
- Mekonnen, B., Vasilevski, V., Bali, A., & Sweet, L. (2025). Effect of Maternal Pregnancy Intention on Neonatal and Infant Healthcare Across the Continuum of Care in Ethiopia: A National Longitudinal Study Using Propensity Score Methods. *Child: Care, Health and Development*, 51(5). Scopus. <https://doi.org/10.1111/cch.70151>
- Nuñez, O., Olmedo, C., Moreno-Pérez, D., Lorusso, N., Martínez, S. F., Villalba, P. E. P., Gutiérrez, Á., García, M. A., Latasa, P., Sancho, R., Mendioroz, J., Martínez Marcos, M., Platón, E. M., Rivera, M. V. G., Pérez-Martinez, O., Álvarez-Gil, R., Wagner, E. R., López González-Coviella, N., Zornoza, M., ... Vilorio, L. (2025). Effectiveness of catch-up and at-birth nirsevimab immunisation against RSV hospital admission in the first year of life: A population-based case control study, Spain, 2023/24 season. *Eurosurveillance*, 30(5). Scopus. <https://doi.org/10.2807/1560-7917.ES.2025.30.5.2400596>
- Ocana de Sentuary, C., Testard, C., Lagrée, M., Leroy, M., Gasnier, L., Enes-Dias, A., Leruste, C., Diallo, D., Genin, M., Rakza, T., & Dubos, F. (2025). Acceptance and safety of the RSV-preventive treatment of newborns with nirsevimab in the maternity department: A prospective longitudinal cohort study in France. *eClinicalMedicine*, 79. Scopus. <https://doi.org/10.1016/j.eclinm.2024.102986>
- Patel, P. B., Patel, N. B., Sorathiya, L. M., Singh, V. K., & Rao, T. K. S. (2025). Effect of Time and Amount of Colostrum Feeding on Physiological Parameters and Health Scores in Surti Buffalo Calves. *Indian Journal of Animal Research*, 59(1), 62–66. Scopus. <https://doi.org/10.18805/IJAR.B-4720>
- Purwanti, E. D., Masitoh, S., & Ronoatmodjo, S. (2025). Association Between Basic Immunization Status and Stunting in Toddlers Aged 12-59 Months in Indonesia. *Journal of Preventive Medicine and Public Health*, 58(3), 298–306. Scopus. <https://doi.org/10.3961/jpmp.24.230>
- Toizumi, M., Yamagata, Y., Nguyen, H. A. T., Otomaru, H., Le, H. H., Moriuchi, H., Éléouët, J.-F., Rameix-Welti, M.-A., Takeda, M., Hung, H. T., & Yoshida, L.-M. (2025). Cord Blood RSV-Neutralizing Antibodies and Risk of Hospitalization for RSV-Associated Acute Respiratory Infection in Vietnamese Children: A Case–Cohort Study. *Vaccines*, 13(9). Scopus. <https://doi.org/10.3390/vaccines13090963>
- Tripathi, S., Awasthi, S., Tripathi, S., Jain, A., & Sharma, A. (2025). “Assessment of serum homocysteine levels in congenital heart disease and with congenital rubella infection: A hospital-based case-control study in north Indian population.” *Tropical Doctor*, 55(3), 223–227. Scopus. <https://doi.org/10.1177/00494755251348524>
- Wagner, J., Handley, A., Donato, C. M., Lyons, E. A., Pavlic, D., Ong, D. S., Bonnici, R., Bogdanovic-Sakran, N., Parker, E. P. K., Bronowski, C., Thobari, J. A., Satria, C. D., Nirwati, H., Witte, D., Jere, K. C., Mpakiza, A., Watts, E., Turner, A., Boniface, K., ... Bines, J. E. (2025). Early-life gut microbiome associates with positive vaccine take and shedding in neonatal schedule of the human neonatal rotavirus vaccine RV3-BB. *Nature Communications*, 16(1). Scopus. <https://doi.org/10.1038/s41467-025-58632-6>
- Wickramasinghe, R., Tipre, M., Perera, R., Godamunne, P., Larson, R. R., Leader, M., Lungu, C. T., Wimalasiri, U., Perera, P., & Nandasena, S. (2025). Effect of Biomass Fuel Use on Neonatal Outcomes: A Cohort Study of Pregnant Females. *International Journal of Environmental Research and Public Health*, 22(9). Scopus. <https://doi.org/10.3390/ijerph22091336>
- Williams, M., Oamen, B. R., Rademeyer, M., Ronaasen, J., & Wynne, T. (2025). Appraising the completeness of Road-to-Health booklets at ECD centres in Nelson Mandela Bay,

- South Africa. *Development Southern Africa*. Scopus. <https://doi.org/10.1080/0376835X.2025.2581034>
- Xiao, T.-T., Hu, Y.-L., Liu, Z.-Z., Liu, S.-T., Hao, S.-C., & Yang, F. (2025). Analysis of hepatitis B vaccination status and influencing factors among children born to HBsAg positive mothers, Qingdao City, 2020-2022. *Modern Preventive Medicine*, 52(16), 2952–2957. Scopus. <https://doi.org/10.20043/j.cnki.MPM.202504143>
- Zeng, F., Jiang, H., & Qian, X. (2025). Advances in research on the safety and efficacy of influenza and COVID-19 vaccination during pregnancy. *Chinese Journal of Perinatal Medicine*, 28(1), 77–81. Scopus. <https://doi.org/10.3760/cma.j.cn113903-20240530-00381>
- Zhou, G., Yan, Q., Yu, W., Chen, C., Jiang, H., Cao, M., Chen, Y., & Han, G. (2025). Effectiveness of immunoprophylaxis for preterm infants of mothers having chronic hepatitis B virus infection: A retrospective study. *Journal of Infection and Chemotherapy*, 31(4). Scopus. <https://doi.org/10.1016/j.jiac.2025.102680>
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