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Childhood Stunting in Nigeria: A Comparison of Determinants Among Vulnerable Populations

Oyinwola Oluwafisayo I.[1], Ahmed Patience[1], Odusanya Olumuyiwa O.[2], Oyesakin Adewunmi B.[1]

[1] Department of Paediatrics, National Hospital, Abuja, FCT

[2] Department of Community Health & Primary Health Care, Lagos State University College of Medicine Ikeja, Lagos State.

ABSTRACT

Background: Stunting affects children worldwide and measures to end this scourge must isolate its determinants among vulnerable groups.

Aim: To determine risk factors for stunting among children aged 6 to 59 months in (IDP) settlements and their host communities within the Abuja municipal area council, Nigeria.

Methods: The participants were recruited using multistage sampling. A structured interviewer-administered questionnaire was used to obtain information on the socio-demographic details of the participants. Height and length measurements were obtained from each participant. Stunting was defined as height-for-age Z scores compared to the 2006 WHO standards and risk factors were determined using logistic regression. Statistical significance was set at p less than 0.05.

Results: Among the 1,179 participants recruited for each group, the prevalence of stunting in the IDP settlements and host communities was 33.4% and 20.5% respectively. Risk factors for stunting were common to both groups and included mother's age below 25years and low birth weight (Adj OR 1.43; 95% CI 1.07 – 1.92) and (Adj OR 1.44; 95% CI 1.01 – 2.05) for IDPs and (Adj OR 1.74; 95% CI 1.19 – 2.54) and (Adj OR 2.18; 95% CI 1.35 – 3.51) for host communities.

Conclusion: Maternal age and birth weight were the specific determinants of stunting in both groups. Therefore, strategies and measures to mitigate should focus on empowering young women through providing nutrition and health education, ensuring robust maternal pre-natal care to reduce low birth weight incidence, supplying nutritional supplementation for pregnant women, and supporting early infant feeding and childcare practices.

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INTRODUCTION

Prolonged nutritional deficits result in poor growth and development with consequent economic underachievement in adulthood and remain a burden among all population groups. Stunting, defined as low height−for−age (HFA) or length-for-age for children below two years), refers to the long-term, cumulative effects of inadequate nutrition and/or health occurring usually during the first 1,000 days from conception hence the term chronic malnutrition.(Nagata and MacDonald, 2024)

Stunting affects 149.2 million children under five years of age worldwide and prevalence rates as high as 31.28% have been reported among low and lower-middle-income African countries which is comparable to 33.2% pooled prevalence found in sub-Saharan Africa.(Akombi et al., 2017) Nigeria has the second-highest burden of stunted children in the world with a prevalence of 32% as of 2020(United Nations Children's Fund Nigeria, 2021) and in the cosmopolitan Federal Capital Territory (FCT), the prevalence of childhood stunting has been consistently above 20% over the last decade.(National Population Commission Nigeria and ICF International, 2019) Moreover, displaced populations are known to be vulnerable to malnutrition in all its forms with very high rates of stunting being reported among them in under-five children from parts of Africa(Owoaje et al., 2016) and Asia,(Hein et al., 2019) as high as 52.4% stunting and 24.9% severe stunting in children aged 3 to 59 months.(Olwedo et al., 2008)

Stunting poses a major public health concern because it increases the risk of death and has a far-reaching impact on individuals, communities, and the nation as a whole ultimately stalling the economic growth and development of the population in view.(United Nations Children's Fund Nigeria, 2021) Internally displaced persons (IDPs) are the largest group of displaced people in the world,

accounting for 59% of forcibly displaced people, and are described as the most vulnerable people worldwide.(Miller, 2021; United Nations High Commission on Refugees Africa, 2024) The communities that host them are also affected though to a lesser extent due to limited resources.(United Nations High Commission on Refugees, National Human Rights Commission and Federal Emergency Management Agency, 2015)

Globally, the phenomenon of displacement is on the rise with a 20% increase in the number of displaced persons from 2018 figures and almost 300,000 new displacements were recorded in the first half of 2021.(Miller, 2021) These figures are still rising as 72.1 million people were internally displaced by mid-2024(United Nations High Commission on Refugees Africa, 2024) and Nigeria had the largest number of displaced persons in West Africa as of the end of 2021, mainly due to armed insurgency.(Internal Displacement Monitoring Centre, 2021) The impact of this insurgency which started in the north-eastern part of Nigeria in 2009 has been profound along with counter-insurgency activities and has resulted in many IDPs fleeing to neighbouring states, more than twenty thousand of which were in the FCT as of 2015.(United Nations Office for the Coordination of Humanitarian Affairs, 2016)

Over the last decade and a half, Nigerian children mostly under-five continue to endure the deleterious effects of displacement on their nutrition, health, and psycho-social well-being. In this country, stunting is most prevalent in the northern states,(National Population Commission Nigeria and ICF International, 2019) and more likely among vulnerable population groups. Thus, even in the cosmopolitan city of Abuja, Northcentral Nigeria, where stunting rates are comparatively lower,(Tesfaw and Fenta, 2021) the IDPs and their host communities remain vulnerable to malnutrition. To ensure a sustainable reduction in current stunting prevalence and achieve a 50% reduction among under-five children by the year 2030,(World Health Organisation and United Nations Children's Fund, 2021) it is important to identify the specific factors that are pivotal to the development, persistence, and propagation of childhood stunting in displaced and non-displaced populations within the FCT.

When risk factors vary widely, it's difficult to implement measures that successfully mitigate childhood stunting, hence its perennial nature in certain regions. Although studies conducted on childhood stunting within the country demonstrate a preponderance in the northern geopolitical zones, a 9-point reduction in prevalence rates was predicted if nine determinants including maternal, child and socioeconomic variables, are improved upon.(Adeyemi et al., 2022) However, none of the factors had an equal impact on stunting. In contrast, among displaced populations in Asia and other parts of the world, researchers found that no maternal education, low social support in the form of cash transfers and food aids, age above 24 months,(Hein et al., 2019) large family size, and poverty(Ali et al., 2015) were associated with childhood stunting. In low-middle-income countries (LMICs), differences in predictors of childhood stunting between population groups mean that significant resources need to be mobilised to end the menace.

Hence, to mitigate childhood stunting in the FCT among all population groups and achieve global nutrition targets, a critical look into the immediate and modifiable factors that may serve as drivers for childhood stunting is necessary, which will provide specific information that is strategic to finding a lasting solution to this problem sustainably. Therefore, this study determined the risk factors for stunting among under-five children in selected IDP settlements and their host communities within the FCT.

METHODS

Background information of study sites: This study was conducted in the FCT, north-central Nigeria. The Abuja Municipal Area Council (AMAC) is the largest of the six area councils in the FCT and was purposively selected as the council with the highest number of IDP settlements in the FCT. The IDP settlements were selected by ballot out of the nine in the AMAC. Eight locations (four IDP and four Host) were sampled and were an admixture of urban, suburban and rural areas. A host community is a non-displaced population or community that experiences the impact or consequences of displacement because it hosts a considerable number of internally displaced persons.

Study Design: This was a cross-sectional study.

Sample size determination: was performed using the formula to compare proportions between two independent groups. The statistical assumptions were the prevalence of wasting (20.6%) in the displaced population from a previous study,(Guerrier et al., 2009) the prevalence of wasting (16.4%) in the non-displaced population from the same study, Type 1 error of 5% and a power of 80%. Thus, the minimum number of participants needed for each group was 1,176.

Study Participants: Children aged six to 59 months living with parents or caregivers for not less than 6 months in IDP settlements and host communities within AMAC, were eligible to take part in this study if the parent/caregiver gave consent. The estimated total population of IDPs in the selected settlements was 9,740 with an estimated under-five population of 1,948.

Sampling Technique: Samples were drawn from each IDP settlement based on a probability proportional to the size. A sampling frame was generated from the enumeration of households in IDP settlements and their host communities. A list of households drawn from the register was obtained from each IDP settlement's executives while the households in each host community were listed by enumerators from the National Population Commission. The participants were drawn from 1,433 and 1558 households in the IDP settlements and host communities, respectively. The IDP settlement executives' office and the host communities' chief's palace were the starting points for sampling. For the IDPs, a systematic random sampling technique and a sampling interval of "1" was employed.

The first household was selected by ballot and all children between the ages of 6 and 59 months in each of the selected households were recruited for the study after obtaining written consent from the respondent (parent or caregiver). If members of the selected household were absent at the time of the visit, the household was visited again later that day or the day after. The proportion of samples drawn from each host community was matched to the minimum sample size calculated for their corresponding IDP settlements and participants were recruited using the same sampling interval as for the IDP settlement until the required sample size was reached. Less than one per cent of parents/caregivers refused to give consent in both groups. Children whose parents/caregivers did not consent and those diagnosed with conditions, as obtained from parents' or caregivers' reports, which could result in growth faltering e.g., congenital heart disease, cerebral palsy, or paediatric AIDS, were excluded from the study.

Data collection and anthropometric measurements: A structured interviewer-administered questionnaire was used for data collection. Anthropometric measurements of length or height in centimetres were performed for each subject using a Shorr length board (United Nations Children's Fund - UNICEF). Weight measurements were taken using the Seca874® electronic weighing scale with the tare function. Weighing was done with subjects naked or in light clothing and tared for those who could not stand on the scale following the guidelines from Standardized Measurements for Assessment of Relief and Transitions (SMART). Ten research assistants including university graduates in medical, social sciences and humanities, were trained according to WHO guidelines. The researcher (first author) and the ten assistants administered the questionnaire, obtained history, and performed height or length measurements on all the subjects. Measurements were taken twice, and the average value was used for analysis. The technical error of measurement (TEM) for each measurer and the team was computed using software (Emergency Nutrition Assessment for SMART). The coefficient of reliability (R) was decided from the TEM, using the formula: $R = 1 - TEM^2 / SD^2$, where SD is the standard deviation (variance) of all measurements. An acceptable R-value of 0.95 was calculated, and the value for R ranges from 0 (not reliable) to 1 (completely reliable).(SMART Methodology, 2020)

Data management: Demographic variables including the age in months (generated from the date of birth or a local events calendar particularly for some IDPs), sex, and location or place of residence which cut across urban, semiurban and rural areas; bio-demographic characteristics such as birth weight (derived from birth records where available or by mother's recall) or estimated size at birth especially in the case of IDPs, birth order, source of drinking water, and toilet facility; family socio-economic features including mother's age, marital status, ethnicity, religion, household size, socio-economic status using socioeconomic class from parent's level of education and occupation; other information to identify household food insecurity characterised by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level using proxy questions were the source of food supply, and pattern of household food utilisation represented by a child eating from his or her own plate. Confounding factors include undiagnosed medical debilitating conditions and unavailable birth records. Participants were enrolled only if they had lived with parents or caregivers for up to six months in the study area.
Moderate stunting was defined as height-for-age z-scores (HAZ) <−2SDs and severe stunting was defined as height-for-age z-scores (HAZ) <−3SDs from the WHO 2006 standard reference population median which was computed using the WHO Anthro Survey Analyzer software version 3.2.2. Data analysis was done using the Statistical Package for the Social Sciences (SPSS) version 25.0. On bivariate analysis, the variables significantly associated with stunting based on unadjusted odds ratio (OR) and 95% confidence intervals (CI), were subjected to multivariate logistic regression to determine the risk factors associated with stunting among the IDPs and host communities. The statistical significance level was set at p equal to or less than 0.05.

RESULTS

One thousand, hundred and seventy-nine (1,179) children aged six to 59 months were sampled from selected IDP settlements and their host communities, respectively. Participants were drawn from rural (Wassa/Waru), urban (Durumi) and semi-urban areas of AMAC as shown in Figure 1.

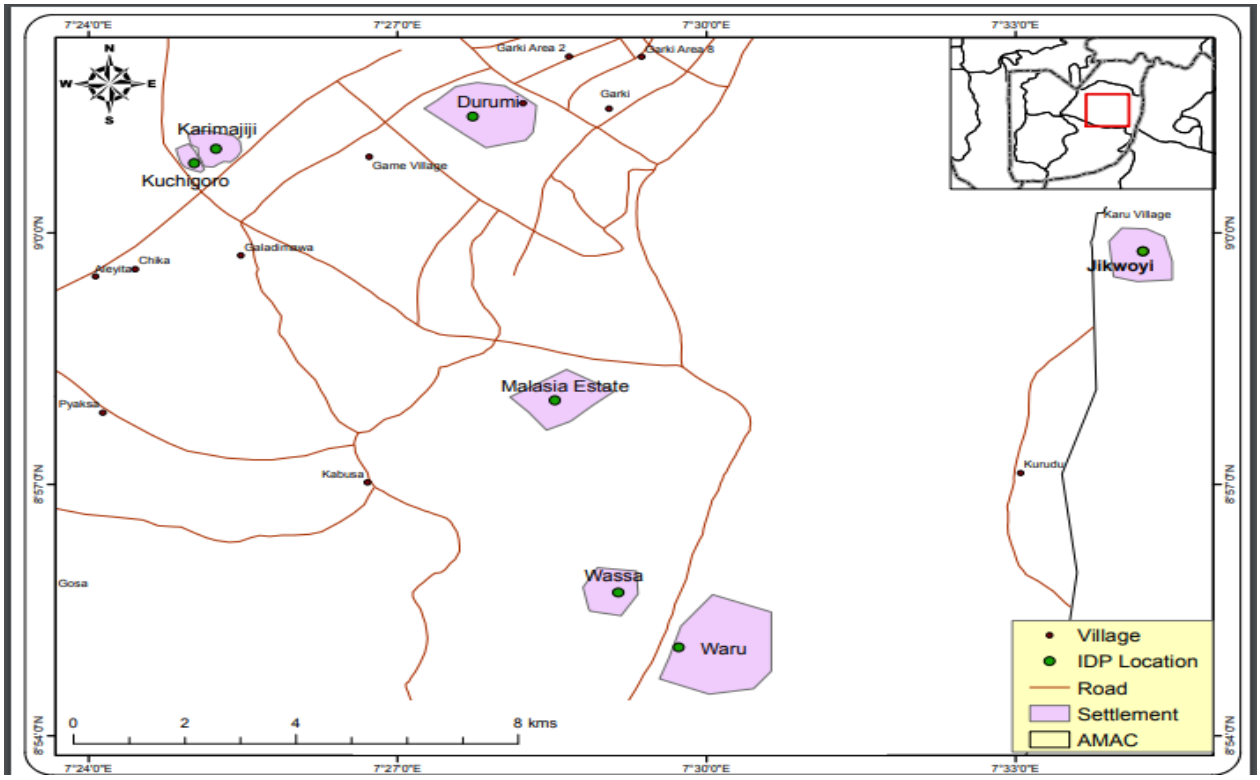

Figure 1: Map of AMAC showing IDP locations as of 2015. Source: Geospatial Unit of the Department of State Services, FCT.

The socio-demographic characteristics of study participants are shown in Table 1. Those aged six to 11 months were the least in number and comparable between the groups [126 (10.7%) IDP and 160 (13.6%) Host respectively]. Households of six or more persons were found among the IDPs 710 (60.2%) more than in the host communities 478 (40.5%) and this was statistically significant $p < 0.001$.

Table 1: Socio-demographic characteristics of Study Participants

Variable	Frequency (%)		χ^2	df	p-value
	IDP	Host			
	n = 1,179	n = 1,179			
Age (month)					
6-11	126 (10.7)	160 (13.6)	14.427	4	0.006*
12-23	291 (24.7)	271 (23.0)			
24-35	251 (21.3)	302 (25.6)			
36-47	285 (24.3)	238 (20.2)			
48-59	226 (19.2)	208 (17.6)			
Sex					
Male	608 (51.6)	602 (51.1)	0.061	1	0.805
Female	571 (48.4)	577 (48.9)			
Location					
Durumi	169 (14.3)	169 (14.3)	0.000	3	1.000
Karimajiji	169 (14.3)	169 (14.3)			
Wassa/Waru	686 (58.2)	686 (58.2)			
Malaysian Garden	155 (13.1)	155 (13.1)			
Household size					
< 6	469 (39.8)	701 (59.5)	91.310	1	< 0.001*
≥ 6	710 (60.2)	478 (40.5)			
Birth weight (g)					
< 2,500	154 (13.1)	101 (8.6)	20.025	3	< 0.001*
2,500 – 3,999	645 (54.7)	699 (59.3)			

≥ 4,000	101 (8.6)	134 (11.4)			
Unknown	279 (23.7)	245 (20.8)			
Birth order					
< 3rd	506 (42.9)	654 (55.5)	37.167	1	< 0.001*
≥ 3rd	673 (57.1)	525 (44.5)			

*** Statistically significant; df = 1; χ^2 Chi square**

Prevalence of stunting: In the host communities, the participants were taller (mean ± standard deviation [SD] 86.7 ± 13.8cm) than in the IDP settlements (mean ± SD 85.4 ± 13.0cm). The prevalence of moderate stunting among under-five children in this study was 394 (33.4%) among the IDPs and 242 (20.5%) among the host communities while severe stunting was 149 (12.6%) and 93 (7.9%) respectively as shown in Figure 2.

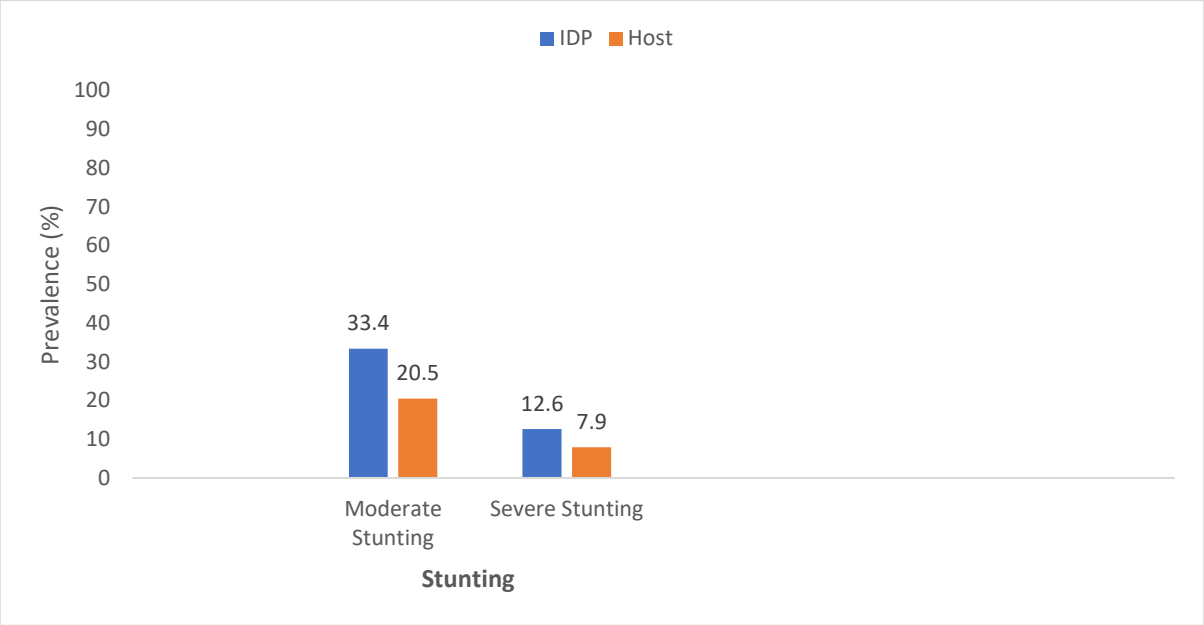

Figure 2: **Prevalence of Stunting among IDPs and Host Communities in AMAC.**

The distribution of stunting prevalence by age was highest in the 24 to 35month age group among the IDPs 94 (37.5%) and host communities 71 (23.5%) and lowest in the 6 to 11month age category (23 (18.3%) and 24 (15.0%) among the IDPs and host communities respectively). It was also higher among males in both groups 215 (35.4%) and 141 (23.4%) respectively.

Risk factors for stunting: The participants' bio-demographic and food security-related factors associated with stunting among the IDPs, and Host communities are shown in Table 2. On bivariate analysis, age 24 months and above was significantly associated with stunting among the IDPs only [odds ratio (OR), 95% confidence interval (CI); 0.74, 0.55 – 0.95] while low birth weight (small birth size) was significantly associated with stunting in both groups (OR 95% CI; 1.45, 1.03 – 2.05 and 2.02, 1.30 – 3.14 respectively]. Subsistence farming as the main food source was significantly associated with stunting only in the host communities (OR, 95% CI: 2.32 (1.73 – 3.10).

Table 2: Association between bio-demographic and food security-related characteristics and stunting

Variable	**IDP**			**Host**		
	Stunting (n=1,179)			**Stunting (n=1,179)**		
	Yes	**No**	**Total**	**Yes**	**No**	**Total**
	n = 394	**n = 785**		**n = 242**	**n = 937**	
Age (month)						
<24	122 (29.2)	295 (70.8)	417	82 (19.0)	349 (81.0)	431
≥24	274 (35.9)	488 (64.1)	762	160 (21.4)	588 (78.6)	748
Odds Ratio (95% CI)	0.74 (0.55 – 0.95)*			0.86 (0.64 - 1.16)		
Sex						
Male	215 (35.4)	393 (64.6)	608	141 (23.4)	461 (76.6)	602
Female	179 (31.3)	392 (68.7)	571	101 (17.5)	476 (82.5)	577
Odds Ratio (95% CI)	1.20 (0.94 - 1.53)			1.44 (1.08 - 1.92)*		

Location						
Wassa (rural)	237 (34.5)	449 (65.5)	686	158 (23.0)	528 (77.0)	686
Others [Garki (urban), Malaysian Garden and Gwarinpa (sub-urban)]	157 (31.8)	336 (68.2)	493	84 (17.0)	409 (83.0)	493
Odds Ratio (95% CI)	1.13 (0.88 – 1.45)			1.46 (1.09 - 1.96)*		
Household size						
< 6	161 (34.3)	308 (65.7)	469	136 (19.4)	565 (80.6)	701
≥ 6	233 (32.8)	477 (67.2)	710	106 (22.2)	372 (77.8)	478
Odds Ratio (95% CI)	1.07 (0.84 - 1.37)			0.84 (0.63 - 1.12)		
Main Source of food supply						
Subsistence Farming	175 (32.8)	358 (67.2)	533	110 (30.7)	248 (69.3)	358
Others (Food Aids, Buying)	219 (33.9)	427 (66.1)	646	132 (16.1)	689 (83.9)	821
Odds Ratio (95% CI)	0.95 (0.75 - 1.22)			2.32 (1.73 – 3.10)*		
The child eats from their plate						
Yes	181 (30.8)	407 (69.2)	588	122 (18.2)	548 (81.8)	670
No	213 (36.0)	378 (64.0)	591	120 (23.6)	389 (76.4)	509
Odds Ratio (95% CI)	0.79 (0.62 - 1.01)			0.72 (0.54 - 0.96)*		
Estimated birth weight (Birth size)						
< 2,500g (Small)	63 (40.9)	91 (59.1)	154	33 (32.9)	68 (67.3)	101
Others [2,500g – 3,999g (Average), ≥ 4,000g (Big), Unknown	331 (32.3)	694 (67.7)	1025	209 (19.4)	869 (80.6)	1078
Odds Ratio (95% CI)	1.45 (1.03 – 2.05)*			2.02 (1.30 – 3.14)*		
Birth order						
≥ 3rd	218 (32.4)	455 (67.6)	673	122 (23.2)	403 (76.8)	525
< 3rd	176 (34.8)	330 (65.2)	506	120 (18.3)	534 (81.7)	654
Odds Ratio (95% CI)	0.90 (0.70 - 1.15)			1.35 (1.02 – 1.79)*		

*** Statistically significant; CI confidence interval. Analysis was conducted for IDPs and Host communities separately.**

The maternal and family socioeconomic variables associated with stunting in the IDPs and Host communities are shown in Table 3.

Table 3: Association between maternal and family socioeconomic characteristics and stunting

Variable	IDP			Host		
	Stunting (n=1,179)			Stunting (n=1,179)		
	Yes	No	Total	Yes	No	Total
	n = 394	n = 785		n = 242	n = 937	
Mother's age (year)						
15 - 24	103 (39.0)	161 (61.0)	264	68 (29.8)	160 (70.2)	228
>24	291 (31.8)	624 (68.2)	915	174 (18.3)	777 (81.7)	951
Odds Ratio (95% CI)	1.37 (1.03- 1.82)*			1.90 (1.37 – 2.63)*		
Mother's education						
Primary and below	306 (36.7)	529(63.3)	835	94 (17.5)	442 (82.5)	536
Above primary	88 (25.6)	256 (74.4)	344	13 (7.0)	173 (93.0)	186
Odds Ratio (95% CI)	1.68 (1.27 – 2.23)*			2.41 (1.81 – 3.21)*		
Mother's occupation						
Unemployed/HW/student/farmers	278 (31.5)	604 (68.5)	882	135 (25.7)	390 (74.3)	525
Others (Petty traders/labourers/messengers, Junior schoolteachers/drivers/artisans)	116 (39.1)	181 (60.9)	297	107 (16.4)	547 (83.6)	654
Odds Ratio (95% CI)	0.72 (0.55 - 0.94)*			1.77 (1.33 – 2.35)*		
Father's education						
Primary and below	179 (37.8)	295 (62.2)	474	91 (31.8)	195 (68.2)	286
Above primary	215 (30.5)	490 (69.5)	705	151 (16.9)	742 (83.1)	893
Odds Ratio (95% CI)	1.38 (1.084 – 1.77)*			2.29 (1.69 – 3.11)*		
Father's occupation						
Unemployed, students, farmers	11 (33.4)	221 (66.6)	332	60 (30.8)	135 (69.2)	195

Others (Senior public servants, professionals, managers, large traders, politicians, contractors, Intermediate-grade public servants/teachers, Junior school teachers/drivers/artisans, Petty traders/labourers/ messengers).	283 (33.4)	564 (66.6)	847	182 (18.5)	802 (81.5)	984
Odds Ratio (95% CI)	0.10 (0.05 - 0.19)*			1.96 (1.39 – 2.76)*		
Religion						
Christianity	117 (28.6)	292 (71.4)	409	147 (17.3)	704 (82.7)	851
Islam	277 (36.0)	493 (64.0)	770	95 (29.0)	233 (71.0)	328
Odds Ratio (95% CI)	0.71 (0.55 - 0.92)*			0.51 (0.38 - 0.69)*		
Type of family						
Monogamous	320 (31.9)	684 (68.1)	1,004	203 (19.2)	857 (80.8)	1,060
Polygamous	74 (42.3)	101 (57.7)	175	39 (32.8)	80 (67.2)	119
Odds Ratio (95% CI)	0.64 (0.46 - 0.89)*			0.49 (0.32 - 0.73)*		
Socio-economic class						
Lower	335 (34.8)	627 (65.2)	962	171 (26.6)	472 (73.4)	643
Middle + Upper	59 (27.2)	158 (72.8)	217	71 (13.6)	465 (86.4)	536
Odds Ratio (95% CI)	1.43 (1.03 - 1.99)*			2.37 (1.75 – 3.22)*		

*** Statistically significant; CI confidence interval. Analysis was conducted for IDPs and Host communities separately.**

The mother's religion (Islam) (OR, 95% CI; 0.71, 0.55 – 0.92 and 0.51, 0.38 – 0.69) and family type (polygamous) (OR, 95% CI; 0.64, 0.46 – 0.89 and 0.49, 0.32 – 0.73) were significantly associated with stunting in both groups. Maternal and paternal education (primary and below), and lower socioeconomic class were also significantly associated with stunting in both groups. The mother and father's occupations (unemployed, farmers) were associated with a lower likelihood of stunting among the IDPs (OR, 95% CI: 0.72, 0.55 – 0.94 and 0.10, 0.05 – 0.19 respectively).

The significant risk factors associated with stunting among the IDPs and host communities determined by multiple logistic regression after adjustment was made for household size, ethnicity, and location include birth weight below 2500g (small birth size), mother's age below 25years, mother's education (primary and below) and occupation (unemployed, farmers), male sex, and subsistence farming as shown in Table 4.

Table 4: Multiple logistic regression of stunting on associated risk factors

Predictor variable	**Multiple logistic regression IDP**			**Multiple logistic regression HOST**		
	p-value	**Adj. OR**	**95%CI Low - Upp.**	**p-value**	**Adj. OR**	**95%CI Low - Upp.**
Sex (Male / Female)	-	-	- -	0.007**	1.52	1.12 - 2.06
Birth weight < 2,500g (Yes /No)	0.045*	1.44	1.01 - 2.05	0.001***	2.18	1.35 - 3.51
Birth order (≥3rd / <3rd)	-	-	- -	0.315	1.18	0.85 - 1.65
Mother's age (15-24years / >24years)	0.015*	1.43	1.07 - 1.92	0.004**	1.74	1.19 - 2.54
Religion (Islam / Christianity)	0.404	1.13	0.85 - 1.49	0.048	1.51	1.00 - 2.26
Mother's education (≤1º / >1º)	0.041*	1.62	1.02 - 2.56	0.967	1.01	0.63 - 1.63
Father's education (≤1º / >1º)	0.179	1.20	0.92 - 1.58	0.064	1.44	0.98 - 2.13
Mother unemployed / farmer (Yes / No)	0.024*	0.72	0.55 - 0.96	0.982	1.00	0.71 - 1.40
Father unemployed / farmer (Yes / No)	-	-	- -	0.927	0.98	0.62 - 1.55
Socio-economic class (Lower / Others)	0.645	0.89	0.53 - 1.48	0.216	1.35	0.84 - 2.16
			- -			1.35 - 3.03

*P<0•05, **P<0•01, ***P<0•001; Adj. = Adjusted; OR = Odds Ratio; Low = Lower; Upp. = Upper, 1º primary. Analysis was conducted for IDPs and Host communities separately.

DISCUSSION

Childhood stunting is of public health importance due to its lasting impact on cognitive, behavioural, and socio-economic development. The prevalence of stunting among under-five children in this study was high, 33.4% among the IDPs and 20.5% in the host communities. These rates are higher than the stunting prevalence threshold of ≥20% which is considered very high.(World Health Organisation and United Nations Children's Fund, 2021) Similarly, the stunting rates reported in the 2018 national survey

for the FCT were lower than what we found.(National Population Commission Nigeria and ICF International, 2019) It could be lower because infants younger than 6 months of age, who are mostly spared from the condition, were included in the nationwide survey. It could also be because about half of the participants in our study resided in rural locations where malnutrition is known to be highly prevalent as observed in these studies.(Juma et al., 2016; National Population Commission Nigeria and ICF International, 2019) Likewise, the rates among the host communities were comparable to the stunting level reported for the FCT. These observed prevalence patterns may be influenced by ethnicity or the place of usual residence as some studies have shown(Tesfaw and Fenta, 2021) but it highlights the transregional and intergenerational potential of stunting while presuming that the problem of malnutrition among non-displaced as well as vulnerable sub-populations in the FCT remains largely unsolved and requires more focused action. A plausible explanation for our findings which apply to both groups could be the lack of relevant nutrition information and is consistent with the report of a reduction in stunting rates when the participants were fed vegetables and their mothers were provided with adequate nutrition education.(Mahari et al., 2023) Furthermore, as a result of displacement and re-displacement with an increased vulnerability to poverty, illiteracy, and food insecurity, mothers in the IDP group may be stunted and much more likely to have stunted children. This agrees with studies where a state of maternal chronic energy deficiency was associated with increased stunting and a reduction in stunting prevalence was found in settings of improved asset index.(Muliani et al., 2023; Vaivada et al., 2020)

Historically, very high levels of stunting among displaced populations in Africa have been attributed to a lack of adequate nutrition and support evidenced by inaccessibility to humanitarian aid, the impact of prolonged conflict and drought in the region with resultant poverty, food shortages, and protracted food insecurity.(United Nations Administrative Committee on Coordination Subcommittee on Nutrition, 1997) Whereas, countries in which the IDPs enjoyed robust and steady humanitarian support in camps had much lower prevalence rates (12.5%).(Ali et al., 2015)

Contributory factors to the high prevalence of stunting observed in our setting may include poor intersectoral and multisectoral collaboration leading to uncoordinated interventions, coupled with a weak legal framework for the implementation of the Nigerian IDP policy.(Adeyemi et al., 2022) Although this study was conducted in the capital city, levels of stunting were high and comparable to findings in less affluent African communities.(Toma et al., 2023) Therefore, it is imperative to terminate the cycle of stunting in both population groups by finding lasting solutions to the problem using strategically channelled resources.

The risk factors for stunting in our study include low birth weight (small birth size), mother's age below 25 years, low maternal educational level and occupation, and male sex. These show a predominance of maternal-related factors. The national survey suggests that the pre-displacement status of the IDP mothers was sub-optimal as shown in the poor health indices for women from the northern geopolitical zone which is further compounded by poverty and lack of access to adequate nutrition, optimal health services, and basic formal education in the IDP settlements.(National Population Commission Nigeria and ICF International, 2019) Several authors also agree that socioeconomic status, asset index, chronic energy deficiency and poor health-seeking practices are correlated with stunting prevalence.(Gidado et al., 2023; Muliani et al., 2023; Restila et al., 2023; Vaivada et al., 2020)

Both groups in this study had risk factors like maternal age and the participant's birth weight in common which are maternal-related drivers of childhood stunting. Young mothers below 25 years of age in this study were more likely to have stunted children. This may be due to several factors like low level of education, unemployment, prolonged displacement, lack of independence and empowerment, etc. For example, in a study of northeastern IDP camps, 81 per cent of the respondents were mostly women, lacked formal education, were less than 40 years of age, were unemployed, and were poor. In addition, the longer they were in displacement (more than five years) the less access they had to quality health services.(Gidado et al., 2023) As in our study, these young, displaced, and vulnerable mothers will likely have stunted children as some authors reported an increased risk of childhood stunting in preschool children who lived in perpetual displacement.(Makinde et al., 2023)

Birth weight below 2500g or small size at birth was also significantly associated with stunting among both groups in our study and some authors agree.(Muliani et al., 2023; Yushananta, Ahyanti and Anggraini, 2024) Birth weight is reflective of maternal nutrition, health and well-being but data obtained in our setting is subject to recall bias because they are generated from attended births which accounted for only one-quarter of total births.(National Population Commission Nigeria and ICF International, 2019) Thus, estimates of birth weight from birth size were used in this study when birth records were unavailable but this did not affect the results. Akombi et al reported stunting to be associated with small birth sizes among under-fives.(Akombi et al., 2017) No fewer than one-third of those participants who were born small or with low birth weight (LBW) in this study were stunted and studies have shown that this pregnancy outcome is characteristic of undernourished mothers with low BMI or short stature. Furthermore, low maternal BMI is a risk factor for childhood stunting(Tadesse et al., 2020) but maternal anthropometry or nutritional status was beyond the scope of this study. Likewise, others have reported a low birth length as a predictor of stunting among under-five Asian children(Yushananta, Ahyanti and Anggraini, 2024) and that a short stature at birth indicated an increased risk of childhood stunting.(Adeyemi et al., 2022) Low birthweight is consequential to maternal undernutrition, low BMI and short stature. Therefore, to mitigate childhood stunting, mothers must be nourished, supported, and empowered.(Kabir et al., 2020)

Being unemployed and a housewife in this study was a protective factor against childhood stunting among the IDPs and this is consistent with other studies conducted among IDPs(Ali et al., 2015; Hein et al., 2019) and the general population.(Akombi et al., 2017; National Population Commission Nigeria and ICF International, 2019) This may be because working mothers are unable to devote the time and attention required for optimal child-rearing despite earning an income, as some may work long hours coupled with a lack of work flexibility and a supportive environment. Households with self-employed parents were also less likely to have stunted children in one study.(Geberselassie et al., 2018) However, others(Mulatu et al., 2022) had a contrary finding likely because about 85% of the mothers were unemployed in that study. As seen in our study where there were more rural than urban residents, maternal educational status below primary level was a significant risk factor for stunting and other studies agree. Improvement in these maternal factors would reduce childhood stunting rates, particularly among vulnerable groups.(Adeyemi et al., 2022) Also, a lower likelihood of childhood stunting was significantly associated with high maternal empowerment.(Wassie et al., 2024)

Among the host communities (non-displaced population) in our study, male sex was significantly associated with stunting and this was also found in other studies.(Akombi et al., 2017; Bukusuba et al., 2017; Juma et al., 2016) This finding could be because males, being more active, have higher energy requirements which are often unrecognised, misunderstood or ignored.

LIMITATIONS of this study include the presence of recall bias in the date of birth and birth weight information obtained from some respondents in the IDP settlements which was reduced by using a local events calendar to accurately approximate the age, and birth weight was estimated with birth size. Also, the study design is cross-sectional which does not allow for the conclusive determination of causality. Nonetheless, our findings in this study are consistent with other studies.

CONCLUSION

The prevalence of stunting was very high among the IDPs as well as the host communities within the FCT. Determinants of stunting among both groups were comparable and included low birth weight and maternal age below 25 years. Others were low maternal education, mother's occupation, and male sex.

Measures to reduce childhood stunting among vulnerable populations, especially in the IDP settlements and host communities within the FCT, should focus on empowering young women by providing free formal education for the girl child and improving the nutrition of women during pregnancy by ensuring adequate antenatal care and access to essential nutrition education and health services to prevent intrauterine growth restriction and reduce the incidence of small (low birthweight) babies.

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