Malnutrition and Associated Co-Morbidities among Infants Affected by Boko Haram Insurgency in Some IDP Camps in Borno State, Nigeria

Elisha Joseph[1, *], Dimas Skam Joseph[2], Mary Danjuma[3], Rabiu Muhammad Shuaibu[4], Kenneth Onyedikachi Obani[5], Dlama Zirra Joseph[2], Adamu Shuaibu[6], Christiana Joseph Tsiam[7], Jimoh Mohammed Musluideen[8]

[1] Khaldia Despensary,
Taif Region,
Ministry of Health Kingdom of Saudi Arabia.

[2] Radiography Department,
Federal University Lafia,
Nasarawa State,
Nigeria.

[3] State Specialist Hospital Maiduguri,
Health Management Board,
Borno State,
Nigeria.

[4] Alfarsha General Hospital,
Sarat Abida Governorate Abha, SA -1435713,
Saudi Arabia.

[5] University Hospital of Derby and Burton Queen Hospital Burton upon trent,
United Kingdom.

[6] Emergency Department,
Turbah General hospital,
Turbah, Taif Region,
Saudi Arabia.

[7] Action Against Hunger
No. 8 Bitam Street off Circular Road Old GRA Maiduguri,
Borno State.

[8] Taraba State Primary Health Care Development Agency.
Sani Abacha State Secretariat Complex,
Jalingo,
Taraba State.

Email: elishaj813@outlook.com

Abstract

Malnutrition is a major problem in developing countries. In recent times, diet related diseases have been recorded in Borno state, Nigeria due to insurgency. The study assessed the socio demographics and comorbidities in malnourished children from six months to fifty-nine months. Ethically approved permission was obtained. Retrospective cohort study of severe acute malnutrition was carried out in 1558 patients from January 2021 to December 2021 in five IDP camp clinics. The minimum and maximum stay in the program were 8 weeks and 12 weeks, respectively. Data collected were analysed using SPSS version 18. The female patients dominated the study with 868 (55.7 %) while the males were 690 (44.3 %). Patients who completed their treatment, recovered and were discharged were 1488 (95.5 %), defaulters were 64 (4.1 %) and deaths were 6 (0.4 %). The co-morbidities recorded in the SAM patients were cough, diarrhoea, vomiting and fever with 184 (11.8 %), 183 (11.7 %), 31 (2.0%) and 11 (7%), respectively. Severe acute malnutrition (SAM) patients with multiple co-morbidities of cough and diarrhoea were 136 (8.7 %) while those with cough, vomiting and diarrhoea were 5 (0.3%). Timely interventions can save the lives of children presenting with SAM and recommend that therapeutic feeding programs be extended to the wider society to prevent death and compromised future of SAM sufferers, effective nutritional education for care givers and parents of SAM children should be encouraged to stay in the program until their children recover.

Keywords: Severe acute malnutrition (SAM), Insurgency, Children, Co-morbidities

INTRODUCTION

The Boko Haram insurgency in Borno state located in North Eastern Nigeria caused internal displacement of the inhabitants of the region. Most of the displaced individuals and families were camped in various locations across the state with the military and paramilitary providing security. Therefore, this condition has made the internally displaced persons (IDPs) stop their means of livelihood and has also increased poverty among the people. The sources of food supply to the camps for the IDPs include aid from international and national non-governmental organizations, as well as governmental agencies such as the federal and state emergency management agencies (FEMA and SEMA). Other government-established agencies assisting the IDPs including financing their resettlement into the domains from which they were displaced by the insurgency include the Victim Support Fund (VSF). Also, spirited individuals such as philanthropists like Mr Aliko Dangote, chairmen of local governments, and members of both state and federal legislature have frequently donated food to camps housing displaced members of their constituency. Most of these IDPs in the camps were farmers who prior to the Boko Haram insurgency were able to feed their households well. Not only that, farmers and fishermen in the northeast region especially Borno State supplied a good proportion of grains, legumes and fish consumed in many parts of the country (Borno State Export Strategy, 2023). Thus, the widespread problem of severe acute malnutrition (SAM) witnessed in the camps has everything to do with the Boko Haram insurgency that killed breadwinners, burnt farms and villages and displaced these erstwhile food-self-sufficient communities who now experience hunger. Mothers of under-five children have a limited way of coping with the SAM conditions of their children. Many of them are making use of what is available to them. For example, they are taking the children to the therapeutic feeding programs available in the camp. They are also presenting their children for immunization (Babakura *et al.*, 2021). It is to their credit that many children have successfully transited from their severely malnourished conditions to normalcy. However, the withdrawal from the program that some mothers did for their children was not good. This should be investigated further to uncover the reasons for their action. As said earlier, it also calls for effective education of parents of infants especially their mothers. Under the circumstances that the IDPs have found themselves (no farms, abject poverty dependency, and deprivation among other undesirable conditions, it is no wonder that the children under

five years in the camps were associated with severe acute malnutrition (SAM). It is a logical result of people in the conditions that the IDPs have found themselves. The present study found many diseases that are associated with malnutrition among children. These diseases called comorbidities in medical terms were many in the IDP camps in Maiduguri. Their pattern confirms what is obtained elsewhere where similar contains obtained or are occurring. These diseases include vomiting, diarrhoea, wasting and stunting among others.

Malnutrition is a broad term commonly used as an alternative to under nutrition but technically it also includes over nutrition (overweight and obesity) and resulting in diet-related non-communicable diseases (World Health Organization [WHO], 2024). The United Nations' Sustainable Development Goal (SDG) targets to end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and addressing the nutritional needs of adolescent girls, pregnant and lactating women and older persons (United Nations, 2022). According to UNICEF (2015), In Nigeria, 37 percent of children, or 6 million children, are stunted (chronically malnourished or low height for age), and more than half of them are severely. In addition, 18 percent of children suffer from wasting (acutely malnourished or low weight for height), half of them severely. Twenty-nine percent of children are underweight (both acutely and chronically malnourished or low weight for age), and almost half of them are severe (UNICEF, 2015). Geographic disparities related to malnutrition are significant. Children from the North-West and North-East geopolitical zones of Nigeria are more at risk of malnutrition than children from other geopolitical zones (UNICEF, 2015). These became more worrisome with the advent of the Boko Haram insurgency, which began in 2009, and has mostly affected people living in Nigeria's north-eastern states. One of them, Borno State, has been at the epicentre of the insurgency. To date, more than 20,000 people have been killed and over 2 million people have fled their homes (Obi & Eboreime, 2017). There are over seven million people in need of humanitarian assistance in Borno, Yobe and Adamawa states and more than half are children (Obi & Eboreime, 2017). Descriptive evidence suggests that poor child health outcomes in the conflict areas of North-east Nigeria may be due to disruptions to social services and increased food insecurity in an already resource-poor area (Dunn, 2018). There are several health consequences, over two million people have been displaced due to the conflict and live in camps for internally displaced people scattered across North-East Nigeria. The disruption in agricultural activities means that food insecurity has worsened which has consequences on people's health (Shipanga *et al.*, 2023; Obi & Eboreime, 2017).

The global index of 2022 revealed that 2.5 billion adults were overweight, including 890 million who were living with obesity, while 390 million were underweight, 149 million children under 5 were estimated to be stunted (too short for age), 45 million were estimated to be wasted (too thin for height), and 37 million were overweight or living with obesity. Nearly half of deaths among children under 5 years of age were linked to under nutrition. These mostly occur in low- and middle-income countries. The developmental, economic, social and medical impacts of the global burden of malnutrition are serious and lasting, for individuals and their families, for communities and for countries (WHO, 2024; Nisbett, 2023; Ghosh, 2020).

This study assessed the socio-demography and comorbidities of SAM children under the age of 5 years attending the therapeutic feeding programs in the IDP camps in Maiduguri Metropolis and Jere.

METHODOLOGY

Study Area
The Maiduguri and Jere Local Government Areas (LGAs) are located in Borno State of the North Eastern Nigeria. The state was formed in 1976 by the split of the North Eastern States. Borno State occupies an area of 79,898 km² the state has 27 local governments (Forbi *et al.*, 2023). The state shares boundaries with; Adamawa State to the south, Gombe State to west, Yobe State to the northwest. Borno State also share boundaries with some countries: Republic of Niger to the north, Chad to the northeast and Cameroon to the east (see Figure 1).

Figure 1: Map of Borno State showing Maiduguri and Jere LGAs (Bukbuk, *et al.*, 2016)

Maiduguri A.K.A MMC is the State's capital city located at latitude of 11° 50' N and longitude of 13° 09' E. The climate of Maiduguri has an annual average temperature of 34.4°C (Muhammad *et al.*, 2023). The relief of Maiduguri is 291 to 352 m above sea level. The rainy season is usually from May to September with most rainfall in July and August; and the annual average rainfall is 452 mm (World Weather & Climate Information, n.d.).

Jere is located between latitudes 11° 40' and 12° 05' N and longitudes 13° 05' and 12° 20' E. In most months of the year, the climate is dry and hot with temperature ranging from 15 to 45 C. The rainy season is usually from May to September and the annual rainfall is within the range of 500 to 700 mm (Ezema *et al.*, 2021).

The coordinates and addresses of the five IDP camp clinics in the study area are as follows:
- **Muna IDP camp:** Latitude 11.87143 (11° 52' 17.148' N) and longitude 13.25046 (13° 15' 1.656' E) and has 43,923 IDPs from Mafa, Dikwa, Ngamboru Ngala, Kalabalge, Monguno, Marte and Konduga LGAs.
- **Bakassi IDP camp:** Latitude 11.79088 (11° 47' 27.168' N) and longitude 13.12079 (13° 7'

14.844' E) and has 35,656 has IDPs from Gwoza, Monguno, Marte, Nganzai and Guzamala LGAs.

- **Dalori IDP camp:** Latitude 11.776117 (11º 46' 34.0212' N) and longitude 13.224632 (13º 13' 28.6752' E) and has 30,617 IDPs from Bama LGA.
- **Gubio IDP camp:** Latitude 11.903333 (11º 54' 11.9988' N) and longitude 13.078056 (13º 4' 41.0016' E) and has 12,059 IDPs from Marte, Gwoza LGAs.
- **NYSC IDP camp:** Latitude 11.82603 (11º 49' 33.708' N) and longitude 13.1181 (13º 7' 5.16' E) and has 6,069 IDPs from Damboa, Bama and Konduga LGAs.

Inclusion/ Exclusion Criteria

The children who were malnourished within the age 6–59 months were admitted into the therapeutic feeding programme was the inclusion criterion.

Malnourished children whose parents refuse to bring them to the camp clinics and severely ill Children were excluded from the study.

Ethical Clearance

Ethical approval was obtained from the Nurses in-charge and the Maternal Newborn Child Health Consultants supporting the respected camp clinics in Maiduguri Metropolitan Council and Jere Local Government areas of Borno state. The ethical consideration followed was based on the Helsinki Declaration of 1975 revised in 2000. The considerations were to strictly ensure anonymity of study subjects, that the data generated for the purpose of the study cannot be linked to any study subjects; and that the data collected was only going to be used for the purpose of this study.

Data Collection

A retrospective review of a total of 1558 already generated data obtained from January to December 2021 records of children with severe acute malnutrition was performed. The purposive sampling technique was adopted

The data collected involved study subjects aged six to fifty-nine months being captured from a structured national outpatient therapeutic program admission card of discharged patients. The bio-data, child's name, care givers name, age, gender, address and admission anthropometry: MUAC were recorded. The basis for the nutritional status of the children was obtained using the MUAC tape: The region RED indicates severe acute malnutrition (SAM), YELLOW indicates risk of acute malnutrition, and GREEN indicates adequate nourishment. The weight, height, and oedema were also contained in the patient's records. The patient's records contained the patient's history of SAM and comorbidities such as diarrhoea, vomiting, cough as well as appetite, results of physical examination at admission: respiratory rate, temperature, hydration status, state of consciousness, lymph nodes, skin change. The patient's records also contained information on routine admission medication and immunization including against measles, and medication history such as anti-malaria, antibiotics, and vitamin A. Furthermore, the patient's treatment history cards sometimes contained information on treatment for human immunodeficiency virus, and tuberculosis. The records also contained a weekly summary of anthropometry, medical history and physical examination throughout the minimum period of eight weeks and a maximum period of twelve weeks in the program.

Statistical analysis

The SPSS version 18 was used in the data analysis. The data was presented in various groups of age, gender, associated co-morbidities, successfully treated patients and defaulters during treatment; showing frequencies, percentages and the total number of subjects involved.

RESULTS AND DISCUSSION

The studies showed a whole-year retrospective assessment of severe acute malnutrition records from 6 to 59 months of age at internally displaced persons' camp clinics, with emphasis on socio-demographic factors. Table 2 shows the prevalence among children with severe acute malnutrition (SAM) in different age groups in months. Children within the age group 06- 20 months show the highest percentage followed by age group 21-40 then 41- 59 respectively. The high frequency could probably be due to some important factors known to play crucial roles in child's critical time period, as infants approach six months the inherited maternal immunity (IGg antibodies) tends to fade off and this will subject the child to various diseases, the child immune system is expected to be fully developed by 36 to 48 months of life and begin to produce antibodies which aid in fighting infection (Vinmec, 2019). To accomplish such a mile stone, some needs such as regular breast-feeding, a complimenting diet with required supplements, routine immunization and limiting out-side exposure are expected to be in place. The findings of this study are similar to those reported by Obani *et al.* (2023) whereby SAM children within the age group 0 to 24 months recorded 306 (83.4%), 25 to 59 months recorded 54 (14.7%) and 48-59 months recorded 7 (1.9%). Kanar and Swor (2016) revealed that the least affected age group range was 36- 59 months. On the other hand, the findings of Yadav *et al.* (2016) showed contrary findings for children within 36-47 months, hence calling for further studies.

Table 1: Frequency distribution according to the age of SAM Children

Age in months	Frequency	Percentage (%)
06- 20	1276	81.9
21- 40	263	16.9
41- 59	19	1.3
Total	1558	100.0

Table 2 shows the frequency distribution by gender of the population studied. Females showed the highest percentage (55.7%) of nutritionally deprived. Walana *et al.* (2016), Sabsebie *et al.* (2015) and Munthali *et al.* (2015) reported on the possible reason for the female preponderance that suckling reflects and affiliation to breast milk is more in males than females, the breast milk supplies immunoglobulin which bust the immune system that protects the body from an invading pathogen, hence this serves as protective mechanisms which males are likely to benefit more than females. On the contrary, Obani *et al.* (2023) and Thurstands *et al.* (2020) showed a higher malnutrition rate among males than females, logically the male children tend to have more muscle mass than their female counterparts even when weighing the same, for this reason, males burn more calories and if not replaced malnutrition may set in and reverse is the case in adulthood as malnutrition is more pronounced in female because of sociocultural and political norms. Similar findings were reported by Ketema *et al.* (2015), Nanda *et al.* (2023) and Yadav *et al.* (2016).

Table 2: Frequency distribution according to the gender of SAM Children

Gender	Frequency	Percentage (%)
Male	690	44.3
Female	868	55.7
Total	1558	100.0

Table 3 presents the frequency distribution of the study subjects according to co-morbidities in severe acute malnutrition. The result revealed that 415 (26.64%), 228 (14.64%, 85 (5.46%) and 11 (0.07%) presented with one, two, three and four comorbidities/ aetiologies, respectively. The highest and lowest number of subjects with one aetiology were 184 and 11 for cough and fever, respectively. The highest number of SAM patients with subjects with multiple co-morbidities and the lowest number with multiple aetiologies were 136 and 5 for fever and diarrhoea and cough, fever and diarrhoea, respectively. The frequency of SAM patients with and without co-morbidities was 733 (47%) and 825 (53%), respectively. The ravaging circle of poverty, disease and death best describe the life pattern in the IDP camps, no co-morbidities no IDP camp. Figure 1 shows different medical conditions associated with severe acute malnutrition. Some patients presented with a single condition while others presented with multiple cases. Cough has the highest presentation as a complication of acute respiratory tract infections, the next topping presentation is diarrhoea, followed by vomiting and fever. Most fevers associated with severe acute malnutrition is usually secondary to malaria, and lower respiratory and urinary tract infections, for this reason anti-malaria and antibiotics are given to patients with SAM during admission. In some instances, SAM patients present with complicated medical conditions like persistent diarrhoea, persistent vomiting, electrolyte imbalance, fever of greater than thirty-eight point five-degree centigrade, difficulty breathing et cetera, such patients are referred to stabilization centres also known as inpatient therapeutic feeding centres. Two-way referrals are designed in the nutrition program, that's from out-patient therapeutic program to the stabilization centre and vice versa. A study conducted at the University Teaching Hospital, Zambia by Munthali *et al.* (2015) among under five with SAM shows diarrhoea disease and pneumonia as the most co-morbidities, these findings are in keeping with the result in the above table, although cough was captured as the presenting symptoms which in turn is among the complications of pneumonia. Gamal *et al.* (2023) also reported a high prevalence of pneumonia in malnourished under-five children. Slightly in keeping with clinical findings seen in the study by Kanan and Swar (2016), gastroenteritis (presentation of diarrhoea and vomiting occurring at the same time) is the major symptom, other presentations are malaria, urinary tract infection, giardiasis, tuberculosis and AIDS. Other similar studies where Walana *et al.* (2016) reported malaria as a common co-morbidity followed by respiratory tract infections, gastrointestinal tract infections (diarrhoea and vomiting are common examples) and sepsis. Nanda *et al.* (2023) reported the prevalent comorbidities of ARI, diarrhoea, worm infestation, skin diseases, dental problems, ear and eye infections, and injury with 32.98%, 13.77%, 9.61%, 4.67%, 4.41%, 2.86%, and 1.03%, respectively. A systematic review by Moate *et al.* (2022) reported that the most prevalent child malnutrition-associated comorbidities were tuberculosis, pneumonia, gastroenteritis, and anaemia. All the aforementioned diseases occur basically due to some factors like low immune status, lack of good nutrition and water supply, overcrowding, poor waste disposal, poor immunization history and craving post-traumatic stress with hopelessness among parents and care-givers (Moate *et al.*, 2022).

Figure 2 presents the frequency distribution of the study subjects according to their immunization status. The values were 1247 (80%), 280 (18%) and 31 (2%) for immunized, not

immunized and no record of immunization, respectively. The level of immunization was appreciable at 80 percent. However, it can be improved upon and this should be pursued as the consequences of non-immunization are dire including the death of children. Good immunization practice addresses coverage of above eighty percent. It is also noteworthy that about one-fifth of eligible patients were not immunized. It would have been interesting to know if the recorded deaths occurred among the non-immunized children. No recorded information was captured for 2 percent of the study subjects in the admission register. Excellent performance coverage was reported in the study by Ketema *et al.* (2015) at Ayder Referral Hospital Tigray region in Ethiopia, 94.8 percent was recorded. Kanan and Swar (2016) reported a bad performance in a study conducted at Omdurman Paediatric Hospital, Sudan with only 33 percent of children benefiting from routine immunization practice, this signifies a higher tendency of the spread of vaccine-preventable diseases among children within the catchment age group. For example, the polio vaccine is given right from birth up to five years of age, measles is administered from six months to fifteen years during the mass campaign, while in routine vaccination schedule measles vaccination commences from nine months. Other antigens are Bacillus Calmette Guerin (BCG) which prevents tuberculosis, Pentavalent vaccine protects against five major infections: diphtheria, tetanus, pertussis (whooping cough), hepatitis B and Haemophilus influenzae type B (Hib), Pneumococcal conjugate vaccine (PCV) prevent disease caused by the bacterium Streptococcus pneumonia.

Table 4 presents the frequency distribution of the treatment outcome of SAM patients. One thousand four hundred and eighty-three (95.5%) SAM patients recovered and were discharged while 64 (4.1%) defaulted in their treatment and 6 (0.4%) died, respectively. This implied that the feeding programme was a success. Possible explanations for those that defaulted might be that the parents took their children to other feeding programmes/ clinics or may-be the patients died or the parents refused to patronize the feeding programme-clinic due to beliefs. A similar finding was the study by Kanan and Swar (2016) at Omdurman Paediatric Hospital, Sudan, which showed that 75.7% of the patients improved and were discharged, 15% were discharged against medical advice and 9.3% died.

Table 3: Frequency distribution according to co-morbidities in SAM patients

Medical Condition	Frequency	Percentage (%)
Fever	11	0.7
Cough	184	11.8
Diarrhea	183	11.7
Vomiting	31	2
Fever and cough	38	2.4
Fever and Diarrhea	14	0.9
Fever and Vomiting	8	0.5
Cough and Diarrhea	136	8.7
Cough and Vomiting	32	2.1
Fever, Cough and Diarrhea	11	0.7
Fever, Cough and Vomiting	5	0.3
Cough, Diarrhea and Vomiting	69	4.4
Fever, Cough, Diaarrhea and Vomiting	11	0.7
Total SAM patients with co-morbidities	733	47
SAM Patients No record co-morbidities	825	53
Total of SAM Patients	1558	100

Table 4: Frequency distribution according to the treatment outcome of SAM patients

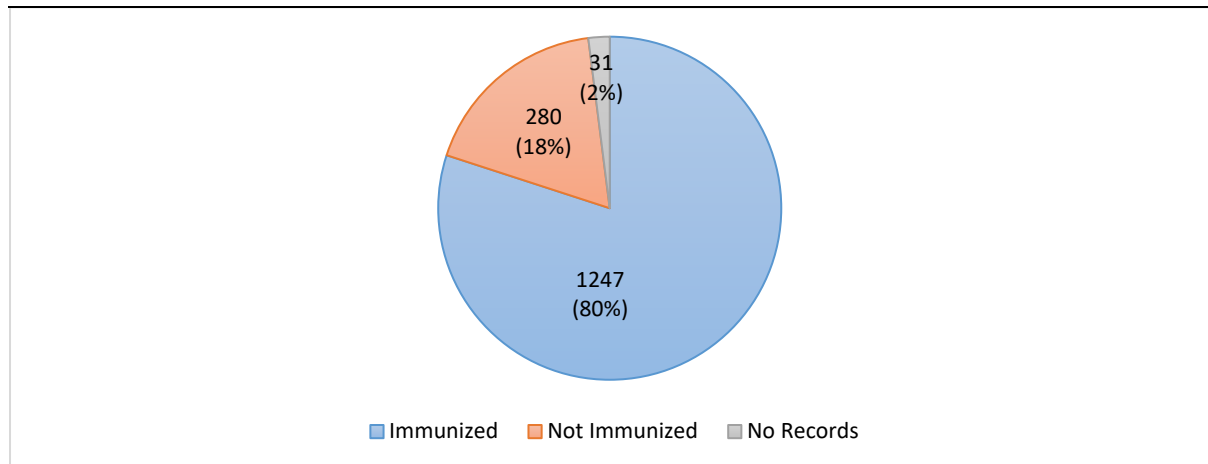| Treatment outcome of SAM patients	Frequency	Percentage (%)
SAM patients who fully recovered and discharged	1488	95.5%
SAM patients who defaulted during treatment	64	4.1%
Number of death among SAM patients	6	0.4 %
Total	1558	100%

Figure 2: Frequency distribution of immunization status of patients

CONCLUSION

The Boko Haram insurgency has caused widespread hunger problems for the displaced populations living in camps. Children under five are among the worst affected members of the IDPs with regard to the hunger or food insecurity problem. In their worst form, the severely malnourished children present with SAM. A total of 1558 SAM patient records were reviewed. The majority of the patients were females with 55.7%. The age range with the highest number of malnourished patients was 0-20 months with 81.9%. A good number of patients presented with cough while few had a fever, multiple symptoms were also seen in some patients during admission. There was a therapeutic feeding program in IDPs' Clinic that studied where children can go on an out-patient basis. The program has recorded a good success rate. However, there is a need for educating parents in the camp on adequate feeding of their children. In conjunction, an adequate supply of food to the IDPs should be ensured by the authorities.

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