Prevalence and risk factors of acute malnutrition among pre-school children in internally displaced person settlements within Abuja Municipal Area Council

Abstract: Background: Malnutrition is pervasive among displaced populations worldwide. Adequate nutrition is essential to the growth and development of all children, particularly in the preschool age. Methodology: This cross-sectional study was conducted in four internally displaced person (IDP) settlements and their host communities within the Abuja municipal area council between April and May 2019. Using a multistage sampling method, subjects were recruited after parents’ informed consent, from the IDP settlements and equal numbers were drawn from their host communities. The proportion of acute malnutrition using weight for height, MUAC, BMI-for-age Z scores were compared to the 2006 WHO standards. Predictors were determined by logistic regression and statistical significance was set at p less than 0.05. Results: There were 1,179 children aged six to 59 months recruited in each group. The prevalence of wasting was 7.7% (91), moderate acute malnutrition was 7.2% (85), and severe acute malnutrition was 3.1% (37) among the IDPs while they were 7.1% (84), 6.5% (77) and 2.9% (34) respectively in the host communities. The predictors for wasting in both groups were age below 24 months (Adj OR, 95% CI 3.88, 2.38 - 6.32), low birth weight (Adj OR, 95% CI 2.70, 1.55 - 4.71) and diarrheal disease (Adj OR, 95% CI 5.45, 2.38 - 12.44). Location was predictive only in the host communities (Adj OR, 95% CI 2.69, 1.37 - 5.28). Conclusion and recommendation: Acute malnutrition was high among the pre-school children in this study. The nutritional needs of displaced children in the FCT should be met and their families educated on prompt recognition and treatment of diarrhoea.

Keywords: acute malnutrition, pre-school children, IDP, Host community

Introduction

Malnutrition is the lack of proper nutrition\textsuperscript{1} and broadly refers to deficiencies, excesses, or imbalances in a person’s intake of energy and/or nutrients.\textsuperscript{2} Acute malnutrition (wasting) results from not having enough to eat.\textsuperscript{3} The quality of nutrition in the early stages of life determines much of a child’s future.\textsuperscript{4} The pre-school age, in particular, is often marked by protein-energy and micronutrient deficiencies.\textsuperscript{5} In any society, children are regarded as one of the most vulnerable groups of persons, most especially in the context of humanitarian emergencies.\textsuperscript{6}

Internally displaced persons (IDPs) are persons or groups of persons who have been forced to leave their homes or places of habitual residence but have not crossed an internationally recognized state border.\textsuperscript{7} Globally, the phenomenon of displacement is on the increase with a 20% rise in the number of displaced persons from the 2018 figures and almost 300,000 new displacements recorded in the first half of 2021.\textsuperscript{8} Nigeria has the largest number of displaced persons in West Africa as of the end of 2021 and the cause of displacement was mainly due to armed insurgency.\textsuperscript{9} The onset of insurgency in North-Eastern Nigeria since 2009 has resulted in more than 20,000 people killed and up to 2.1 million displaced as of 2016.\textsuperscript{10}

High rates of acute malnutrition have been reported among displaced populations and their host communities within and outside Nigeria\textsuperscript{10,11} with wide variations noted in displaced populations depending on the time of assessment and other factors such as climatic changes,
access to food rations, humanitarian aid/services received and source of livelihood.\(^{[5]}\) Despite the availability of resources and opportunities for livelihoods and survival in the nation’s capital city, displaced populations and their host communities in the Federal Capital Territory (FCT) may still experience malnutrition. Therefore, this study determined the prevalence of acute malnutrition (wasting) and its predictors among under-five children in selected IDP settlements and their host communities within the FCT. It has the potential to add to the body of knowledge on displaced children and inform policymakers on measures to prevent malnutrition among displaced populations and their host communities.

**Materials and Methods**

This study was conducted in the FCT, North-Central Nigeria. Abuja Municipal Area Council (AMAC) is the largest of the six area councils in the FCT and was purposively selected being the one with the highest number of IDP settlements in the FCT. Four IDP settlements were selected by ballot out of the nine in AMAC namely Dagba, Tundun Natsira, Malaysian Garden and Wassa IDP settlement and along with their corresponding host communities namely Durumi, Karomanjigi, Pigba Sama and Wassa respectively.

The sample size was determined using the formula for comparing proportions between two independent groups based on the prevalence of wasting from a previous study.\(^{[14]}\)

\[
n = \frac{(U + V)^2 (P_1 (1 - P_1) + P_2 (1 - P_2)) }{(P_1 - P_2)^2} \]

Therefore, the minimum sample size for each group was 1,176.

It was a cross-sectional study. The estimated total population of the IDPs in these settlements was 9,740 with an estimated under-five population of 1,948. Samples were drawn from each IDP settlement based on probability proportional to size. A sampling frame was generated from the enumeration of households in the IDP settlements and their host communities. Using a systematic random sampling technique, 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 written consent was obtained. Children diagnosed, as obtained from parent or caregiver’s report, with conditions that could result in growth faltering e.g., congenital heart disease, cerebral palsy, paediatric AIDS, or whose family had not been resident in the location of study for at least six months were excluded from the study.

Ethical approval for the study was obtained from the Institutional Review Board of the National Hospital, Abuja with an approval number NHA/EC/019/2015. Approval was also obtained from the Federal Capital Territory Administration authority with an approval number FHREC/2019/01/35/15-04-19.

An interviewer-administered semi-structured questionnaire was used for data collection. Anthropometry measurements of weight in kilogram, length or height in centimetre and mid-upper arm circumference (MUAC) in centimetre were taken from each subject using an electronic weighing scale with tare function (Seca874\(^{[9]}\) Germany), a Shorr length board (United nations children emergency fund - UNICEF), and a flexible, non-stretchable, color-coded plastic insertion tape (Shakir’s strip) respectively. Ten Assistants were trained according to WHO guidelines. The Researcher and Assistants administered the questionnaire and obtained history including recent illness, performed anthropometry on all the subjects and conducted a brief physical examination looking for pallor, angular stomatitis, hair changes, bitot spots, and pedal oedema.

The Statistical Package for the Social Sciences (SPSS) version 21.0 was used to analyse the data. Results were presented in tables and charts. Quantitative variables such as age, weight, height/length, and mid-upper arm circumference (MUAC) were summarized using mean and standard deviation, while qualitative variables were summarized using percentages. Wasting was defined as weight-for-height (WFH) \(z\)-scores \(<-2SDs\) from the WHO 2006 standard reference population median while severe wasting was defined as weight-for-height \(z\)-scores \(<-3SDs\) from the reference population median. Moderate acute malnutrition was defined as WFH \(<-2 \ z\)-scores to \(\geq-3 \ z\)-score MUAC from 11.5 to < 12.5 cm or BMI-for-age \(z\)-score (BAZ) from -3 to -2, whereas severe acute malnutrition (SAM) was defined as WFH \(<-3 \ z\)-scores or presence of oedema on both feet or MUAC < 11.5cm or BAZ < -3. Weight-for-height \(z\)-score (WHZ) was computed using the WHO Anthro Survey Analyzer software version 3.2.2. and the student’s t-test was used to compare the normally distributed quantitative variables (age, BAZ, MUAC, WHZ) between the two groups. Pearson’s Chi-square test was used to compare the categorical variables between the two groups and to test the associations between wasting and other categorical variables. The variables on bivariate analysis, that were significantly associated with wasting (\(P\) value 0.05 and below) were subjected to multivariate logistic regression to determine the risk factors associated with acute malnutrition among the IDPs and host communities. The statistical significance level was set at \(p\) less than or equal to 0.05.

**Results**

One thousand, one hundred and seventy-nine (1,179) children between the ages of 6 to 59 months were sampled from selected IDP camps and their host communities respectively. The majority of 1,100 (93.3\%) of the IDPs were displaced by Boko haram insurgency while ethnic clashes and Farmer-herdsmen clashes were responsible for the rest. The age distribution showed a significance (\(p = 0.006\))
The prevalence and risk factors of acute malnutrition among pre-school children in internally displaced person settlements within Abuja Municipal Area Council Oyinwola Oluwafisayo I et al

between the categories, the least being the 6 to 11-month age bracket in both groups as shown in Table 1. Also, the household size categories were significant \( p < 0.001 \) with more than 6 being the majority in both groups. Other variables namely sex, location, and household head were not significant \( (p > 0.05) \).

The mothers were mostly aged 25 to 34 years, unemployed, housewives, students, or farmers, and had more than 4 children among the IDP group, this was statistically significant \( (p < 0.05) \) as shown in Table 2. Family features, such as religion and family types are as shown in Table 3. Socio-economic status for both IDPs and Host communities was mostly of the lower class; this was statistically significant, \( p < 0.0001 \).

Clinical features characteristic of malnutrition was found in both groups but much more among the IDPs as shown in Figure 1.

The subjects in the host communities were taller (mean \( \pm \) SD 86.7 \( \pm \) 13.8 cm) than those in the IDPs settlements (mean \( \pm \) SD 85.4 \( \pm \) 13.0 cm) and this difference was statistically significant (\( p = 0.016 \)) but weight and MUAC were not statistically significant between the groups as shown in Table 4.

### Table 1: Socio-demographic characteristics of Study Subjects

| Variable                | Frequency (%)     | \( x^2 \) | df  | p-value |
|-------------------------|-------------------|-----------|-----|---------|
| Age (month)             |                   |           |     |         |
| 6-11                    | 126 (10.7)        | 144.4     | 4   | 0.006*  |
| 12-23                   | 291 (24.7)        |           |     |         |
| 24-35                   | 251 (21.3)        |           |     |         |
| 36-47                   | 285 (24.3)        |           |     |         |
| 48-59                   | 226 (19.2)        |           |     |         |
| Sex                     |                   |           |     |         |
| Male                    | 608 (51.6)        | 0.06      | 1   | 0.805   |
| Female                  | 571 (48.4)        |           |     |         |
| Location                |                   |           |     |         |
| Garki                   | 169 (14.3)        |           |     |         |
| Gwarinpa                | 169 (14.3)        |           |     |         |
| Wassa                   | 686 (58.2)        |           |     |         |
| Malaysian Garden        | 155 (13.1)        |           |     |         |
| Household size          |                   |           |     |         |
| 3                       | 99 (8.4)          | 112       | 4   | < 0.001*|
| 4                       | 197 (16.7)        | 796       |     | 0.001*  |
| 5                       | 173 (14.7)        |           |     |         |
| 6                       | 205 (17.4)        |           |     |         |
| > 6                     | 505 (42.8)        |           |     |         |
| Head of household       |                   |           |     |         |
| Father                  | 1,138 (96.5)      | 5.68      | 2   | 0.058   |
| Mother                  | 39 (3.3)          |           |     |         |
| Others                  | 2 (0.2)           |           |     |         |

* Statistically significant

### Table 2: Maternal characteristics of Study Subjects

| Variable               | Frequency (%) | \( x^2 \) | df | p-value |
|------------------------|---------------|-----------|----|---------|
| Mother’s age (years)   |               |           |    |         |
| 15 – 24                | 264 (22.4)    |           | 14 | 0.002   |
| 25 – 34                | 768 (65.1)    |           | 77 | < 0.001*|
| 35 – 49                | 145 (12.3)    |           | 14 |         |
| ≥50                    | 2 (0.2)       |           | 2  |         |
| Mother’s education     |               |           |    |         |
| No Formal              | 488 (41.4)    |           | 3  | 0.001*  |
| Primary                | 347 (29.4)    |           |    |         |
| Secondary              | 329 (27.9)    |           |    |         |
| Tertiary               | 15 (1.3)      |           |    |         |
| Mother’s occupation    |               |           |    |         |
| Junior school          | 155 (13.1)    |           |    |         |
| teachers, drivers,     |               |           |    |         |
| and artisans           |               |           |    |         |
| Petty trader /         | 142 (12.0)    |           |    |         |
| labourer / messengers  |               |           |    |         |
| or similar grade       |               |           |    |         |
| Unemployed, housewife, | 882 (74.8)    |           |    |         |
| students, farmers      |               |           |    |         |
| Number of children ever born | | | | |
| 1                      | 108 (9.2)     |           | 11 | < 0.001*|
| 2                      | 256 (21.7)    |           |    |         |
| 3                      | 220 (18.7)    |           |    |         |
| 4                      | 181 (15.4)    |           |    |         |
| > 4                    | 414 (35.1)    |           |    |         |
| Marital status         |               |           |    |         |
| Married                | 1,167 (99.0)  |           | 12 | 0.025   |
| In union as if married | 978 (84)      |           |    | < 0.011 |
| Never married          | 2 (0.2)       |           |    |         |
| Separated              | 3 (0.3)       |           |    |         |
| Divorced               | 0 (0)         |           |    |         |
| Widowed                | 7 (0.6)       |           |    |         |

* Statistically significant; \( df = 1 \); \( ^2 \) Chi square

The prevalence of acute malnutrition: There was no statistically significant difference between the prevalence of wasting among the IDPs and Host communities 91 (7.7%) and 84 (7.1%) respectively (\( p = 0.582 \)) as shown in Table 5. The prevalence of moderate acute malnutrition was 85 (7.2%) and 77 (6.5%) among the IDPs and Host communities respectively, but this difference was not statistically significant (\( p = 0.515 \)). The prevalence of severe acute malnutrition was 37 (3.1%) and 34 (2.9%) among the IDPs and Host communities respectively. This difference was not statistically significant (\( p = 0.718 \)).

Determinants of acute malnutrition: The subjects’ biographic, and health-related factors associated with acute malnutrition (wasting) in both IDP, and Host communities are shown in Tables 6 and 7. Age below 24 months, location, birth weight below 2500g, and history of recent diarrhoea were significantly associated with wasting among the IDPs, and host communities (p...
<0.05) as shown in Table 6. The maternal socio-demographic factors associated with acute malnutrition (wasting) in the IDP, and Host communities are shown in Table 8. The mother's religion and educational status were significantly associated with wasting only in the host communities (p 0.001 and 0.014 respectively) as shown in Table 8. The clinical features characteristic of malnutrition was not significantly associated with wasting (p > 0.05) as shown in Table 9.

The risk factors associated with acute malnutrition (wasting) among the IDPs, and host communities determined by logistic regression include age below 24months, birth weight below 2500g, diarrhoea episodes within two weeks before the study, and the location of the host community as shown in Table 10.

Table 3: Family Socio-economic characteristics of Study Subjects

| Variable                  | Frequency (%) | IDP n = 1,179 | Host n = 1,179 | ² df | P-value |
|---------------------------|---------------|---------------|---------------|------|---------|
| Religion                  |               |               |               |      |         |
| Christianity              | 409 (34.7)    | 851 (72.2)    | 332.978       | 1    | < 0.001*|
| Islam                     | 770 (65.3)    | 328 (27.8)    |               |      |         |
| Ethnicity                 |               |               |               |      |         |
| Fulani                    | 86 (7.3)      | 41 (3.5)      | 975.880       | 6    | < 0.001*|
| Hausa                     | 377 (32.0)    | 245 (20.8)    |               |      |         |
| Gulafadah                 | 472 (40.0)    | 16 (1.4)      |               |      |         |
| Igbo                      | 0 (0)         | 253 (21.5)    |               |      |         |
| Yoruba                    | 0 (0)         | 54 (4.6)      |               |      |         |
| Igbo                      | 0 (0)         | 154 (13.1)    |               |      |         |
| Others                    | 244 (20.7)    | 416 (35.3)    |               |      |         |
| Type of family            |               |               |               |      |         |
| Monogamous                | 1,004 (85.2)  | 1,060 (89.9)  | 12.186        | 1    | < 0.001*|
| Polygamous                | 175 (14.8)    | 119 (10.1)    |               |      |         |
| Socio-economic status     |               |               |               |      |         |
| Upper                     | 0 (0)         | 18 (1.5)      | 204.669       | 2    | < 0.001*|
| Middle                    | 217 (18.4)    | 518 (43.9)    |               |      |         |
| Lower                     | 962 (81.6)    | 643 (54.5)    |               |      |         |

* Statistically significant

Table 4: Anthropometric measurements of Study Subjects

| Variable       | Mean ± SD IDP n = 1,179 | Host n = 1,179 | T p-value Mean diff. 95% CI of diff Lower Upper |
|----------------|-------------------------|---------------|---------------------|
| Weight (kg)    | 11.9 ± 5.7              | 12.3 ± 5.3    | 1.617 0.106 0.36 -0.08 0.80 |
| Height/Length (cm) | 85.4 ± 13.0         | 86.7 ± 13.8  | 2.408 0.016* 1.33 0.25 2.42 |
| MUAC (cm)      | 152 ± 3.5               | 15.3 ± 3.2    | 1.017 0.309 0.14 -0.13 0.41 |
| BMI (kgm⁻²)    | 25.0 ± 153.3            | 34.3 ± 290.4  | 0.979 0.328 9.40 -9.40 28.10 |

* Statistically significant, CI confidence interval, diff difference

Table 5: Prevalence of acute malnutrition among the Study Subjects

| Variable                  | Frequency (%) | IDP n = 1,179 | Host n = 1,179 | ² p-value |
|---------------------------|---------------|---------------|---------------|-----------|
| Wasting                   |               |               |               |           |
| Yes                       | 91 (7.7)      | 84 (7.1)      | 0.302         | 0.582     |
| No                        | 1,088 (92.3)  | 1,095 (92.9)  |               |           |
| Moderate acute malnutrition|             |               |               |           |
| Yes                       | 85 (7.2)      | 77 (6.5)      | 0.424         | 0.515     |
| No                        | 1,094 (92.8)  | 1,102 (93.5)  |               |           |
| Severe acute malnutrition |               |               |               |           |
| Yes                       | 37 (3.1)      | 34 (2.9)      | 0.131         | 0.718     |
| No                        | 1,142 (96.9)  | 1,145 (97.1)  |               |           |

df = 1; ² Chi square
Table 6: Bio-demographic factors associated with wasting in both IDP and Host communities

| Variable     | IDP Wasting (n=1,179) | Host Wasting (n=1,179) |
|--------------|-----------------------|------------------------|
|              | Yes  n= 91            | No  n= 1,088           | Total  n= 1,179 |
|              | Yes  n= 84            | No  n= 1,095           | Total  n= 1,179 |
| Age (month)  |                       |                        |                |
| 6-11         | 26 (20.6)             | 100 (79.4)             | 126 (18.8)     | 130 (81.3)     | 160 |
| 12-23        | 36 (12.4)             | 255 (87.6)             | 291 (9.6)      | 245 (90.4)     | 271 |
| 24-35        | 10 (4.0)              | 241 (96.0)             | 251 (12.4)     | 290 (96.0)     | 302 |
| 36-47        | 11 (3.9)              | 274 (96.1)             | 285 (10.4)     | 228 (93.8)     | 238 |
| 48-59        | 8 (3.5)               | 218 (96.5)             | 226 (6.2)      | 202 (97.1)     | 208 |
|              |                       |                        |               | 54.770, 4, < 0.001* | 48.432, 4, < 0.001* |
| Sex          |                       |                        |                | 2, df, p       |                |
| Male         | 50 (8.2)              | 558 (91.8)             | 608 (4.3)      | 559 (92.9)     | 602 |
| Female       | 41 (7.2)              | 530 (92.8)             | 571 (3.9)      | 536 (92.9)     | 577 |
|              |                       |                        |                | 0.450, 1, 0.502 | 0.001, 1, 0.980 |
| Location     |                       |                        |                | 2, df, p       |                |
| Garki        | 24 (14.2)             | 145 (85.8)             | 169 (9.3)      | 160 (94.7)     | 169 |
| Gwarinpa     | 17 (10.1)             | 152 (89.9)             | 169 (9.3)      | 146 (86.4)     | 169 |
| Wassa        | 38 (5.5)              | 648 (94.5)             | 686 (3.9)      | 645 (94.0)     | 686 |
| Malaysian Garden | 12 (7.7)      | 143 (92.3)             | 155 (7.1)      | 144 (92.9)     | 155 |
|              |                       |                        |                | 15.845, 3, 0.001* | 12.933, 3, 0.005* |

* Statistically significant, df = 1; ² Chi square

Table 7: Health-related factors associated with wasting in both IDP and Host communities

| Variable                      | IDP Wasting (n=1,179) | Host Wasting (n=1,179) |
|-------------------------------|-----------------------|------------------------|
|                               | Yes  n= 91            | No  n= 1,088           | Total  n= 1,179 |
|                               | Yes  n= 84            | No  n= 1,095           | Total  n= 1,179 |
| Birth weight (g)              |                       |                        |                |
| < 2,500                       | 24 (15.6)             | 130 (84.4)             | 154 (19.8)     | 84 (83.2)     | 101 |
| 2,500 – 3,999                 | 43 (7.0)              | 600 (93.0)             | 645 (7.7)      | 637 (94.0)     | 699 |
| ≥ 4,000                       | 3 (3.0)               | 98 (97.0)              | 101 (4.0)      | 130 (97.0)     | 134 |
| Unknown                       | 19 (6.8)              | 260 (93.2)             | 279 (9.1)      | 224 (91.4)     | 245 |
| ², df, p                     | 17.396, 3, 0.001*     | 19.943, 3, < 0.001*    |                |                |    |
| Birth order                   |                       |                        |                | ², df, p       |                |
| < 3rd                        | 34 (6.7)              | 472 (93.3)             | 506 (5.5)      | 618 (94.5)     | 654 |
| ≥ 3rd                        | 57 (8.5)              | 616 (91.5)             | 673 (8.9)      | 477 (90.9)     | 525 |
| ², df, p                     | 1.242, 1, 0.265       | 5.826, 3, 0.016*       |                |                |    |
| Morbidity in the previous 2 weeks |                   |                        |                | ², df, p       |                |
| Yes                           | 43 (15.4)             | 237 (84.6)             | 280 (10.1)     | 205 (89.9)     | 228 |
| No                            | 48 (5.3)              | 851 (94.7)             | 899 (64.0)     | 890 (93.6)     | 951 |
| ², df, p                     | 30.082, 1, < 0.001*   | 3.750, 1, 0.055        |                |                |    |
| Type of morbidity             |                       |                        |                | ², df, p       |                |
| Cough                         | n= 43                 | n= 237                 | n= 280         | n= 23          | n= 205 |
| Yes                           | 23 (16.4)             | 117 (83.6)             | 140 (5.6)      | 71 (93.4)      | 76 |
| No                            | 20 (14.3)             | 120 (85.7)             | 140 (11.8)     | 134 (88.3)     | 152 |
| ², df, p                     | 0.247, 1, 0.619       | 1.547, 1, 0.214        |                |                |    |
| Diarrhea                      |                       |                        |                | ², df, p       |                |
| Yes                           | 22 (30.1)             | 51 (69.9)              | 73 (27.8)      | 26 (72.2)      | 36 |
| No                            | 21 (10.1)             | 186 (89.9)             | 207 (13.8)     | 179 (86.2)     | 192 |
| ², df, p                     | 16.591, 1, < 0.001*   | 14.750, 1, < 0.001*    |                |                |    |

* Statistically significant df = 1; ² Chi square
### Table 8: Maternal socio-demographic factors associated with wasting amongst the IDP and Host communities

| Variable | IDP Wasting (n=1,179) | Host Wasting (n=1,179) |
|----------|-----------------------|------------------------|
|          | Yes (n = 91) | No (n = 1,088) | Total (n = 1,179) | Yes (n = 84) | No (n = 1,095) | Total (n = 1,179) |
| **Mother’s age (year)** | | | | | | |
| 15 - 24 | 17 (6.4) | 247 (93.6) | 264 | 15 (6.6) | 213 (93.4) | 228 |
| 25 - 34 | 66 (8.6) | 702 (91.4) | 768 | 55 (7.4) | 687 (92.6) | 742 |
| 35 - 49 | 8 (5.5) | 137 (94.5) | 145 | 14 (6.9) | 190 (93.1) | 204 |
| ≥50 | 0 (0) | 2 (100) | 2 | 0 (0) | 5 (100) | 5 |

², df, p, Fisher’s exact p 2.586, 3, 0.460, 0.432

| **Mother’s education** | | | | | | |
| No Formal | 36 (7.4) | 452 (92.6) | 488 | 28 (11.7) | 211 (88.3) | 239 |
| Primary | 30 (8.6) | 317 (91.4) | 347 | 11 (5.0) | 207 (95.0) | 218 |
| Secondary | 22 (6.7) | 307 (93.3) | 329 | 36 (6.7) | 500 (93.3) | 536 |
| Tertiary | 3 (20.0) | 12 (80.0) | 15 | 9 (4.8) | 177 (95.2) | 186 |

², df, p 4.167, 3, 0.244

| **Mother’s occupation** | | | | | | |
| Junior schoolteachers / drivers / artisans | 11 (7.1) | 144 (92.9) | 155 | 20 (6.3) | 299 (93.7) | 319 |
| Petty trader / labourer / messengers | 9 (6.3) | 133 (93.7) | 142 | 27 (8.1) | 308 (91.9) | 335 |
| Unemployed / HW / student / farmers | 71 (8.0) | 811 (92.0) | 882 | 37 (7.0) | 488 (93.0) | 525 |

², df, p 0.600, 2, 0.741

* Statistically significant, df = 1; ² Chi square.

### Table 9: Association between Clinical features of malnutrition and Wasting

| Variable | IDP Wasting (n=1,179) | Host Wasting (n=1,179) |
|----------|-----------------------|------------------------|
|          | Yes (n = 91) | No (n = 1,088) | Total (n = 1,179) | Yes (n = 84) | No (n = 1,095) | Total (n = 1,179) |
| **Skin/hair changes** | | | | | | |
| Yes | 29 (7.2) | 373 (92.8) | 402 | 11 (7.8) | 130 (92.2) | 141 |
| No | 62 (8.0) | 715 (92.0) | 777 | 73 (7.0) | 965 (93.0) | 1,038 |

², df, p 0.218, 1, 0.641

| **Pallor** | | | | | | |
| Yes | 26 (9.8) | 239 (90.2) | 265 | 7 (8.0) | 81 (92.0) | 88 |
| No | 65 (7.1) | 849 (92.9) | 914 | 77 (7.1) | 1,014 (92.9) | 1,091 |

², df, p 2.102, 1, 0.147

| **Bitot’s spot** | | | | | | |
| Yes | 3 (9.1) | 30 (90.9) | 33 | 1 (10.0) | 9 (90.0) | 10 |
| No | 88 (7.7) | 1,058 (92.3) | 1,146 | 83 (7.1) | 1,086 (92.9) | 1,169 |

², df, p, Fisher’s exact p 0.090, 1, 0.764

| **Angular stomatitis** | | | | | | |
| Yes | 2 (6.7) | 28 (93.3) | 30 | 0 (0) | 14 (100) | 14 |
| No | 89 (7.7) | 1,060 (92.3) | 1,149 | 84 (7.2) | 1,081 (92.8) | 1,165 |

², df, p, Fisher’s exact p 0.048, 1, 0.827

* Statistically significant; df = 1; ² Chi square.

### Table 10: Multiple logistic regression of wasting on associated factors for both groups

| Predictor variable | IDP p-value | Adj. OR | 95% CI Low | Upp | Host p-value | Adj. OR | 95% CI Low | Upp |
|--------------------|-------------|---------|------------|-----|-------------|---------|------------|-----|
| Age (< 24months / ≥24 months) | < 0.001* | 3.88 | 2.38 | 6.32 | < 0.001* | 2.92 | 1.74 | 4.92 |
| Location (Gwarinpa/Others) | 0.070 | 1.63 | 0.96 | 2.77 | 0.004* | 2.69 | 1.37 | 5.28 |
| Birth weight < 2,500g (Yes / No) | < 0.001* | 2.70 | 1.55 | 4.71 | < 0.001* | 3.18 | 1.72 | 5.88 |
| Birth order (≥3rd / <3rd) | - | - | - | - | 0.113 | 1.49 | 0.91 | 2.42 |
| Morbidity in previous 2 weeks (Yes / No) | 0.013* | 2.06 | 1.16 | 3.63 | - | - | - | - |
| Diarrhoea (Yes / No) | 0.003* | 3.01 | 1.45 | 6.24 | < 0.001* | 5.45 | 2.38 | 12.44 |
| Religion (Islam / Christianity) | - | - | - | - | 0.582 | 1.19 | 0.64 | 2.20 |
| Mother’s education (No formal / Others) | - | - | - | - | 0.090 | 1.62 | 0.93 | 2.83 |

* Statistically significant; CI confidence interval, Crd. = Crude; Adj. = Adjusted; OR = Odds Ratio; Low = Lower; Upp = Upper
The prevalence of wasting among the IDPs was 7.7%, which was higher than was found among the host communities in this study. This is consistent with findings in North-Eastern Nigeria that displaced populations had more likelihood of wasting than those unaffected. This prevalence of acute malnutrition is higher than was reported among displaced under-five children in Uganda and Pakistan. High levels of wasting and severe wasting found among IDPs is indicative of acute food shortage that follows the conflict or disaster responsible for the displacement as reported in Sub-Saharan Africa. The prevalence of severe wasting among the IDPs in this study was high because any significant prevalence of severe wasting is an indicator of a heightened risk for nutritional health crises. This is comparable to the high rates of wasting and severe wasting reported among IDPs in East and Central Africa derived from surveys conducted shortly after the humanitarian emergency as part of initial assessment to plan, execute and monitor targeted nutritional intervention.

The prevalence of wasting among the host communities in this study was 7.1% and this agrees with findings from previous studies that host communities are significantly affected by malnutrition. Although our finding was comparable to the levels reported in low-middle-income countries and the national average prevalence from the 2018 National demographic health survey (NDHS), some studies conducted among host communities have found in them a higher prevalence of wasting compared to the general population. For example, a lower prevalence of wasting (6.1% and 4.4%) was reported among under-five children in Cameroon and Iran respectively. Furthermore, the prevalence of severe wasting was slightly higher among the host communities in this study than was reported among the general under-five population. Where higher rates of wasting were reported within and outside Nigeria, the studies were carried out in predominantly rural areas whereas, in this study, the host communities were a mixture of urban, semi-urban and rural.

The prevalence of moderate acute malnutrition and severe acute malnutrition was also high among both groups in this study, further showing that the communities which host displaced populations are also vulnerable to malnutrition, probably due to a more rapid depletion of already scarce resources which are spread thin over both populations. Surveys conducted among the conflict-affected displaced population have shown that any significant prevalence of SAM up to one percent, is undesirable and indicative of an increased risk of mortality. The high prevalence of SAM in this study is worrisome and requires urgent intervention by the government and other relevant stakeholders to mitigate this trend. The national IDP policy as adopted from the 2009 Kampala convention serves as a guide for state actors in the care and support of the IDPs. Nevertheless, collaboration for strategic nutritional intervention with Non-Governmental Organizations such as the World Food Programme and UNICEF is necessary. On the other hand, no document or policy addresses the concerns of the host communities. This may be because there is a paucity of literature on host communities in Africa and other parts of the world.

Risk factors associated with acute malnutrition in this study include age below 24months, birth weight below 2500g, diarrhoea episode in the two weeks preceding the study and location of the host community. Age below and equal to 24months was significantly associated with wasting among both groups in this study. This is consistent with other studies among the IDPs and the general population. Children below 24months of age are particularly vulnerable to acute malnutrition because they are in the critical window period for optimal growth and development. The nutritional requirements for which if not met will readily result in a poor nutritional status.

The semi-urban (Karomanjigi) location was significantly associated with wasting among the host communities. This could be due to scarce resources, limited opportunities for economic growth, partially developed infrastructure, and poor access to social amenities in semi-urban areas. On the other hand, fully urbanized communities are known to have better opportunities for survival due to a higher concentration of state resources and basic amenities such as water, electricity, and road network. Malnutrition as reported in the 2018 NDHS is more likely to affect those living in rural than urban areas while one study reported no association between undernutrition and place of residence.

Birth weight below 2500g or small size at birth was significantly associated with wasting among both groups. Most studies that have been done among IDPs did not assess the incidence of low birth weight or small size at birth. Moreover, available data on low birth weight is unreliable because it is subject to recall bias and only accounts for attended births (up to 75% of births in Nigeria are unattended). However, small size at birth is closely related to maternal malnutrition and maternal BMI below 18.5 has been associated with under-five malnutrition in several studies. The association of small size at birth with wasting among the host communities in this study is consistent with other studies.

Recent diarrhoea was significantly associated with wasting among both groups in this study. This is consistent with other studies conducted among the general population. However, some studies reported association with the frequency of the child’s illness and recurrent illness. Cough which is indicative of acute respiratory illness (ARI) was not significantly associated with wasting in both groups unlike in other studies.
Conclusion

The prevalence of acute malnutrition was high among the IDPs as well as the host communities. Determinants of wasting among the IDPs and host communities were alike including age below 24 months, recent diarrhoea, low birth weight and the semi-urban location of the host communities.

Recommendations

The Federal Government should ensure quick resolution of the ongoing conflict in all the States of the federation affected by Boko Haram insurgency and enforce the full implementation of the national policy on IDPs to improve support for the IDPs in rural and urban areas within the FCT by providing nutritional support and strengthening existing feeding programs at the community level for the prevention and management of malnutrition. Pregnant women in the IDP settlements and host communities should be educated on the need for adequate ante-natal care to reduce low birth weight babies and ensure access to prompt treatment and prevention of common childhood diseases such as diarrhoea within the FCT.

Acknowledgements

Special thanks to the executives of the IDP settlements and Chiefs of the host communities who gave permission and released their members to assist where necessary.

Authors’ Contributions

First author was involved in the manuscript concept, design, and definition of intellectual content, literature search, data acquisition, data analysis, statistical analysis, manuscript preparation, manuscript editing. Second author was involved in the manuscript definition of intellectual content, manuscript editing and manuscript review. Third author was involved in the manuscript definition of intellectual content, statistical analysis, manuscript editing and manuscript review. Fourth author was involved in the manuscript concept, editing and review.

Conflict of interest: None
Funding: None

References

1. World Health Organization. Health topics: Nutrition [Internet]. 2017 [cited 2018 May 3]. Available from: http://www.who.int/topics/nutrition/en/
2. World Health Organization. Fact sheet: Malnutrition [Internet]. 2018 [cited 2018 Mar 13]. Available from: http://www.who.int/mediacentre/factsheets/malnutrition/en/
3. Gbenga-Mustapha O. Malnutrition: Nigeria’s silent crisis [Internet]. The Nation Nigeria, 2016 [cited 2018 Mar 12]. Available from: http://thenationonlineng.net/malnutrition-nigerias-silent-crisis/
4. National Population Commission [NG]: ICF International. Nigeria demographic and health survey 2013. Abuja Nigeria, Maryland USA: NPC and ICF, 2014.
5. United Nations, Administrative Committee on Coordination, Subcommittee on Nutrition. Third report on the world nutrition situation. Geneva: ACC/SCN, 1997.
6. Steering Committee for Humanitarian Response. Humanitarian charter and minimum standards in disaster response. 2nd ed. McConnan I, editor. Geneva: The Sphere Project, 2001 [cited 2017 June 6]. Available from: http://ocw.hsph.edu/courses/RefugeeHealthCare/PDFs/SphereProjectHandbook.pdf>
7. African Union. Convention for the protection and assistance of internally displaced persons in Africa: Kampala convention. Int J Refug Law 2010;22:119–35.
8. Internal displacement: an agenda for progress. ReliefWeb [Internet]. [cited 2022 Jan 22]. Available from: https://reliefweb.int/report/world/issue-brief-internal-displacement-agenda-progress
9. Internal displacement at mid-year: 10 situations in review. ReliefWeb [Internet]. [cited 2022 Jan 22]. Available from: https://reliefweb.int/report/afghanistan/internal-displacement-mid-year-10-situations-review
10. United Nations, Office for the Coordination of Humanitarian Affairs. About the Crisis [Internet]. 2016 [cited 2018 Mar 22]. Available from: http://www.unocha.org/nigeria/about-ocha-nigeria/about-crisis
11. Olwedo MA, Mworozi E, Bachou H, Orach CG. Factors associated with malnutrition among children in internally displaced person’s camps, northern Uganda. Afr Health Sci. 2008;8:244-52.
12. Javed M. Nutritional disorders in children of internally displaced people. aPMC 2012;6:5–8.
13. Grandesso F, Sanderson F, Kruijt J, Koene T, Brown V. Mortality and malnutrition among populations living in south Darfur, Sudan: Results of 3 surveys. JAMA. 2005;293:1490–4.
14. Guerrier G, Zounoun M, Delarosa O, Defourny I, Lacharite M, Brown V, et al. Malnutrition and mortality patterns among internally displaced and non-displaced population living in a camp, a village or a town in eastern Chad. PLoS One 2009;4:e8077-81.
15. Dunn G. The impact of the Boko Haram insurgency in northeast Nigeria on childhood wasting: a double difference study. *Confl Health* 2018;12:6-17.

16. Ali W, Ayub A, Hussain H. Prevalence and associated risk factors of undernutrition among children aged 6 to 59 months in internally displaced persons of Jalozai camp, district Nowshera, Khyber Pakhtunkhwa. *J Ayub Med Coll Abbottabad* 2015;27:556–9.

17. United Nations, Administrative Committee on Coordination, Subcommittee on Nutrition. Refugee Nutrition Information System: report on the nutrition situation of refugee and displaced populations [Internet]. [cited 2017 Oct 28]. Available from: https://www.unscn.org/layout/modules/resources/files/RNIS_No_1.pdf

18. Delbiso TD, Rodriguez-Llanes JM, Donneau AF, Speybroeck N, Guha-Sapir D. Drought, conflict and children’s undernutrition in Ethiopia 2000–2013: a meta-analysis. *Bull World Health Organ.* 2017;95:94–102.

19. Mason JB, White JM, Heron L, Carter J, Wilkinson C, Spiegel P. Child acute malnutrition and mortality in populations affected by displacement in the horn of Africa 1997–2009. *Int J Environ Res Public Health* 2012;9:791–806.

20. Akombi BJ, Chitekwe S, Sahle BW, Renzaho AM. Estimating the double burden of malnutrition among 595,975 children in 65 low and middle income countries: a meta-analysis of demographic and health surveys. *Int J Environ Res Public Health* 2019;16:e2886-96.

21. Asoba GN, Sumbele IU, Anchang–Kimbi JK, Metuge S, Teh RN. Influence of infant feeding practices on the occurrence of malnutrition, malaria and anaemia in children ≤5 years in the Mount Cameroon area: a cross sectional study. *PLoS One* 2019;14:e0219386-0219402.

22. Payandeh A, Saki A, Safarian M, Tabesh H, Siadat Z. Prevalence of malnutrition among preschool children in northeast of Iran, a result of a population based study. *Glob J Health Sci.* 2013;5:208-12.

23. Rahman A. Significant risk factors for childhood malnutrition: evidence from an Asian developing country [Internet]. [cited 2019 Nov 11]. Available from: https://scinapse.io/papers/2278221716

24. Babatunde RO, Olagunju FI, Fakayode SB, Sola-Ojo FE. Prevalence and determinants of malnutrition among under five children of farming households in Kwara State Nigeria. *J Agric Sc.* 2011;3:173-81.

25. Senbanjo IO, Oyewole AO. Risk factors for malnutrition among rural Nigerian children. *Asia Pac J Clin Nutr.* 2006;15:491-5.

26. Haidar J, Abate G, Kogi-Makau W, Sorensen P. Risk factors for child undernutrition with a human rights edge in rural villages of north Wollo, Ethiopia. *East Afr Med J.* 2005;82:625-30.

27. Hadju V, Yunus R, Arundhana AI, Salimah AU, Wahyu A. Nutritional status of infants 0 to 23 months of age and its relationship with socioeconomic factors in Pangkep. *Asia J Clin Nutr.* 2017;9:71-6.

28. Centers for Disease Control and Prevention. Famine affected, refugee, and displaced populations: recommendations for public health issues [Internet]. [cited 2019 Sep 30]. Available from: https://www.cdc.gov/mmwr/preview/mmwrhtml/00019261.htm

29. Federal Republic of Nigeria. National policy on internally displaced persons (IDPs) in Nigeria [Internet]. [cited 2018 Aug 28]. Available from: http://infopointmigration.org.ng/wp-content/uploads/national-idp-policy.pdf