JHER Vol. 32 (2) December 2025, pp. 219 – 230

Prevalence of Stunting and Underweight among Preschoolers in Early Child Care Centers in Enugu State, Nigeria

[1]Dibia, Samuel I. C; [2]Ugwa, Leonard M. [1]Dibia, Obianuju C., [1]Obayi, Agatha N. [1]Paul Uyonwu, Vivian A.

[1]Department of Human Kinetics and Health Education, University of Nigeria, Nsukka;
[2]School of Health Technology, Oji-River, Enugu State

Corresponding Author: vivian.uyonwu@unn.edu.ng

Abstract

The study investigated prevalence of stunting and underweight among preschoolers in Enugu State. Specifically, it determined prevalence of stunting and underweight based on mothers' education; income; and occupation. The study adopted a cross-sectional research design. Population consisted of 541,326 preschoolers enrolled in early child care centers in Enugu State and their mothers/caregivers. Multi-stage sampling involving other various sampling techniques was employed to select 900 preschoolers of between 6-59 months. A proforma, anthropometric scale, measuring boards and tapes were used for data collection. Frequency count, percentages and logistic regressions were used for data analysis. Findings reveal that 37.5 percent and 29.6 percent of preschoolers in Enugu State were stunted and underweight respectively. About one-third of preschoolers are stunted for all categories of mothers' income. Mother's education was significant predictor of underweight ($p < .05$). Based on these findings, the study recommended, among others, that: health educators, nutritionists and food experts should intensify community education, weight screening and counselling, promotion of school feeding programmes in schools and other community settings so as to create awareness on how to mitigate stunting and underweight in Enugu State.

Keywords: Stunting, Underweight, Preschoolers, Prevalence, Maternal, Educational, Income, Occupation.

Introduction

Stunting and underweight constitute a major public health problem among preschoolers around the globe, with higher prevalence in developing countries. Stunting is defined as a height that is more than two standard deviations below the World Health Organisation (WHO) Child Growth Standards Median (United Nation Children's Fund-UNICEF, 2015). It is a largely irreversible outcome and is the result of poor maternal health and nutrition, inadequate infant and young child feeding practices, and repeated infections interacting with a variety of other factors over a sustained period (WHO, 2023). Stunting is acknowledged as the best indicator for child growth and a well-established risk marker of poor child development. In the

context of this study, World Health Organization (2024) definition of stunting as low height for age is the result of chronic and recurrent undernutrition, usually associated with poor socioeconomic conditions, poor maternal health and nutrition, frequent illness and inappropriate infant and young child feeding and care in early life was adopted as the operational definition of stunting.

Underweight is another health condition that profoundly affects the preschoolers. Underweight is defined as a weight that is more than two standard deviations below the WHO Child growth Standards Median (UNICEF et al., 2020). Underweight remains a pervasive problem in developing countries, where poverty is a strong underlying determinant, contributing to household food insecurity, poor child care, maternal undernutrition, unhealthy environments, and poor health care. All ages are at risk, but underweight is most prevalent among children under five years of age. In this study, UNICEF et al., (2023) definition of underweight was adapted as the proportion of children preschooler years that fall below minus 2 and minus 3 standard deviations from the median weight-for-age.

United Nations Children's Fund (UNICEF), World Health Organisation (WHO) and World Bank (2024) averred that nearly half of all deaths in children under five are attributed to stunting and underweight. The report further stated that underweight persists at alarming rates while stunting has declined steadily since 2000 – but faster progress is needed to reach the 2030 target. Sustainable Development Goal Target 2.2 aimed at ending all forms of malnutrition, including achieving targets on stunting, wasting and underweight in children under 5 years of age. Globally, over one in five children (148.1 million) under five years of age were stunted in 2022. (UNICEF et al., 2023). Nearly half of deaths among children under 5 years of age are linked to undernutrition, and they mostly occur in low-and middle-income countries (WHO, 2024). The developmental, economic, social, and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries. In developing countries especially sub-Saharan Africa, malnutrition among children under five years is one of the most public health problems (Abubakari et al., 2023). Food and Agriculture Organisation et al. (2023) reported 30 per cent prevalence of stunting among children under-five years which is significantly higher than the global estimate.

Preschoolers are young children whose ages range five years and below, often referred to as under-fives. They are classified into three groups: 0-1year old children (infants), 2-3years old children (toddlers) and 4-5 years old children (pre-school age) (Basavanthappa, 2013). Infants are more susceptible to various intestinal infections and infestations because of oral incorporation. Toddlers are critical because they have been weaned, and are depending completely on adult food. If

they are not well fed at this age, their growth could be adversely affected. At 4-5 years, they have started nursery school and feeding pattern could be affected. The children go to school in the morning and return in the afternoon. Improper feeding at this age could affect their growth and development, leading to stunting and underweight. In this study, preschoolers are children between 6-59 months of age who are enrolled in early child care centers in Enugu State.

Early child care centers cover ages 6 months to 59 months. Education at this level is offered by both government and private providers. Early child care centers aim to promote a smooth transition from home to school, prepare children for primary education, and provide adequate care and supervision for children while their parents work. Majority of mothers (54%) in Enugu State are literate (National Population Commission, 2015). A good number of them are public servants, others engage in trading, farming and other businesses. Most times, families leave off their children to school management so as to meet up with their workplace and business calls. This is capable of affecting the feeding and care-giving pattern of the preschoolers.

This study is anchored on precaution-adoption process model. The precaution-adoption process model propounded by Weinstein (1988) which posits that the process of adopting precaution against any disease consists of seven distinct stages between ignorance and completed preventive action. These stages are the stage where the person could be unaware of the issue or aware of the issue but not personally engaged or disengaged and deciding what to do or planning to act but not yet acted or having decided not to act or acting and maintaining optimal health. This model was adopted to examine the maternal predictors of stunting and underweight among preschoolers in Enugu State since safety of the children from the health anomalies depend on precautionary measures adopted by their mothers/care-givers.

Studies on stunting and underweight which were conducted in Nigeria in the last decade revealed that the mean proportion of stunted children was approximately 40 per cent. Earlier study in Enugu State, stunting was found in 3.5% and underweight in 2.4% of children, indicating a relatively low prevalence compared to national averages (Jude et al., 2019). Other studies in Enugu communities have also found stunting rates as high as 41.6 percent and underweight at 18.2 percent among children, suggesting that malnutrition remains a persistent issue (Okafor et al., 2021). Majority of the studies reviewed centred on patterns, determinants, factors and status of stunting and underweight with very few of them considering predictors. Among the few that considered predictors, some of the maternal predictors such as mothers' income, mothers' education and mothers' occupation were not studied. This necessitated this study to determine the current prevalence and maternal predictors of stunting and underweight in Enugu State. The findings of the study

would be of great importance to mothers, caregivers of preschoolers, health educators, women, infant and children (WIC) experts, pediatricians, health organizations (WHO, UNICEF and CDC), researchers, non-governmental organizations-NGOs, and policy makers.

Purpose of the Study

This study focused on prevalence of stunting and underweight among preschoolers in Enugu State. Specifically, it determined prevalence of stunting and underweight among preschoolers in Enugu State based on:

1. mother's education;
2. mother's income;
3. mother's occupation.

Hypotheses (HOs)

Three null hypotheses were tested at .05 level of significance. The following are not significant predictors of stunting and underweight among preschoolers in Enugu State:

HO_1: mother's education
HO_2: mother's income
HO_3: mother's occupation

Methodology

***Design of the Study*:** Descriptive survey research design was used in the study.

***Area of the Study*:** The area of the study was Enugu State of Nigeria. It is made up of three senatorial districts and seventeen Local Government Areas (LGAs).

***Population of the Study*:** The population for the study comprised 541,326 preschoolers in early child care centres (daycare, crèche, nursery, kindergarten) between 6-59 months in Enugu State. There is no recent estimation of the preschoolers in the State. However, in the last general census of 2006, there were 384,464 preschoolers (193,220 males & 191,244 females) in Enugu State (National Population Commission, 2009). Going by Nigeria population growth rate of 2.4 per cent (World Bank, 2024), the projected population of preschoolers in Enugu State as at 2024 was 541,326. There are 1150 public and 1138 private early childcare centers and pre-primary schools in Enugu State in 2015/2016 session in Enugu State (Federal Ministry of Education, 2019).

Sample for the Study: The sample size for the study was 900 preschoolers. Multistage sampling technique was used for the study. The first stage involved sampling nine out of seventeen LGAs from the state using simple random sampling technique without replacement. Stage two involved selecting five autonomous communities from each of the selected LGAs in alphabetical order using systematic random sampling technique. This process yielded a total of 50 communities. In the third stage, two early child care centres for the preschoolers were selected from each sampled community using simple random sampling of balloting without replacement technique. This yielded 100 early child care centres. In the fourth stage, ten preschoolers were selected from each of the sampled early child care centres using convenience sampling technique. The rationale for using convenience is to ensure that mothers or caregivers gave their consent before the

preschoolers are used for the study. Secondly, convenience sampling technique was used to ensure that the researcher selected the subjects across different age ranges (0-59 months) and for equal representativeness. The entire process gave a total of 900 preschoolers.

***Instruments for Data Collection*:** Proforma titled Stunting and Underweight Proforma (SUP), UNICEF anthropometric scale, measuring boards and tapes were used for data collection. The questionnaire consisted of section A and B. Section A comprised of three-items on maternal characteristics of the subjects' mothers. The UNICEF anthropometric scale (UNISCALE) and measuring boards were used to measure the lengths/heights and weights of the preschoolers, and were recorded in section B. Face validity of SUP was established by seven experts: five from the Department of Human Kinetics and Health Education (Health Education Unit), one from Department of Early Childhood and Primary Education (Early Childhood Unit), and one from Science Education (Measurement & Evaluation Unit), all in University of Nigeria, Nsukka. Twenty copies of the final draft of SUP were administered to twenty preschoolers and their care-givers in Ebonyi State after which Cronbach alpha statistic (.81) was used to determine the internal consistency. The instrument was deemed reliable after a high reliability coefficient was obtained.

***Method of Data Collection*:** For an easy access to the preschoolers used for the study, a letter of introduction duly signed by the Head, Department of Human Kinetics and Health Education, University of Nigeria, Nsukka seeking permission to carry out the study, and ethical clearance from Ministry of Health, Enugu State were presented to each administrative head of the early child care centres that were used for the study. Measurements of length/height and weight were obtained for children born in the five years preceding the survey in all of the selected early child care centres. Measurements were made using lightweight SECA scales (with digital screens) designed and manufactured under the authority of the United Nations Children's Fund (UNICEF). The measuring boards used were specially made by Shorr Productions for use in survey settings. Children under age two were measured lying down on the board (recumbent length), and standing height was measured for all other children that were between two and five years. The UNICEF anthropometric scale (UNISCALE) and measuring boards were used to measure the lengths/heights and weights of the preschoolers. Nine hundred copies of the proforma were administered to the mothers/caregivers who bring the preschoolers to school in each of the early child care centers by the researchers. The mothers or care-givers of the preschoolers used for the study responded to the questions about the maternal factors. The measurements were taken of the preschoolers and recorded. The completed copies of the instrument were collected from the respondents on the spot. Where any mother or care giver was unable to fill immediately, the proforma was collected the next day by

the day-care staff. This approach yielded a return rate of 92.2 per cent.

***Method of Data Analysis*:** Frequencies, percentages and logistic regression analysis at .05 level of significance were used to analyse data.

Results

Prevalence of stunting and underweight among preschoolers in Enugu State: Data analysis on this shows that out of 830 preschoolers, 311 (37.5%) were stunted while 246 (29.6%) were underweight.

Stunting and underweight among preschoolers based on mothers' educational level: Data analysis indicates that the prevalence of stunting based on mothers' level of education is highest with no formal education (45.9%), followed by those with secondary education (39.8%), tertiary education (37.2%), and those with primary education (30.1%) as the least. Regarding underweight based on mothers' education, preschoolers whose mothers had tertiary education and secondary education are 31.9 per cent, followed by those with primary education (29.1%) while those with no formal education (17.6%) was the least.

Prevalence of stunting and underweight among preschoolers based on mothers' income: Data analysis indicates that the prevalence of stunting of preschoolers whose mothers' income was less than #10,000 (39.0%) is more that those whose mothers earn more than #100,000 (37.3%), and between #10,000 - #100,000 (36.7%). This means that about one-third of preschoolers are stunted for all categories of mothers' income. The table also shows that preschoolers who are underweight based on mothers' income is highest among those that earn less than #10,000 (31.7%), followed by those who earn between #10,000-#100,000 (30.9%) and lastly those who earn more than #100,000 (26.2%).

Table 1: Proportion of Stunting and Underweight among Preschoolers in Enugu State based on Mothers' Occupation (n = 830)

S/N	Mother's Occupation	f $(\%)_N$	Height-for-Age HFA)		Weight-for-Age (WFA)	
			f (%)μ_1	**f (%)μ_2**	**f (%)η_1**	**f (%)η_2**
1	Civil Servants	261 (31.4)	99(37.9)	162(62.1)	188 (72.0)	73 (28.0)
2	Businesswomen	164 (19.8)	57(34.8)	107(65.2)	114 (69.5)	50 (30.5)
3	Artisans	96 (11.6)	32(33.3)	64(66.7)	65 (67.7)	31 (32.3)
4	Farmers	208 25.1)	77(37.0)	131(63.0)	143 (68.8)	65 (31.2)
5	Unemployed	101 (12.2)	46(45.5)	55(54.5)	74 (73.3)	27 (26.7)

N = Number of mothers/caregivers based on occupation; f(%)μ_1 = frequency and percentage for normal HFA; f(%)μ_2 = frequency and percentage for stunted HFA; f(%)η_1 = frequency and percentage for normal WFA; f(%)η_1 = frequency and percentage for underweight WFA

Table 1 shows that about two-thirds of the preschoolers are stunted among children whose mothers are artisans (66.7%), while 54.5 percent are from unemployed mothers. This implies that preschoolers whose mothers are artisans had the

highest proportion of stunting, followed by the businesswomen, while children of unemployed are least. Table 1 further shows that slightly less than one-third of the preschoolers (32.3%) whose mothers are artisans, followed by preschoolers whose mothers are farmers (31.2%), while preschoolers of unemployed are least underweight (26.7%).

Table 2: Summary of Logistic Regression Analysis of Maternal Predictors and Stunting and Underweight among Preschoolers in Enugu State (n = 830)

S/N	Variables	B	S.E.	Wald χ^2	p-value	OR	95% CI OR	
							Lower	Upper
	Height-for-Age							
1	Mothers' education	.043	.088	.236	.627**	1.044	.878	1.241
2	Mothers' income	.003	.107	.001	.980**	1.003	.813	1.237
3	Mothers' occupation	.007	. 071	.005	.541**	1.011	.673	1.338
	Constant	.360	.243	2.191	.139	1.434		
	Weight-for-Age							
1	Mothers' education	.278	.097	8.184	.004*	1.320	1.091	1.596
2	Mothers' income	-.117	.113	1.066	.302**	.890	.712	1.111
3	Mothers' occupation	-.213	.111	2.127	.311**	.740	.823	1.131
	Constant	-.459	.267	3.500	.047	.381		

** Significant ** Not Significant; Degree of freedom (df) = 1; B = Unstandardized regression weight, S.E = Standard error, Wald χ^2 = Test statistic for the individual predictor variable; p = P-value; OR = Odds ratio, 95% CI OR = 95% confidence interval for the odd ratios.*

Table 2 shows the logistic regression analysis of maternal predictors and stunting and underweight among preschoolers. The table shows that mother's education (p = .627; OR = 1.044; CI at 95% = .878- 1.241), mothers' income (p = .980; OR = 1.003; CI at 95% = .813- 1.237), and mother's occupation (p = .541; OR = 1.011; CI at 95% = .673- 1.338) are not significant predictors of stunting among preschoolers, since their p-values are greater than .05 level of significance at one degree of freedom. On the other hand, mothers' education (p = .004; OR = 1.320; CI at 95% = 1.091– 1.596) is a significant determinant of underweight among preschoolers, since the p-value is less than .05 level of significance at one degree of freedom. The table further shows that mothers' income (p = .302; OR = .890; CI at 95% = .712 – 1.111), and mothers' occupation (p = .311; OR = .740; CI at 95% = .823 – 1.131) are not significant predictors of underweight among preschoolers.

Discussion of Findings

Findings of this study showed that 37.5 per cent and 29.6 per cent of the preschoolers in Enugu State were stunted and underweight respectively. This was markedly higher than the recent results of Nigerian Demographic Health Survey (NDHS) in 2018. This finding on stunting

was unexpected because the researcher expected a figure that is ± 10 per cent round the national survey. This is because NDHS report indicated that Enugu State has the lowest proportion (12%) of stunted preschoolers (NPC & ICF International, 2019). However, the finding on underweight was expected because a proportion of underweight to be approximately same as the figure in the Nigerian Demographic Health Survey (NHDS) of 2018 which was 29 per cent. Some related studies that were conducted in Nigeria showed lower proportion of stunting among preschoolers too. Ezeama et al. (2015) reported proportion of 15.1 per cent and 10.4 per cent for stunting and underweight respectively among preschoolers in Anambra State. Andy et al. (2016) found 47.6 percent of the preschoolers were stunted in Niger state. Surprisingly, a recent study from Ghana (Abubakari et al., 2023) reported a stunting prevalence of 9.6 per cent and underweight prevalence of 18.3 per cent in Tamale Metropolis, Ghana. The lower prevalence of stunting and underweight recorded in the Ghana study could be attributed to the fact that, the study was conducted in an urban area (Tamale metropolis) where food security is good compared to the present study conducted in a state where rurality and food insecurity is prevalent. Comparing the stunting and underweight proportion, it is glaring that Enugu State has lower underweight proportion but unacceptably high stunting rates.

Findings in Table 2 indicated mothers' education (mothers' education = p = .004; OR = 1.320; CI = 1.091– 1.596) is a significant predictor of underweight among preschoolers. This finding was not surprising because educated mothers are more inclined to utilize healthcare services, such as immunizations and growth monitoring, which are crucial for preventing and addressing stunting and underweight. A comprehensive analysis of the 2018 Nigeria Demographic and Health Survey (NDHS) involving over 34,000 children under five revealed that children of uneducated mothers had a 55 percent higher likelihood of being stunted and a 51 percent higher likelihood of being underweight compared to those whose mothers had at least secondary education (Lawal et al, 2024). Similarly, a systematic review and meta-analysis found that maternal education is significantly associated with improved child growth indicators, including height-for-age and weight-for-age z-scores (Rezaeizadeh et al. 2024). This finding collaborates with the findings of Sigdel et al. (2020) that children whose mother had minimal education (no formal education and primary education) were 1.5 times more likely to be underweight than children of mothers who had optimal education (secondary and/or tertiary education). Education helps mothers gain additional knowledge about the adequate intake of food for their children in terms of correct quantity, quality and frequency. It also determines her income and helps her access proper nutrition for the child as well as health services. Also, increasing education and income generation for

women can help to reduce malnutrition among children.

Stunting occurs among preschoolers irrespective of their mother's income level whereas the less the mother earns, the more the underweight of the preschooler. The present study revealed that mother's income is not a significant predictor of stunting and underweight among preschoolers in Enugu State, Nigeria. This finding was shocking because the researchers believed that financial power has the potential to take care of basic nutritional needs. Also, mothers who have income have better access to the health system and are more empowered to make decisions to care for and feed children. This finding is at variance with reports of Sigdel et al. (2020) that children whose mothers had no income were more than three times more likely to be underweight as compared to those mothers who have monthly income. In a different study, it was also said that the incidence of stunting could increase due to a decrease in family income, changes in food availability, and disruption of health and social services (Khairunnas et al., 2020). There is a significant relationship between family income and the incidence of stunting in children under five (Mulyani et al., 2020). Families with incomes less than the regional minimum wage are more likely to experience stunting (Mariska et al., 2022). In a different development, Rahayuwati et al. (2023) opined that family income and expenditure are not predictive of stunting. This completely agrees with the present findings of the study.

The present study showed that preschoolers whose mothers are artisans had the highest proportion of stunting, followed by the businesswomen, while children of unemployed are least. Table 2 also showed that mothers' occupation was not a significant predictor of stunting ($p = .627$; OR = 1.044; CI = .878- 1.241) and underweight ($p = .004$; OR = 1.320; CI = 1.091– 1.596) among preschoolers. These findings were unexpected because in measuring stunting and underweight, maternal variables are considered major factors. More so, this finding was unexpected because mothers' related variables usually relate with all forms of under nutrition, stunting and underweight inclusive. In a similar development, Hosen et al. (2023) found out that maternal occupation significantly increased stunting and overweight in under-fives. For example, the likelihood of stunting and underweight increased by about 9.5 per cent and 6.3 per cent points respectively, in South Asia when mothers worked. Maternal occupation has two broad effects, namely, the income effect (the mother's income for the family) and the substitution effect (reducing the mother's care time for her family). Stunting is more common in preschool children of employed mothers than in those of unemployed mothers (Tekeba et al., 2023). It is critical to demonstrate the scale of stunting in order to address the negative repercussions of stunting in preschool children, particularly in connection with maternal employment.

Conclusion

Stunting and underweight were reported to be moderately prevalent among preschool children in Enugu State. Maternal education was a powerful predictor of child nutritional outcomes, particularly stunting and underweight among preschool-aged children. The findings of the study reveal that mothers' education, income, and occupation were not significant predictors of stunting, while only income, and occupation were not significant predictors of underweight among preschool children between 6-59 months in Enugu State.

Recommendations

The following recommendations were made:

1. Awareness campaigns on how to mitigate stunting and underweight should be carried out by health educators, nutritionists and food experts through education, weight screening and counselling, promotion of school feeding programmes in schools in Enugu State.
2. The government should sponsor continuous monitoring and evaluation of children feeding and nutritional practices to profile stunting and underweight among preschoolers.
3. There should be media involvement to sensitize parents, families and schools on the dangers of stunting and underweight, as well as the ways to prevent them.
4. Workshops for mothers on the importance of exclusive breastfeeding as frontline action towards reducing stunting and underweight should be mounted by relevant stakeholders.
5. Schools should support families in tracking preschoolers' growth and development, and regularly evaluate the effectiveness of school nutrition and health programmes.

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