

RESEARCH STUDY

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Prevalence of Stunting Among Under 5 Children in Al-Rajaiya Health Center, Ash-Shamaytayn District - Taiz, Yemen

Prevalensi Stunting Anak Bawah lima Tahun di Puskesmas Al-Rajaiya, Distrik Ash-Shamaytayn - Taiz, Yaman

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ARTICLE INFO

Received: 31-08-2023

Accepted: 13-09-2023

Published online: 31-12-2023

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10.20473/amnt.v7i2SP.2023.1-6

Available online at:

<https://e-journal.unair.ac.id/AMNT>

Keywords:

Stunting, Malnutrition, Children under 5 years, Nutritional status

ABSTRACT

Background: Yemen is one of the low-income countries, with 80% of the population living below the poverty line and almost half the population lacks adequate access to nutritious food. The low-birth-weight rate is 24.6%, and the overall infant mortality rate is 47 per 1,000 births. The risk of death of newborns varies depending on social, demographic, and economic factors.

Objectives: This study aims to evaluate the effect of the ongoing war on stunting prevalence among children under five years in Al-Rajaiya Health Center, Ash-Shamaytayn District - Taiz, Yemen.

Methods: This study is an observational analytic with a cross-sectional design. It was conducted from January to June 2022, following purposive sampling gathered 254 participants.

Results: The data revealed that the prevalence of severe stunting in 6- to 23-month-old children was higher in urban areas than in rural areas (45% vs. 43.7%); it was also higher in girls than in boys (58.4% vs. 30.3%). Furthermore, in 24- to 59-month-old children, it was higher in urban areas than in rural areas (50% vs. 12.5%) and higher in girls than in boys (42.9% vs. 19.6%) with p-value (0.040, 0.018, 0.001 and >.001) respectively.

Conclusions: Findings demonstrated that the ongoing war has a significant effect on the stunting prevalence among children under five years. Early childhood undernutrition is linked to several adverse outcomes in adulthood, and it is plausible that undernutrition in early childhood may be a significant factor in explaining the health disparities faced by Yemeni children under five.

INTRODUCTION

Yemen stands as one of the impoverished nations within the Middle East region. According to the United Nations Development Program's 2021/2022 Human Development Index, Yemen's ranking was notably low at 183 out of 191¹. This country faces a significant poverty challenge, with an estimated 80% of its entire populace residing below the poverty threshold. Disturbingly, data on food security indicates that in early 2021, approximately five million Yemenis teetered on the edge of famine, a plight particularly affecting displaced

individuals who face a fourfold increased risk of experiencing hunger compared to other Yemenis. Furthermore, about half of Yemen's population needs more access to nutritional food².

Yemen has been through various conflicts that escalated in 2010 and beyond³. Large protests took place in 2011, followed by internal clashes until 2014, and ongoing war and siege from 2015 until now⁴. These hostilities caused extensive damage to crucial sectors in Yemen, including agriculture, service industries, and manufacturing, resulting in significant devastation and

cost escalations^{5,6}. The conflict has also severely impacted social service provision and an already fragile healthcare system. Prolonged power outages have affected service delivery, including the operational capacities of clinics and hospitals. Concurrently, essential services related to water supply, sanitation, irrigation, and agriculture have been impeded, worsening public health, especially among women and children⁷. In Yemen, the most recent data estimate for the low-birth-weight rate is 24.6%, with an overall infant mortality rate of 47 deaths/newborn. The risk of death of newborns in Yemen varies in terms of social, demographic, and economic factors such as region, place of residence, geographic location, mother's educational status, and household wealth index⁸. According to an IPC report, around 54% of Yemen's population of 31.5 million suffer from food insecurity but before the war, it was 18.5%. While about 2.2 million children between 6-54 months suffer from acute malnutrition, acute malnutrition affects around 1.3 million pregnant and breastfeeding women⁹.

Malnutrition is a serious public health issue in the majority of developing countries. Despite improvements in the health of children under 5 (U5) in developing countries, malnutrition remains a major public health problem¹⁰. Malnutrition is associated with stunting, underdevelopment growth, and impaired cognitive development, which can lead to poor educational performance¹¹. One of the nutritional problems faced by the world is stunting, especially in poor and developing countries, characterized by development impairment and chronic growth^{12,13}. Childhood stunting (low height for age) is one of the most important health issues that should not be ignored in healthcare. This type of chronic malnutrition limits a child's growth potential due to inadequate food intake. Stunting is defined as being less than 2 SD from the mean z-score of height (HAZ) determined by WHO growth standards in 2014^{14,15}. Globally, one in four (25%) children U5 suffer from growth retardation associated with growth and developmental retardation. One hundred fifty-one million (22%) children U5 were affected by stunting in 2017¹⁶. The data shows that 66% of them are in middle-income countries, 25% of all stunting children live in low-income countries, and 8% of them are in high-income countries¹⁷, and its prevalence is about 40.1 % in Yemen¹⁸.

Children who experience stunted growth due to deficiencies in iodine and iron are susceptible to irreversible brain damage, impairing their potential for full developmental growth. This condition results in reduced adult height, heightened vulnerability to chronic ailments in later life, limited educational attainment, and diminished adult earnings¹⁹. Stunting arises from a complex interplay of factors beyond merely the inadequate nutritional status of children and expectant mothers¹⁷. Socio-economic disparities, maternal education, parental occupations, and the health of maternal or paternal relatives influence encompassing the mother's nutritional well-being during the initial 1000 days of the child's life²⁰. Maternal nourishment significantly shapes fetal development, infant well-being,

survival rates, and the sustained health and development of the child. During the critical window of the first 1,000 days, the mother singularly serves as the infant's nutritional source²¹. Malnutrition significantly increases the likelihood that children aged 6 to 59 months will meet the minimum diet diversity requirement as well as their scores on diet diversity. Risk factors associated with stunting are inadequate nutritional intake, low birth weight (LBW), low education of parents, economic status, unemployed father, micronutrients, and vitamin deficiency such as iron, zinc, vitamin D, calcium, and other risk factor related to poverty^{13,22}.

The impact of stunting is impaired cognitive and psychomotor function development, leading to disturbance in the body's organs, as the brain is one of the organs affected by stunting. The consequences of stunting are increasing morbidity and mortality of children^{13,23}. This study aims to evaluate the effect of the ongoing war on stunting prevalence among children U5.

METHODS

The research adopted an observational analytical approach with a cross-sectional design, conducted from January to June 2022 in the Al-Rajaiya Health Center situated within Al-Rajaiya village, Ash Shamayatayn District, Taiz, Yemen. A purposive sampling technique was utilized to gather a total of 254 participants. The study primarily assessed stunting prevalence, utilizing child height as the key independent variable. The collection of height data was executed by the researcher, who had undergone appropriate training. Stunting cases were identified based on the criterion of a Z-value <-2 standard deviations from the median height for age. Z-scores were employed to quantify height, weight, and Body Mass Index (BMI), with Weight age Z score (WAZ) <-2 indicating underweight. For children aged 25-59 months, height was measured using a measuring tape, while a portable calibration board was employed to gauge the length of those aged 0-24 months. The interviewer meticulously recorded the length/height of each child U5, designating Height age Z score (HAZ) <-2 as indicative of stunting²⁴. Data were analyzed using the SPSS version 24 program assessed by the Chi-square test considered significant at a 95% probability level²⁵.

RESULTS AND DISCUSSION

This study involved 254 children under 5 years of age, suffering from Acute severe malnutrition, in Al-Rajaiya Health Center, Ash Shamayatayn District - Taiz, Yemen, during the period from January to June 2022. The demographic characteristics of children U5 are shown in Table 1. 66 (25.9%) males and 188 (74.0%) females comprise the entire sample. Females made up the majority of the responders. According to the children's age distribution, 232 (91.3%) were between the ages of 6 and 23 months, while 22 (8.7%) were between the ages of 24 and 59 months. The children in the research sample were divided into two groups according to where they lived, with 136 (53.5%) living in urban regions and 118 (46.5%) living in rural areas.

Table 1. Characteristics of respondents

Variable	n	Percentage (%)
Gender		
Male	66	26.0
Female	188	74.0
Age		
6-23 Months	232	91.3
24-59 Months	22	8.7
Area		
Rural	118	46.5
Urban	136	53.5

Table 2 revealed that severe stunting prevalence in the 6-23 months age group was slightly elevated in urban areas compared to rural areas (45% versus 43.7%). It was also higher in girls than boys (58.4% versus 30.3%). Similarly, in the 24-59 months age group, urban areas showed a higher prevalence of severe stunting than rural areas (50% versus 12.5%), and it was also more prevalent among girls than boys (42.9% versus 19.6%). Conversely, the findings reveal that moderate stunting prevalence in the 6-23 months age group was slightly higher in urban areas than in rural areas (34.4% versus 30.9%). It was also more visible in girls compared to boys (49.5% versus 15.8%), with p-values of 0.086 and 0.062, respectively. In the 24-59 months age group, rural areas exhibited a

significantly higher prevalence of moderate stunting than urban areas (75% versus 28.6%), and it was also more prevalent among girls than boys (89.3% versus 14.3%). Moreover, the results indicate that non-stunting prevalence in the 6-23 months age group was somewhat higher in rural areas compared to urban areas (25.4% versus 20.5%). In addition, it was more noticeable in girls compared to boys (39.8% versus 6.1%). In the 24-59 months age group, non-stunting was more prevalent in urban areas than rural areas (21.4% versus 12.5%). Boys had a slightly higher prevalence compared to girls (19.6% versus 14.3%), with p-values of 0.018 and 0.442, respectively.

Table 2. Nutritional status of different age/gender groups for stunting based on anthropometric measurements

Variable	Rural		p-value	Urban		p-value
	Male n (%)	Female n (%)		Male n (%)	Female n (%)	
6-23 Months						
HAZ ^a < -3	18 (16.4%)	30 (27.3%)	0.086	17 (13.9%)	38 (31.1%)	0.062
-3 ≤ HAZ ^a < -2	12 (10.9%)	22 (20%)		6 (4.9%)	36 (29.5%)	
-2 ≤ HAZ ^a < -1	4 (3.6%)	24 (21.8%)		3 (2.5%)	22 (18%)	
24-59 Months						
HAZ ^a < -3	1 (12.5%)	-	0.018	1 (7.1%)	6 (42.9%)	0.442
-3 ≤ HAZ ^a < -2	-	6 (75%)		2 (14.3%)	2 (14.3%)	
-2 ≤ HAZ ^a < -1	1 (12.5%)	-		1 (7.1%)	2 (14.3%)	

^a Based on the WHO 2007 classification

Table 3 showed that severe wasting in children aged 6 to 23 months was more prevalent in rural areas in contrast to urban areas (30.9% compared to 29.5%). Furthermore, a gender-based disparity was noted in this regard, with girls exhibiting a higher prevalence than boys. In the 24 to 59-month age group, the prevalence of severe wasting was notably higher in urban areas as opposed to rural areas (57.2% versus 12.5%), and the pattern shifted, with boys surpassing girls (31.1% versus 28.6%). These disparities were associated with p-values of 0.064 and 0.040, respectively. On the other hand, the research revealed that moderate wasting among children aged 6 to 23 months was more prominent in rural areas compared to urban locales (42.7% versus 38.5%). Once again, a gender-based distinction emerged, with girls displaying a significantly higher prevalence than boys. The p-values for these disparities were recorded at 0.001 and >0.001, respectively. In the 24 to 59-month age category, a higher prevalence of moderate wasting was observed in rural areas (87.5%) compared to urban areas (42.9%). Additionally, the findings underscored that non-wasting prevalence among children aged 6 to 23 months

was more pronounced in urban areas than in rural regions (32% versus 26.3%).

Childhood stunting remains a pressing nutritional concern in Yemen, underscoring the significance of nurturing robust and intellectually capable youngsters to indicate the nation's advancement. Consequently, early childhood health and education are pivotal foundations influencing children's holistic growth, development, and overall quality of life²⁶. On a global scale, child stunting (characterized by low height for age) and wasting (exhibiting low weight for height) are reported at rates of 26.3% and 8.1%, respectively. The comparative rates for Asia stand at 27.7% for stunting and 10.2% for wasting²⁷. Within the context of this study, the prevalence rates of stunting and wasting among children aged 6 to 23 months were recorded at 88.7% and 60.4%, respectively. For children aged 24 to 59 months, these rates stood at 69.7% for stunting and 62.5% for wasting. A study by Kazi et al. (2022) indicated stunting, underweight, and wasting prevalence among Bangladeshi children under the age of 5 to be 29.0%, 23.4%, and 15.6%, respectively²⁸. However, contrasting figures were presented by Francis Danso et al. (2023), reporting stunting at 12.5% and

wasting at 27.5%²⁹. Meanwhile, Mireku et al. (2020) documented stunting, wasting, and underweight prevalence at 14.1%, 13.6%, and 17.7% respectively at 9

months, and 17.3%, 12.7%, and 17.2% respectively at 12 months³⁰.

Table 3. Nutritional status based on anthropometric measurements for malnutrition for different age/gender groups

Variable	Rural			Urban		
	Male n (%)	Female n (%)	p-value	Male n (%)	Female n (%)	p-value
6-23 Months						
WHZ ^a < -3	18(16.4%)	30(27.3%)	0.001	16(13.1%)	20(16.4%)	<.001
-3 ≤ WHZ ^a < -2	13(11.8%)	22(20%)		7(5.7%)	40(32.8%)	
-2 ≤ WHZ ^a < -1	3(2.7%)	24(21.8%)		3(2.5%)	36(29.5%)	
24-59 Months						
WHZ ^a < -3	1 (12.5%)	-	0.064	4(28.6%)	4(28.6%)	0.040
-3 ≤ WHZ ^a < -2	1 (12.5%)	6(75%)		-	6(42.9%)	
-2 ≤ WHZ ^a < -1	-	-		-	-	

^a Based on the WHO 2007 classification

Moreover, Aklilu et al. (2021) reported that the occurrence of malnutrition markers indicated WaSt (5.8%), wasting (16.8%), stunting (53.9%), and underweight (36.9%)³¹. A comparison between these rates and global and Asian benchmarks underscores Yemen's concerning nutritional landscape for children. The nation's child nutrition domain needs to give more targeted attention, more household nutritional education, adequate implementation of nationwide nutrition-enhancing initiatives, and insufficient coverage for vulnerable families. Consequently, these factors have precipitated a decline in children's nutritional well-being, notably marked by an upswing in the prevalence of wasting and stunting. These factors collectively contribute to the dire state of child nutrition in Yemen.

In this study, the significant prevalence may be due to the ongoing war in Yemen and other factors such as not enough exclusive breastfeeding, complementary breastfeeding, infectious disease outbreaks, lack of basic health practices, lack of environmental sanitation, and low knowledge of maternal nutrition are related with the prevalence of stunting in poverty societies such as Yemen. According to a previous study, two of the characteristics most significantly associated with stunting in children U5 are the mother's height and education³². Furthermore, in countries with low and medium incomes, maternal height has the potential to give birth to stunted children²⁴.

However, there are opportunities to address this issue through short-term solutions, such as implementing food assistance and social protection programs, and long-term solutions, such as reconfiguring food, health care, and social protection systems. Collaboration between different sectors, including healthcare, education, and local businesses, can also play a vital role in addressing food insecurity and malnutrition among children. It is crucial to prioritize the well-being of children and families in Yemen by providing them with access to healthy and nutritious food, as well as other essential resources and support³³.

Several studies show that the critical determinants associated with stunting and underweight are low or short parents, children's nutritional status, exposure to undernutrition and infections, exposure to a poor WASH environment induces diarrheal diseases and other infections, poverty, and poor maternal education,

low birth weight and height, insufficient protein energy, an unstable job, breastfeeding for more than 6 months, mother's farming occupation, and a lack of vitamin A, and accessing family food³⁴⁻³⁸. Stunting and underweight were associated with factors including reduced birth weight, duration of breastfeeding lasting six months or beyond, the presence of underweight or shorter stature in parents, as well as maternal absence from formal education³⁴.

According to Rachmi et al. (2016), stunting is also more prevalent in rural regions of Indonesia³⁴. However, this study discovered that stunting was more prevalent in cities than in rural regions. Furthermore, Reyes et al. (2004) said that in rural areas, the father's profession as a farmer and family networks for child care were related to a higher incidence of stunting³⁸.

The significant cognitive delay was related to a higher prevalence of exposure to three indices of undernutrition (underweight, wasting, and stunting) in both middle-income and low-income nations. Children with significant cognitive delay were twice as likely as their counterparts to be very underweight, severely wasting, or severely stunted. After correcting for the nation's economic categorization group, relative family wealth was the most significant and consistent predictor of exposure to undernutrition among children with substantial cognitive impairment³⁹.

CONCLUSIONS

Findings demonstrate that the ongoing war has a significant effect on the stunting prevalence among children U5. The prevalence of stunting among U5 children in Yemen is a critical issue that requires urgent attention. The available search results highlight the impact of food insecurity and malnutrition on children's physical and mental health, as well as their long-term development outcomes.

ACKNOWLEDGMENTS

The authors would like to thank the Health Office in Ash-Shamaytayn Directorate for their cooperation and for providing access to data.

Conflict of Interest and Funding Disclosure

The authors declare that there is no conflict of interest regarding this study. This research did not receive a specific grant from agencies in the public, commercial, or non-profit sectors.

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