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Prevalence and determinants of a double burden of malnutrition among displaced populations in Abuja, Nigeria's Federal Capital Territory

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ABSTRACT

Background: Undernutrition coexisting with overweight or obesity in the same population is a growing global public health concern, especially for the internally displaced. **Aim**: To identify a double burden of malnutrition, comprising underweight and overweight/obesity among pre-school age internally displaced children and the associated risk factors. **Materials and Methods**: A cross-sectional study was conducted among 1,179 randomly selected children aged 6-59 months living in four internally displaced persons (IDPs) settlements of Abuja Municipal Area Council (AMAC), Federal Capital Territory (FCT), Nigeria. Weight and height measurements were taken, and a structured interviewer-administered questionnaire was used to collect data on the research variables. Data were analyzed using IBM SPSS version 25 computer statistical software package. **Results**: The prevalence of underweight was 18.9%, while overweight/obesity was 3.1%. The predictors of underweight were low birth weight (aOR = 2.67; 95% CI = 1.67 – 4.29), recent diarrhoea (aOR = 2.13; 95% = 1.02 - 4.44), and the child not eating from his/her own plate (aOR = 1.51; 95% CI = 1.04 – 2.19); while urban residence (aOR = 2.81; 95% CI = 1.16 – 6.78) and frequent ingestion of non-nutritious foods (aOR = 2.42; 95% CI = 1.21 - 4.85) were the determinants of overweight and obesity. **Conclusions**: A double burden of malnutrition exists among the IDPs in this study. Risk factors were demonstrable of household food insecurity and poor feeding practices, thus portending a cycle of morbidity and mortality among this vulnerable population and an urgent need for government to institute interventions for their prevention and control.

Keywords: Underweight, overweight/obesity, prevalence, under-five, displaced populations

INTRODUCTION

A double burden of malnutrition (DBM), as defined by the World Health Organization (WHO), is the coexistence of undernutrition along with overweight, obesity, or diet-related non-communicable diseases (NCDs), within individuals, households, and populations, and across the life course.[1] Malnutrition remains a global public health problem and refers to deficiencies, excesses, or imbalances in a person's energy and nutrient intake.[2]

In its various forms, malnutrition encompasses undernutrition and overnutrition[2], implying inadequate nutrition or deprivation and excess, respectively.[3] Undernutrition results from not having enough to eat, not eating the right foods, or the inability of the body to utilize the ingested nutrient[4] while overweight/obesity (overnutrition) results from an imbalance of caloric intake and energy expenditure.[2,5]

The DBM demonstrates the life course implications of nutrition for women in pregnancy and children in early life with health and well-being in later life.[6] Children in low- and middle-income countries (LMICs) like Nigeria are susceptible to inadequate pre-natal, infant, and young child nutrition, especially if displaced. Concurrently, these children ingest foods high in fat, sugar, salt, and energy but low in cheap and nutrient-deficient micronutrients. These dietary patterns and lower physical activity levels result in sharp increases in childhood obesity while undernutrition is still endemic.[7]

Pre-school children are particularly vulnerable because the period from the beginning of pregnancy to a child's second birthday is critical for quality nutrition, which positively impacts optimal physical, mental, and cognitive growth, health, and development.[8]

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Undernutrition, used interchangeably in the literature with underweight (low weight−for−age/WFA), is associated with about 45% of child deaths, mostly in LMICs.[2] Out of 11.6 million deaths in 1995 amongst under-five children in developing countries, 6.3 million (54%) were associated with low weight-for-age.[3] One out of every six children in developing countries, roughly 100 million children, are underweight[9], whereas 42 million children under five are overweight or obese globally.[7]

The largest number of displaced persons in West Africa were found in Nigeria by the end of 2021.[10] Of the 2.1 million displaced persons in Nigeria, 10 per cent (20,000) moved to the Federal Capital Territory (FCT) in 2014, while the rest were found mainly in the northeastern states of Borno, Yobe, and Adamawa.[11] Previous studies conducted in IDPs have shown the endemicity of undernutrition among them, but there is a paucity of data regarding their rates of overweight/obesity.[12–14] However, a meta-analysis on the DBM in LMICs reported that over 15 years, underweight and overweight/obesity prevalence was 15.5% and 5.3%, respectively.[15] Previously, overweight and obesity were only found among high-income and developed countries. However, in the past two decades, trends show increasing prevalence among poor, low and middle-income, developing countries.[15] About a decade ago in Nigeria, some studies[16,17] reported high prevalence rates in the southwest and southeast rural areas, but the determinants were not explored.

As of 2010, the prevalence of overweight and obesity in developed countries was twice that of developing countries, but a rapid rise has occurred such that by the year 2020, the prevalence of overweight/obesity in West Africa was projected to be 10.6%. According to the National Demographic Health Surveys, the prevalence of underweight in the FCT, Nigeria, has been stable over the past decade, while overweight/obesity rates have fluctuated.[8,18] Overall, DBM as an evolving phenomenon in LMICs raises concerns because of the attendant under-five mortality and risk of cardiovascular disease, diabetes, and premature death in adulthood. The emergence of DBM among IDPs is more worrisome because it increases their vulnerability to ill health and death.

This study determined the prevalence of DBM (underweight, overweight, and obesity) and identified its determinants amongst under-five children in selected IDPs settlements within the FCT. The results of this study would provide information for stakeholders and policymakers on how to reverse the trend among displaced populations and the general population in the FCT.

MATERIALS AND METHODS

Study Design, Population and Area

A cross-sectional study was conducted among children aged 6-59 months living in four internally displaced persons (IDPs) settlements of Abuja Municipal Area Council (AMAC), Federal Capital Territory (FCT), Nigeria. AMAC is the largest of the six area councils in the FCT, otherwise known as Local Government Areas (LGAs) in other states of the federation, and it contains 9 of 14 IDP settlements in the FCT. Most of the occupants of these settlements are from Gwoza, Kirawa, Pulka, and Bama towns in Borno state, Nigeria. All children aged 6-59 months whose families have resided in the study location for at least six months and whose parents gave consent for them to participate in the study were considered eligible and enrolled in the study, while children diagnosed with conditions that could result in growth faltering, such as congenital heart disease, cerebral palsy, or pediatric AIDS (as obtained from parent or caregiver's reports) were excluded from the study.

Sample Size Estimation and Sampling Technique

The sample size was estimated at 1,176 using the formula for estimation of a single proportion,[19] a standard normal deviate of 1.96 (corresponding to the level of significance, $\alpha = 0.05$), a 20.6% prevalence of wasting from a previous study,[20]a 3% margin of error, and an anticipated 90% response rate. The eligible participants were selected using a two-stage sampling technique. In stage 1, four of the nine IDPs settlements in AMAC were randomly chosen by balloting, and the number of participants to be selected from each of them was allocated proportionately based on their populations (obtained from the IDPs settlements registers generated and kept by the officials in charge of the settlements). In stage 2, an enumeration of the households in the respective settlements was done to create the sampling frame, and households were selected using a systematic sampling technique. Eligible children between the ages of 6 and 59 months in each selected household were recruited into the study.

Data Collection

A semi-structured interviewer-administered questionnaire was used to obtain information on the study participants'

sociodemographic, health and medical characteristics. Anthropometric weight measurement in kilogram and length or height measurement in centimetres were done for each subject using an electronic weighing scale with tare function (Seca874®, Germany) and a Shorr length board (United Nations Children Emergency Fund - UNICEF), respectively. A local events calendar customized for each IDP settlement was used to derive the date of birth for participants without birth records and was recorded in months. For those participants, the birthweights were estimated from the birth size as small for weight less than 2500g, average for weight between 2500g and 4000g, and big for birthweight above 4000g. A proxy for the dietary energy supply (DES) indicator for household food security in this study, "the child eating from his/her own plate", was adopted to surmount the difficulties encountered in collecting food consumption data for large populations.

Data Analysis

Data were analyzed using IBM SPSS version 25 computer statistical software package. Weight-for-age z-score (WAZ), weight-for-height z-score (WHZ), and BMI-for-age z-score (BAZ) were computed using the WHO Anthro Survey Analyzer software version 3.2.2. Underweight and severe underweight were defined as WAZ less than minus 2 Standard Deviation (SD) and less than minus 3 SD of the median value of the WHO international reference, respectively.[14] Also, overweight and obesity were defined as WHZ greater than 2 Standard Deviation (SD) and greater than 3 SD above the WHO Child Growth Standards median.[6] Quantitative variables such as age, weight, and height/length were summarized using means and standard deviations, while qualitative variables were summarized using frequencies and percentages. Pearson's chi-square test was used to evaluate associations between underweight, overweight/obesity, and other categorical variables, while logistic regression analysis was used to determine the predictors of underweight and overweight/obesity. All levels of significance were set at $p < 0.05$.

Ethical Consideration

Ethical approval for the study was obtained from the Institutional Review Board of the National Hospital, Abuja (with approval number NHA/EC/019/2015), and from the Federal Capital Territory Administration (with approval number FHREC/2019/01/35/15-04-19). Also, informed consent was obtained from the participants before commencing questionnaire administration.

RESULTS

Sociodemographic characteristics of participants

One thousand one hundred and seventy-nine (1,179) children were recruited from the selected IDP settlements. The mean age of the participants was 31.4±15.2 years, and the majority of them, 762 (64.6%), were aged 24-59 months.

Table 1: Sociodemographic characteristics of participants

Variables	Frequency (%) n = 1,179
Age group (months)	
6-23	417 (35.4)
24-59	762 (64.6)
Mean ± SD	31.4 ± 15.2
Birth records available	
Yes	356 (30.2)
No	823 (69.8)
Sex	
Male	608 (51.6)
Female	571 (48.4)
Religion	
Christianity	409 (34.7)
Islam	770 (65.3)
Location	
Durumi (urban)	169 (14.3)
Karomanjigi & Malaysian garden (semi-urban)	324 (27.4)
Wassa (rural)	686 (58.3)
Birth weight (g)/Estimated birth size	
<2,500 / Small	154 (13.1)
2,500 – 3,999 / Average	645 (54.7)
≥4,000 / Big	101 (8.6)
Unknown	279 (23.6)
Birth order	
<3rd	506 (42.9)
≥3rd	673 (57.1)
Household size	
<6	469 (39.8)
≥6	710 (60.2)
Mother's age (years)	
15-24	264 (22.4)
25-34	768 (65.1)
≥35	147 (12.5)
Mother's education	
No formal education	488 (41.4)
Formal	691 (58.6)
Type of family	
Monogamous	1,004 (85.2)
Polygamous	175 (14.8)
Socioeconomic class	
Lower	962 (81.6)
Middle	217 (18.4)
Cause of displacement	
Boko Haram	1,100 (93.3)
Ethnic clashes	51 (4.2)
Farmers and Herdsmen clashes	28 (2.4)

The majority of participants were males (51.6%) and lived in a rural community (58.3%) with a household size ≥6 (60.2%). The majority of the participants' mothers were

aged 25-34 years (65.1%), practised Islam as a religion (65.3%), and had formal education (58.6%). Most of the parents were in the lower socioeconomic class (81.6%) and were displaced from their communities by Boko Haram (93.3%) [Table 1].

Table 2: Environmental, lifestyle, dietary and health characteristics of participants

Variables	Frequency (%) n = 1,179
Source of drinking water	
Tube well or borehole	1,106 (93.8)
Sachet (pure) water	28 (2.4)
Public tap/Standpipe	24 (2.0)
Surface water	21 (1.8)
Type of toilet facility	
No toilet facility/bush/field	531 (45.0)
Water closet/Pit latrine	648 (55.0)
Time spent watching TV or on other media	
≤1 hour	1,103 (93.6)
>1 hour	76 (6.4)
Child plays outdoors daily	
Yes	1,095 (92.9)
No	84 (7.1)
Immunization status	
Immunized	915 (77.6)
Unimmunized	246 (20.9)
Unknown	18 (1.5)
Used multivitamin syrup & blood tonic	
Yes	180 (15.5)
No	999 (84.7)
Sweetened snack/drinks ingestion	
Always/often	241 (20.4)
Occasionally	446 (37.8)
Rarely/never	492 (41.7)
Child eats from his/her own plate	
No	591 (50.1)
Yes	588 (49.9)
Morbidity in the previous two weeks	
Yes	280 (23.7)
No	899 (76.3)
Type of morbidity (n = 68)	
Diarrhoea	25 (36.8)
Other diseases	43 (63.2)

Environmental, lifestyle, dietary and health characteristics of participants

Most, 1,106 (93.8%) of the 1,179 participants, had access to potable water (tube well or borehole), and the majority of them (55.0%) had access to a water closet or pit latrine. Most of the participants played outdoors daily (92.9%) and spent ≤1 hour watching TV or other media daily (93.6%). Whereas most participants have been immunized (77.6%), less than a fifth of them, 180 (15.5%), routinely use multivitamin syrup and blood tonic. About a fifth of participants always or frequently ingest sweetened snacks and drinks (20.4%), while about half (49.9%) eat from their own plates. Also, about a fifth of the participants (23.7%) had experienced morbidity in the previous two weeks, and about a third (36.8%) of the cases were due to diarrhoea (Table 2).

Prevalence of underweight and overweight/obesity among participants

Two hundred and twenty-three (18.9%) of the 1,179 participants were underweight, while 37 (3.1%) of them had overweight/obesity (Figure 1).

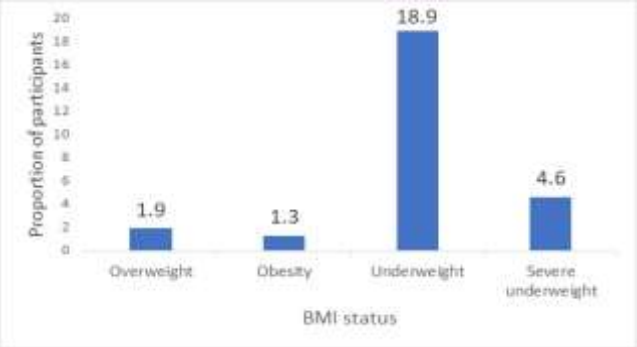

Figure 1: Prevalence of underweight and overweight/obesity among participants

Factors associated with underweight among participants

Being underweight was associated with sociodemographic variables such as the ages of the child and mothers and the child's sex, birthweight and family type. The prevalence of underweight was significantly higher ($p < 0.05$) among very young children (6-23 months old), children of young mothers (15-24 years old), males, those with birth weight <2,500g, and those from polygamous marriage set up (Table 3). It was also associated with environmental, dietary and health variables such as the child's immunization status, the child not eating from his/her own plate, and the presence of morbidity (particularly diarrhoea) in the past two weeks. The prevalence of overweight was significantly higher ($p < 0.05$) among unimmunized children, children who do not eat from their own plates, and the presence of morbidity (particularly diarrhoea) in the past two weeks (Table 4).

Table 3: Association between underweight and participants' sociodemographic characteristics

Variables	Total, n = 1,179	Underweight, n = 223 Frequency (%)	Test of significance
Age group (months)			
6-23	417	98 (23.5)	χ^2= 8.851,
24-59	762	125 (16.4)	p = 0.002*
Sex			
Male	608	129 (21.2)	χ^2= 4.341,
Female	571	94 (16.5)	p = 0.037*
Religion			
Christianity	409	62 (15.2)	χ^2= 5.759,
Islam	770	161 (20.9)	p = 0.016*
Location			
Durumi (urban)	169	43 (25.4)	χ^2= 5.798,
Karomanjigi & Malaysian garden (semi-urban)	324	61 (18.8)	p = 0.055
Wassa (rural)	686	119 (17.3)	
Birth weight (g)/Estimated birth size			
<2,500 / Small	154	47 (30.5)	χ^2= 23.759,
2,500 – 3,999 / Average	645	122 (18.9)	p = 0.001*
≥4,000 / Big	101	7 (6.9)	
Unknown	279	47 (16.8)	
Birth order			
<3rd	506	97 (19.2)	χ^2= 0.038,
≥3rd	673	126 (18.7)	p = 0.846
Household size			
<6	469	91 (19.4)	χ^2= 0.121,
≥6	710	132 (18.6)	p = 0.728
Mother's age (years)			
15-24	264	61 (23.1)	χ^2= 10.322,
25-34	768	147 (19.1)	p = 0.006*
≥35	147	15 (10.2)	
Mother's education			
No formal education	488	101 (20.7)	χ^2= 1.725,
Formal	691	122 (17.7)	p = 0.095
Type of family			
Monogamous	1,004	180 (17.9)	χ^2= 4.288,
Polygamous	175	43 (24.6)	p = 0.038*
Socioeconomic class			
Lower	962	190 (19.8)	χ^2= 2.383,
Middle	217	33 (15.2)	p = 0.123

χ^2: Pearson's chi-square test; *Statistically significant (p<0.05)

Factors associated with overweight/obesity among participants

The only sociodemographic variable related to overweight/obesity among the participants was the place of residence (or location). The prevalence of overweight/obesity was significantly higher ($p < 0.05$) among those who live in an urban community as compared to those who live in semi-urban and rural communities (Table 5).

Overweight/obesity was also associated with health and dietary variables such as immunization, multivitamin syrup and blood tonic use, and frequent consumption of sweetened snacks/drinks. The prevalence of overweight was significantly higher ($p < 0.05$) among immunized children, those who use multivitamin syrup and blood tonic, and those who ingest sweetened snacks/drinks often (Table 6).

Table 4: Association between underweight and participants' environmental, dietary and health characteristics

Variables	Total, n = 1,179	Underweight, n = 223 Frequency (%)	Test of significance
Source of drinking water			
Tube well or borehole	1,106	207 (18.7)	LRχ^2= 2.957, p = 0.398
Sachet (pure) water	28	7 (25.0)	
Public tap/Standpipe	24	7 (29.2)	
Surface water	21	2 (9.5)	
Type of toilet facility			
No toilet facility/bush/field	531	89 (16.8)	χ^2= 2.921, p = 0.087
Water closet/Pit latrine	648	134 (20.7)	
Immunization status			
Immunized	915	159 (17.4)	χ^2= 8.468, p = 0.014*
Unimmunized	246	62 (25.2)	
Unknown	18	2 (11.1)	
Used multivitamin syrup & blood tonic			
Yes	180	32 (17.8)	χ^2= 0.179, p = 0.672
No	999	191 (19.1)	
Sweetened snack/drinks ingestion			
Always/often	241	43 (17.8)	χ^2= 10.919, p = 0.004*
Occasionally	446	66 (14.8)	
Rarely/never	492	114 (23.2)	
Child eats from his/her own plate			
No	591	131 (22.3)	χ^2= 7.392, p = 0.007*
Yes	588	92 (15.6)	
Morbidity in the previous two weeks			
Yes	280	68 (24.3)	χ^2= 6.908, p = 0.009*
No	899	155 (17.2)	
Type of morbidity			
Diarrhoea	73	25 (34.2)	χ^2= 5.328, p = 0.021*
Other diseases	207	43 (20.8)	

LRχ^2: Likelihood Ratio chi-square test; χ^2: Pearson's chi-square test; *Statistically significant (p<0.05)

Determinants of underweight and overweight/obesity among participants

In logistic regression analysis, low birth weight, a recent illness (particularly diarrhoea) and a child not eating from their own plate were predictors of underweight. Those with low birth weight (i.e., birth weight less than 2,500g) were about three times (aOR: 2.67; 95% CI: 1.67 – 4.29; p < 0.001) more likely to be underweight as compared to those with normal birth weight. Those who had a recent illness (particularly diarrhoea) were twice (aOR: 2.13; 95% CI: 1.02 – 4.44; p = 0.044) likely to be underweight compared to those who did not. Similarly, those who did not eat from their own plates were about twice (aOR: 1.51; 95% CI: 1.04 – 2.19; p = 0.031) likely to be underweight compared to those who did (Table 7).

Concerning overweight/obesity, the predictors were being residents of an urban community, using supplements, and frequently consuming snacks and beverages. Those who live in an urban community were about three times (aOR: 2.81; 95% CI: 1.16 – 6.78; p = 0.022) more likely to be overweight/obese as compared to those who live in semi-urban and rural communities. Those who use supplements were twice (aOR: 2.27; 95% CI: 1.07 – 4.84; p = 0.033) likely to be overweight/obesity as compared to those who do not. Also, those who always/often take snacks and beverages were twice (aOR: 2.42; 95% CI: 1.21 – 4.85; p = 0.013) likely to be overweight/obesity as compared to those who do not (Table 7).

Table 5: Association between overweight/obesity and participants' sociodemographic characteristics

Variables	Total, n = 1,179	Overweight/obesity, n = 37 Frequency (%)	Test of significance
Age group (months)			
6-23	417	8 (1.9)	χ^2= 3.158,
24-59	762	29 (3.8)	p = 0.076
Sex			
Male	608	21 (3.5)	χ^2= 0.412,
Female	571	16 (2.8)	p = 0.521
Religion			
Christianity	409	9 (2.2)	χ^2= 1.812,
Islam	770	28 (3.6)	p = 0.178
Location			
Durumi (urban)	169	10 (5.9)	χ^2= 7.826,
Karomanjigi & Malaysian garden (semi-urban)	324	13 (4.0)	p = 0.019*
Wassa (rural)	686	14 (2.0)	
Estimated birth size			
Small	154	3 (1.9)	χ^2= 3.413,
Average	645	19 (2.9)	p = 0.322
Big	101	6 (5.9)	
Unknown	279	9 (3.2)	
Birth order			
<3rd	506	13 (2.6)	χ^2= 0.944,
≥3rd	673	24 (3.6)	p = 0.331
Household size			
<6	469	12 (2.6)	χ^2= 0.861,
≥6	710	25 (3.5)	p = 0.354
Mother's age (years)			
15-24	264	10 (3.8)	χ^2= 0.552,
25-34	768	23 (3.0)	p = 0.907
≥35	147	4 (2.8)	
Mother's education			
No formal education	488	17 (3.5)	χ^2= 0.327,
Formal	691	20 (3.2)	p = 0.568
Type of family			
Monogamous	1,004	34 (3.4)	χ^2= 1.371,
Polygamous	175	3 (1.7)	p = 0.242
Socioeconomic class			
Lower	962	32 (3.3)	χ^2= 0.609,
Middle	217	5 (2.3)	p = 0.435

χ^2: Pearson's chi-square test; *Statistically significant (p<0.05)

DISCUSSION

This study assessed the prevalence and determinants of a double burden of malnutrition among displaced populations in Abuja, Nigeria's Federal Capital Territory. The prevalence of underweight among the IDPs in this study was 18.9%. A lower prevalence of underweight (11.4%)[12] was reported among the IDPs in Pakistan, although fewer subjects were sampled. Similarly, this study's 4.6% prevalence of severe underweight is higher than the 3.6% prevalence reported in the Pakistani camps.[12] The difference may be due to the robust support given to the IDPs in camps traditionally set up by the government in collaboration with humanitarian organizations, unlike those in settlements or camp-like sites as our participants. This was affirmed in a study that reported that persons living in unofficial, self-settled IDP camps, especially when small and located in rural areas, have worse health outcomes than those in official, government-run camps since they received less humanitarian assistance.[20]

Table 6: Association between overweight/obesity and participants' environmental, lifestyle, dietary and health characteristics

Variables	Total, n = 1,179	Overweight/obesity, n = 37 Frequency (%)	Test of significance
Source of drinking water			
Tube well or borehole	1,106	31 (2.8)	LRχ^2= 17.265, p < 0.001*
Sachet (pure) water	28	5 (17.9)	
Public tap/Standpipe	24	1 (4.2)	
Surface water	21	0 (0)	
Type of toilet facility			
No toilet facility/bush/field	531	23 (4.3)	χ^2= 4.818, p = 0.028*
Water closet/Pit latrine	648	14 (2.2)	
Immunization status			
Immunized	915	35 (3.8)	LRχ^2= 6.379, p = 0.041*
Unimmunized	246	2 (0.8)	
Unknown	18	0 (0)	
Used multivitamin syrup & blood tonic			
Yes	180	14 (7.8)	χ^2= 15.043, p < 0.001*
No	999	23 (2.3)	
Sweetened snack/drinks ingestion			
Always/often	241	16 (6.6)	χ^2= 15.170, p = 0.004*
Occasionally	446	12 (2.7)	
Rarely/never	492	9 (1.8)	
Child eats from his/her own plate			
No	591	16 (2.7)	χ^2= 0.724, p = 0.395
Yes	588	21 (3.6)	
Morbidity in the previous two weeks			
Yes	280	12 (4.3)	χ^2= 1.591, p = 0.207
No	899	25 (2.8)	

LRχ^2: Likelihood Ratio chi-square test; Feχ^2: Fisher's exact test; χ^2: Pearson's chi-square test; *Statistically significant (p<0.05)

Notwithstanding, underweight was least among those settlements located in the rural areas in our study, likely because they were majorly agrarian communities, although the 2018 NDHS reports that malnutrition is more likely to affect those living in rural than in urban areas and higher prevalence of underweight has been reported in predominantly rural communities within Nigeria[16,21,22] and in other African and non-African countries.[23–27]

According to the NDHS, despite the economic recession which lasted from 2016 to 2017, marginal differences were observed in the prevalence of underweight and severe underweight in the FCT, Nigeria, between 2013 and 2018, as they have been stable in the range of 12.6 to 12.8% and 3.4 to 3.5% respectively. However, among these IDPs who moved to the FCT in 2014 (five years before this study was conducted), the prevalence of underweight was higher than reported in the FCT general under-five population and other African countries (13% in Ghana[28] and 17.4% in Ethiopia[29]). This may be because they are mainly from the northeastern states of Nigeria, where childhood underweight and severe underweight rates are up to 30% and 10%, respectively.[18] It is disturbing that the pooled prevalence of overweight/obesity in this study was up to 3.1%, whereas reports from the last NDHS show that the prevalence of overweight/obesity decreased from 2.3 to 1.5% in the FCT. Though no disaggregated analysis was done for displaced populations, and very low rates of overweight/obesity below 1% were reported in the northern States.[8,18] Thus, this study indicates a growing prevalence of the double burden of malnutrition among the IDPs. This trend is inimical to the global nutrition target of no increase in childhood overweight by the year 2025 and may be a result of poor weaning practices[30] and the ingestion of high-calorie foods that have poor nutritional value.[31]

Table 7: Predictors of underweight and overweight/obesity among participants

Variables	Underweight				Overweight/obesity			
	Aor	95% CI		p-value	aOR	95% CI		p-value
		Lower	upper			Lower	upper	
Age (<24months vs ≥24 months*)	1.44	0.99	2.08	0.056	--	--	--	--
Sex (Male vs Female*)	1.28	0.89	1.85	0.191	--	--	--	--
Location Durumu (urban) vs Others* (semi-urban, rural)	1.33	0.86	2.08	0.203	2.81	1.16	6.78	0.022**
Birth weight < 2,500g (Yes vs No*)	2.67	1.67	4.29	<0.001**	--	--	--	--
NPI immunization (No vs Yes*)	1.22	0.57	2.62	0.617	3.17	0.36	27.70	0.297
Recent illness - diarrhoea (Yes vs No*)	2.13	1.02	4.44	0.044**	--	--	--	--
Mother's age (years) (15-24 vs >24*)	1.46	0.95	2.23	0.082	--	--	--	--
Religion (Islam vs Christianity*)	1.10	0.71	1.69	0.671	--	--	--	--
Family type (Polygamy vs Monogamy*)	0.99	0.58	1.68	0.969	--	--	--	--
Mother's education (No formal vs Formal*)	1.48	0.96	2.30	0.079	--	--	--	--
Child eats from his/her own plate (No vs Yes*)	1.51	1.04	2.19	0.031**	--	--	--	--
Use supplements (Yes vs No*)	--	--	--	--	2.27	1.07	4.84	0.033**
Always/often take snacks/drinks (Yes vs No*)	--	--	--	--	2.42	1.21	4.85	0.013**

aOR = adjusted Odds Ratio; **CI** = Confidence Interval; ***** Reference group; **Significant ($p < 0.05$)

The determinants of being underweight in this study were small size at birth, diarrhoea in the preceding two weeks, and the child not eating from their plate. Although child demographic characteristics such as age 24 months and below and male sex were associated with being underweight, no effect was found on logistic regression, contrary to the reports of the NDHS and other studies among IDPs.[8,18,32] The incidence of low birth weight (small birth size) indicates maternal access to health services assessed by antenatal clinic attendance and maternal immunization coverage (Tetanus Toxoid) but may be lacking in this population group.[20] Hence a small size at birth is closely related to maternal malnutrition, and maternal BMI below 18.5 has been shown to be associated with under-five malnutrition in several studies.[21,22,24,27,28]

The presence of morbidity such as diarrhoea in the two weeks preceding the study was associated with underweight, and this is consistent with reports by others[33–36] Yet, one study found a link between undernutrition and the frequency (monthly) of a child's illnesses, whereas a different study found a link between underweight and recurrent illnesses. The availability of and access to safe, adequate, and nutritious food is often a challenge among displaced populations who live in unstable environments and are susceptible to poor utilization of ingested food from untreated illnesses. The DES, an estimate of the amount of energy (kcal) in the food available for consumption, is an indicator of household food security. The child not eating from his or her plate was a predictor of being underweight in this study. This cultural practice of serving meals on a common plate for all the children in a household may inadvertently result in a low DES for any child who does not feed aggressively or competitively. This agrees with other studies where undernutrition was associated with the child being served food with the family and eating with the father.[23,27]

A semi-urban location, use of supplements such as multivitamin syrups and blood tonics, and frequent ingestion of sweetened snacks and beverages were predictors of overweight/obesity in this study. A close look at these factors suggests that there may be a relationship between the seeming growing urbanization of semi-urban areas, the usage of supplements to complement the nutrient-deficient meals consumed at the household level, and the absence of sufficient nutrition education. An increased incidence of overweight and obesity globally due to urbanization and changes in food patterns was reported in one study.[37] The double burden of malnutrition in our study population further worsens their future outcome by increasing the risk for morbidity and mortality from non-communicable diseases.

CONCLUSION

This study showed a double burden of malnutrition among displaced populations in Abuja, Nigeria's FCT, and the determinants were recent diarrhoea, low birth weight, household food insecurity, semi-urban location, frequent ingestion of nutrient-poor foods, and use of multivitamin supplements. The double burden of malnutrition among IDPs, portends a rise in the incidence of non-communicable disease and a grim future for this vulnerable population, and it underscores the need for the FCT Administration and the Federal Government to institute urgent interventions for their prevention and control, including periodic nutrition education programmes for the populace through the mass media, strengthening existing feeding programs at the community level for the prevention and management of malnutrition, promoting adequate maternal nutrition and ante-natal care to reduce low birth weight babies, and by facilitating access to treatment and prevention services for the common childhood diseases, particularly, diarrhoea.

Study Limitations

The birth records of some participants were unavailable, hence the use of estimated birth size in place of birth weight and a local events calendar developed for each IDPs settlement to eliminate the bias in recall of the date of birth. Also, a lack of household food consumption data necessitated using a proxy.

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Conflict of interest

None declared.

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