

Factors Associated with Stunting Among Children Aged 0–23 Months in Coastal Communities of Balatan, Philippines

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Abstract— Stunting remains a major public health concern, particularly among children during the first 1,000 days of life, when growth and development are strongly influenced by nutritional, environmental, maternal, and socioeconomic conditions. This study assessed the factors associated with stunting among children aged 0–23 months in the coastal communities of Balatan, Philippines. It described caregiver and child characteristics, assessed environmental, maternal, socioeconomic, child-feeding, and immunization-related factors, and determined whether these factors differed according to children's stunting status. A quantitative cross-sectional design was used among 142 caregivers of children aged 0–23 months. Data were collected through a structured questionnaire and analyzed using frequency, percentage, weighted mean, and the Kruskal–Wallis test. Most caregivers were young adults, living with partners, high school graduates, unemployed, and from low-income households. Most children were aged 12–23 months, male, and had normal birth weight. Environmental, maternal, socioeconomic, child-feeding, and immunization-related indicators were generally rated favorably. However, no statistically significant differences were found in these factors according to children's stunting status ($p > 0.05$). These findings suggest that stunting in the study area is shaped by complex and interconnected determinants that may not be fully explained by caregiver-reported measures alone. Strengthening integrated maternal, nutrition, feeding, sanitation, immunization, and child health services during the first 1,000 days remains essential.

Keywords— stunting; child nutrition; first 1,000 days; infant and young child feeding; coastal communities.

I. INTRODUCTION

Stunting remains one of the most persistent public health challenges affecting children worldwide, particularly during the critical period of the first 1,000 days of life. It is characterized by impaired linear growth resulting from chronic nutritional deficiencies, repeated infections, and inadequate care during early childhood. Beyond being an indicator of nutritional deprivation, stunting reflects broader social, economic, environmental, and healthcare-related inequalities that influence child growth and development. Children who experience stunting are at increased risk of delayed cognitive development, poor educational achievement, reduced productivity in adulthood, and increased vulnerability to illness throughout the life course. Therefore, preventing stunting is essential not only for improving child health outcomes but also for strengthening human capital development.

The first two years of life represent a particularly sensitive period because rapid physical growth and brain development require adequate nutrition, disease prevention, and responsive caregiving. The World Health Organization (WHO) identifies stunting through low height-for-age measurements and emphasizes that growth faltering frequently occurs during the first 1,000 days, beginning from conception until a child reaches two years of age. During this period, inadequate dietary intake, maternal undernutrition, poor infant feeding practices, and recurrent infections may interact and contribute to irreversible growth impairment. Global evidence demonstrates that childhood stunting remains a major concern, particularly in low- and middle-income countries where children are more likely to experience poverty, food insecurity, limited healthcare access, and unfavorable environmental conditions.

Stunting is widely recognized as a multifactorial condition influenced by immediate, underlying, and structural determinants. At the immediate level, inadequate nutrient intake and frequent infections directly affect growth and nutritional status. Breastfeeding practices and complementary feeding are among the most important immediate determinants because infants require appropriate timing, frequency, and diversity of food intake to support rapid growth. Exclusive breastfeeding during the first six months of life and continued breastfeeding with adequate complementary feeding thereafter have been consistently associated with improved child survival and development outcomes. However, inappropriate introduction of complementary foods, inadequate dietary diversity, and early cessation of breastfeeding remain important contributors to childhood undernutrition.

Maternal factors also play a significant role in determining child growth outcomes. Maternal nutritional status before and during pregnancy, antenatal care utilization, and maternal health conditions influence fetal growth, birth outcomes, and subsequent child development. Evidence indicates that children born to mothers experiencing nutritional deficiencies or inadequate prenatal care are more likely to experience impaired growth. Pregnancy represents an important intervention opportunity because improving maternal nutrition and healthcare access can reduce the risk of growth restriction beginning before birth.

Environmental conditions further contribute to childhood stunting through pathways involving infection and nutrient absorption. Poor water, sanitation, and hygiene (WASH) conditions increase children's exposure to pathogens that may cause diarrhea and intestinal inflammation. Repeated infections can reduce appetite, increase nutritional requirements, and interfere with nutrient utilization, thereby contributing to growth faltering. Studies have demonstrated that access to safe drinking water, improved sanitation facilities, and appropriate handwashing practices are important components of strategies aimed at reducing childhood undernutrition.

Socioeconomic conditions represent another fundamental determinant of stunting. Household income, parental education, employment opportunities, and food security influence a family's ability to provide adequate nutrition and healthcare for children. Families with limited financial resources may experience difficulties accessing diverse and nutrient-rich foods, even when basic food availability exists. Likewise, caregiver education influences knowledge and decision-making regarding breastfeeding, complementary feeding, hygiene practices, and healthcare-seeking behavior. These socioeconomic influences are particularly important in rural and coastal communities where livelihood opportunities may be limited.

In the Philippines, childhood stunting continues to be a significant public health concern despite ongoing national nutrition and health programs. The burden of stunting is often greater in economically disadvantaged and geographically isolated communities where families experience challenges related to income, food availability, healthcare accessibility, sanitation infrastructure, and health information. Rural coastal populations may face additional vulnerabilities because many households depend on livelihood activities that are sensitive to economic and environmental conditions. These circumstances may influence household food security, maternal health, and childcare practices, ultimately affecting child nutritional outcomes.

The Municipality of Balatan in Camarines Sur represents a coastal community where many families rely on fishing and other local livelihood activities. Although government health and nutrition initiatives are implemented within the municipality, local evidence regarding factors associated with stunting among children aged 0–23 months remains limited. Understanding the characteristics of caregivers, child profiles, environmental conditions, maternal factors, socioeconomic circumstances, child-feeding practices, and immunization-related behaviors is necessary to develop context-specific approaches for addressing childhood growth problems.

Previous research has established that stunting results from complex interactions among multiple factors; however, findings may vary depending on local social, economic, and environmental contexts. Factors contributing to stunting in urban populations may differ from those affecting rural coastal communities. Therefore, community-level assessment is important to identify whether specific patterns exist among vulnerable populations and whether measured factors differ according to children's stunting status.

This study aimed to assess the factors associated with stunting among children aged 0–23 months in coastal communities of Balatan, Philippines. Specifically, it sought to (1) describe the sociodemographic characteristics of caregivers and the profiles of children aged 0–23 months; (2) assess environmental, maternal, socioeconomic, child-feeding, and immunization-related factors associated with stunting; and (3) determine whether these identified factors differ significantly according to children's stunting status. The findings may contribute to improved understanding of childhood stunting within coastal communities and provide evidence that can support locally appropriate nutrition and child health strategies.

II. METHODOLOGY

This study employed a quantitative cross-sectional research design to assess factors associated with stunting among children aged 0–23 months in the coastal communities of Balatan, Camarines Sur, Philippines. The design enabled the simultaneous assessment of stunting status and environmental, maternal, socioeconomic, child-feeding, and immunization-related factors without attempting to establish causal relationships. The study involved 142 primary caregivers of children aged 0–23 months from the six coastal barangays of Camangahan, Pararao, Luluasan, Siramag, Coguit, and Duran. Total enumeration was used to include all eligible caregivers identified through the available local nutrition records.

Data were collected using a structured questionnaire checklist developed according to the study variables and reviewed by the research adviser for clarity and suitability. The instrument gathered information on

caregiver characteristics, including age, marital status, educational attainment, number of children, employment status, and monthly family income, as well as child characteristics such as age, sex, and birth weight. It also assessed sources of drinking water, sanitation and handwashing practices, maternal nutrition and health during pregnancy, antenatal care utilization, household food security, healthcare access, breastfeeding and complementary-feeding practices, and immunization. The researcher coordinated with the Municipal Nutrition Action Officer and used the 2024 Operation Timbang Plus records to identify eligible children. Following official permission from the Municipality of Balatan, caregivers were invited through barangay health and nutrition personnel, informed about the study, and asked to complete the questionnaire after providing consent. Completed questionnaires were collected, reviewed for completeness, and prepared for analysis.

Frequencies and percentages were used to summarize caregiver sociodemographic characteristics and child profiles. Weighted means were calculated to assess environmental, maternal, socioeconomic, child-feeding, and immunization-related indicators using a five-point Likert scale, where higher scores indicated stronger agreement with the stated conditions or practices. The Kruskal–Wallis test was used to determine whether the factor scores differed significantly according to the children's reported stunting status, with statistical significance evaluated at the .05 level. Ethical safeguards included voluntary participation, informed consent, confidentiality of responses, and the participants' right to withdraw from the study at any stage without penalty.

III. RESULTS

Sociodemographic characteristics of the caregivers and the profiles of children aged 0–23 months in the coastal communities of Balatan

The findings showed that most caregivers were young adults aged 25–29 years (38.73%), living with their partners (50.70%), high school graduates (46.48%), unemployed (65.49%), and belonged to households earning below ₱5,000 monthly (48.59%).

Most caregivers also had two to three children (52.82%). These characteristics indicate that children experiencing stunting in the coastal communities of

Balatan were largely from households with limited economic resources and potentially constrained caregiving capacity.

Table 1. Sociodemographic Characteristics of Caregivers of Children Aged 0–23 Months in Coastal Balatan, Philippines (n=142)

Characteristic	Category	Frequency	Percentage (%)
Age	Below 20 years	5	3.52
	20–24 years	32	22.54
	25–29 years	55	38.73
	30–34 years	28	19.72
	35 years and above	22	15.49
Marital status	Single	2	1.41
	Married	63	44.37
	Living with partner	72	50.70
	Separated	5	3.52
Highest educational attainment	Elementary level	15	10.56
	Elementary graduate	16	11.27
	High school level	31	21.83
	High school graduate	66	46.48
	College level	9	6.34
	College graduate	5	3.52
Number of children	One child	20	14.08
	Two to three children	75	52.82
	Four to five children	34	23.94
	Six or more children	13	9.15
Employment status	Regularly employed	13	9.15
	Contractually employed	10	7.04
	Self-employed	26	18.31
	Unemployed	93	65.49
Average monthly family income	Below ₱5,000	69	48.59
	₱5,001–₱10,000	48	33.80
	₱10,001–₱15,000	17	11.97
	₱15,001–₱20,000	5	3.52
	Above ₱20,000	3	2.11

The predominance of caregivers with lower educational attainment and limited employment opportunities may influence child nutrition outcomes. Education is an important determinant of maternal and caregiver decision-making because it affects knowledge regarding appropriate feeding practices, healthcare utilization, hygiene behaviors, and recognition of childhood nutritional problems. Previous studies have demonstrated that caregivers with limited educational opportunities are more likely

to experience challenges in providing adequate nutrition and accessing appropriate health services for their children (Handayani et al., 2023; Philippine Institute for Development Studies, 2023).

The high proportion of unemployed caregivers and households with low monthly income also reflects the economic vulnerability of coastal communities. Household income directly affects food availability, dietary diversity, healthcare access, and the ability to

provide nutrient-rich foods required during the critical first 1,000 days of life. Magno et al. (2024) emphasized that inadequate financial resources contribute to food insecurity and reduced dietary quality, increasing the likelihood of childhood growth impairment. Similarly, Alderman and Headey (2021) reported that larger household sizes may dilute available resources, including food, financial support, and parental attention, potentially affecting optimal child development.

These findings suggest that interventions addressing stunting in Balatan should not focus solely on nutrition education but should also consider socioeconomic

strengthening, livelihood support, and programs that improve household capacity to provide adequate nutrition.

The child profile showed that most children were aged 12–17 months (38.73%), followed by those aged 18–23 months (36.62%). Male children comprised the majority (55.63%), and most children had normal birth weight (71.83%).

Despite having generally favorable birth characteristics, these children experienced stunting, highlighting the multifactorial nature of chronic growth impairment.

Table 2. Profile of Children Aged 0–23 Months in Coastal Balatan, Philippines (n=142)

Characteristic	Category	Frequency	Percentage (%)
Age	0–5 months	9	6.34
	6–11 months	26	18.31
	12–17 months	55	38.73
	18–23 months	52	36.62
Sex	Male	79	55.63
	Female	63	44.37
Birth weight	Low birth weight	29	20.42
	Normal birth weight	102	71.83
	High birth weight	0	0.00
	Unknown	11	7.75

The concentration of cases among children aged 12–23 months is consistent with evidence identifying the second year of life as a critical period when growth faltering frequently occurs.

During this stage, children transition from exclusive breastfeeding to complementary feeding, increasing their vulnerability to inadequate dietary intake and infections. Nasrul et al. (2023) emphasized that stunting commonly becomes more evident between 12 and 23 months because children require greater nutritional support during rapid growth and developmental transitions.

The higher proportion of male children is also consistent with previous findings indicating that boys may have greater biological vulnerability to growth impairment compared with girls. UNICEF (2022) reported that male children often demonstrate higher

susceptibility to stunting due to differences in growth patterns, immune response, and nutritional requirements.

Although most children had normal birth weight, approximately one-fifth had low birth weight (20.42%). Birth weight remains an important early indicator of future growth potential.

Christian et al. (2021) reported that intrauterine growth restriction and low birth weight increase the risk of childhood stunting because early growth limitations may persist into later childhood.

These findings reinforce the importance of interventions beginning before birth through maternal nutrition improvement, prenatal care, breastfeeding support, and appropriate complementary feeding during the first two years of life.

Environmental, maternal, socioeconomic, child-feeding, and immunization-related factors associated with stunting among children aged 0–23 months

The results demonstrated generally favorable caregiver-reported practices across all domains. Environmental factors, including drinking water

source (WM=4.10), sanitation facilities (WM=3.97), and handwashing practices (WM=4.23), were rated as “Agree.” Maternal factors, including maternal nutritional status during pregnancy (WM=4.12), maternal health status (WM=4.15), and antenatal care utilization (WM=4.14), also received favorable ratings.

Table 3. *Environmental, Maternal, Socioeconomic, Child-Feeding, and Immunization-Related Factors*

Domain	Indicator	Weighted mean	Interpretation
Environmental factors	Source of drinking water	4.10	Agree
	Sanitary facilities	3.97	Agree
	Handwashing practices	4.23	Agree
Maternal factors	Maternal nutritional status during pregnancy	4.12	Agree
	Maternal health status during pregnancy	4.15	Agree
	Antenatal care utilization	4.14	Agree
Socioeconomic factors	Household food security	4.06	Agree
	Access to healthcare services	4.19	Agree
Child-feeding practices	Initiation of breastfeeding within one hour after birth	4.19	Agree
	Exclusive breastfeeding from birth to six months	3.97	Agree
	Duration of breastfeeding	3.99	Agree
	Complementary feeding and continued breastfeeding	4.14	Agree
Immunization	Immunization practices	4.14	Agree

These findings suggest that caregivers perceived their household conditions and health-related practices as adequate. However, the presence of stunting despite favorable reported practices highlights the complexity of childhood growth failure. Stunting is a chronic condition resulting from prolonged exposure to multiple interacting determinants rather than a single risk factor.

Regarding environmental factors, the results support previous evidence emphasizing the importance of water, sanitation, and hygiene (WASH) in preventing growth faltering. Wahidah et al. (2022) reported that inadequate sanitation and unsafe water increase exposure to infections, particularly diarrhea, which negatively affects nutrient absorption. Similarly, Wolf et al. (2023) demonstrated that improved handwashing practices reduce childhood infections that contribute to impaired growth.

Maternal factors were also rated positively, particularly antenatal care utilization. Adequate prenatal care provides opportunities for maternal nutrition counseling, supplementation, disease prevention, and monitoring of fetal development. However, favorable healthcare utilization does not always guarantee adequate maternal dietary intake or sufficient household resources to support optimal child growth.

Socioeconomic factors showed relatively positive ratings for household food security (WM=4.06) and healthcare access (WM=4.19). Nevertheless, the demographic findings revealed that almost half of households earned below ₱5,000 monthly. This suggests a possible difference between perceived household adequacy and actual economic capacity. Families may have access to basic food supplies but still experience limitations in dietary diversity and

nutrient quality. Child-feeding practices were generally favorable, with early breastfeeding initiation receiving the highest score (WM=4.19).

However, exclusive breastfeeding and breastfeeding duration had slightly lower scores, suggesting areas requiring continued support.

WHO recommendations emphasize exclusive breastfeeding during the first six months and continued breastfeeding with appropriate complementary foods thereafter.

Victora et al. (2022) and Rollins et al. (2023) emphasized that optimal breastfeeding practices significantly contribute to protection against infections and support healthy growth.

Immunization practices received a favorable rating (WM=4.14), reflecting strong utilization of child health services. Although vaccination does not directly reverse stunting, it indirectly contributes to growth

protection by reducing infection-related nutritional losses.

Overall, the findings suggest that stunting persists despite favorable reported practices, emphasizing the importance of addressing hidden socioeconomic constraints, food quality, caregiver practices, and broader structural factors influencing child nutrition.

Significant differences in the identified environmental, maternal, socioeconomic, child-feeding, and immunization-related factors according to the children's stunting status

The Kruskal–Wallis test showed no statistically significant differences in environmental factors, socioeconomic factors, maternal factors, child-feeding practices, and immunization when grouped according to stunting status ($p>0.05$).

These findings indicate that the measured factors were relatively similar across the reported groups.

Table 4. Differences in Factors According to Stunting Status

Factor	Kruskal–Wallis H	df	p-value	Decision at ($\alpha=.05$)
Environmental factors	$1.79 \times 10^{-5*}$	1	.997	Not significant
Socioeconomic factors	1.198	1	.274	Not significant
Maternal factors	0.967	1	.325	Not significant
Child-feeding practices	1.347	1	.246	Not significant
Immunization	0.496	1	.481	Not significant

The absence of significant differences suggests that stunting in the study area cannot be explained by isolated household-level characteristics alone. Instead, it may reflect the interaction of multiple determinants occurring over time.

According to the UNICEF conceptual framework of malnutrition, childhood stunting develops through immediate causes such as inadequate dietary intake and infection, underlying causes such as household food insecurity and inadequate care, and basic causes including poverty and social conditions.

The findings are also consistent with the ecological and systems perspectives used in the study, which recognize stunting as a complex outcome influenced

by interconnected individual, household, community, and societal factors.

However, interpretation should consider methodological limitations. The cross-sectional design prevents establishing causal relationships, while caregiver-reported measures may introduce reporting bias.

Additionally, the similarity of factor scores among participants may have reduced the ability to detect statistical differences.

Future studies using larger samples, objective measurements of dietary intake, household food security, maternal nutritional status, and longitudinal follow-up may provide deeper understanding of

pathways contributing to stunting in coastal communities.

IV. CONCLUSION & RECOMMENDATION

The study found that caregivers of children aged 0–23 months in the coastal communities of Balatan were predominantly young adults, commonly living with partners, high school graduates, unemployed, and members of low-income households.

Most children were aged 12–23 months, male, and reported to have normal birth weight.

Caregivers generally reported favorable environmental conditions, maternal health practices, socioeconomic circumstances, child-feeding practices, and immunization-related behaviors.

However, no statistically significant differences were observed in environmental, maternal, socioeconomic, child-feeding, or immunization-related factors when grouped according to children's stunting status.

These findings indicate that stunting in the study area is likely influenced by multiple interacting conditions that may not be fully captured through caregiver-reported measures or isolated domain scores.

Local health and nutrition programs should continue strengthening maternal and child health services, particularly during pregnancy and the first two years of life, with emphasis on exclusive breastfeeding, appropriate complementary feeding, sustained breastfeeding, immunization, sanitation, and regular growth monitoring.

Greater attention should also be given to economically vulnerable households, especially families with limited income and employment opportunities, because favorable self-reported practices may not always reflect the actual adequacy, consistency, or nutritional quality of care received by children.

Future studies should use clearly defined stunting-status groups, objective anthropometric and dietary measures, larger and more diverse samples, and longitudinal or analytical designs to better determine which factors predict stunting in coastal communities.

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