Prevalence of Malnutrition Among Under-five Children and Associated Maternal/Caregiver Factors in A Semi-Urban Community in Delta State, Nigeria

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ABSTRACT

Background: *Nigeria has the highest number of stunted under-fives in sub-Saharan Africa. Underlying causes include food insecurity, poor living conditions, lack of safe water, maternal illiteracy, unsafe child-feeding practices, and neglect of women and children. Repeated surveys are needed to determine the up-to-date nutritional status of children in communities, design strategies, and track progress.*

Objective: *This study aimed to determine the prevalence of malnutrition among under-fives and the associated maternal/caregiver factors in Oghara, Delta State, Nigeria.*

Methods: *This was a cross-sectional study involving 200 child-mother/caregiver pairs recruited by multistage sampling. An interviewer-administered questionnaire was used to collect data on demographic characteristics, immunization status, and anthropometric measurements of under-fives, as well as socio-demographic characteristics and level of nutrition knowledge of mothers/caregivers. Anthropometric indices were determined based on Z-scores of weight-for-age, height-for-age, and weight-for-height obtained for each child using the WHO child growth standards and recorded in a section of the questionnaire.*

Results: *Prevalence of wasting was 41.5%; stunting, 25%; and underweight, 34%. The cumulative prevalence of malnutrition was 60%. Less than 60% of mothers/caregivers had good nutrition knowledge. Mothers'/caregivers' level of education ($\chi 2 = 14.52$, $p = 0.0001$) and nutrition knowledge ($\chi 2 = 21.73$, $p = 0.0001$) had a strong relationship with level of nutrition.*

Conclusion: *The high prevalence of undernutrition necessitates measures for the timely identification/treatment of cases in Oghara and its environs. Interventions should also be geared towards training, behavioural change communication, and provision of knowledge/skills on child care practices among women in the communities.*

Keywords: Under-fives, Stunting, Underweight, Wasting, Delta State

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INTRODUCTION

Malnutrition is the effect of inadequate or excessive intake of any nutritional component of food (1). Although malnutrition in general is a condition of public health importance worldwide, nutrient deficiency (under-nutrition) is the preponderant form in developing countries like Nigeria, affecting mainly the vulnerable, such as children and women of childbearing age in the lower socio-economic rungs (2). Individual micronutrient deficiencies manifest as specific clinical/biochemical conditions such as abnormal bones and teeth, and anaemia, while multi-nutrient under-nutrition leads to general growth failure and body malfunction because of inadequate energy and nutrients (3). The direct causes of multi-nutrient undernutrition (also known

as protein-energy malnutrition) include foetal deprivation of nutrients due to maternal undernutrition or ill health; low quantity/quality of child's diet; and reduced intake/absorption or increased demand as a result of illnesses such as diarrhoea, measles, respiratory tract infections, and helminthiasis (2,4). Underlying causes include food insecurity, lack of social safety net, poor living conditions, lack of safe water, maternal illiteracy, unsafe child-feeding practices, and neglect of women and children as a consequence of poverty and lack of female empowerment, often made worse by social conflict, harmful sociocultural practices, weak governance and lack of implementation of nutrition policies (2,4). Malnutrition is a significant cause of morbidity and mortality in children, in whom growth and development are important processes (5–7). A well-nourished child achieves better physical and mental development and obtains better educational and economic outcomes (7). On the other hand, undernourishment, especially in the early stages of life, results in growth failure, delayed developmental milestones, poor cognitive function, weak immunity, and increased propensity to infections, with ripple effects on the immediate community and the nation (5,6).

The commonly used measurements for the assessment of multi-nutrient malnutrition in children include mid-arm circumference, and the more epidemiologically useful indices: weight-for-height (WFH), height-for-age (HFA), and weight-for-age (WFA), which can be expressed in standard deviation (SD) units from the median of the reference population (Z-scores) (8). When WFH is more than two SDs below the median, i.e., Z-score < -2, the child has moderate/severe wasting, which is reflective of acute (new onset) deficiency. A child with an HFA Z-score < -2 is moderately/severely stunted, indicative of chronic (long-standing) inadequacy. A WFA of Z-score < -2 indicates moderate/severe underweight, which may be due to acute and/or chronic undernutrition (8).

Children in developing countries where the level of poverty and hunger is high are at risk of starvation and malnutrition. Globally, malnutrition directly or indirectly accounts for about 45% of mortality among children who are less than five years old, with the majority of these deaths occurring in developing countries (9). Data collated by the United Nations Children's Fund (UNICEF) on the state of the world's children estimated the global burden of stunting among under-fives to be 149 million in 2018; while wasting was 50 million, and underweight was 38 million (6,10). The Nigerian National Demographic and Health Survey 2018 reported that 37%, 22%, and 17% of under-fives in Nigeria were stunted, underweight, and wasted, respectively (11). The country has the highest number of stunted under-fives in sub-Saharan Africa (12). Going by this prevalence of stunting in the country, which is above the average for the African region (29.1%), Nigeria is by no means on course to achieving the global nutrition targets (13). Malnutrition is treatable, and early identification improves survival and minimizes the concurrent complications that may arise (12,13).

A review of the literature showed that undernutrition continues to be rampant in developing countries, and characteristics of mothers (level of education, occupation, and nutrition knowledge) remain crucial to the nutritional status of the children in these parts of the world (14–20). In a study conducted in Zaria, North-West Nigeria, 7% of the under-fives who participated were wasted, 31% were stunted, and 29% were underweight (21). Low literacy of mothers was associated with stunting, and the proportion of malnourished children was significantly higher among those who were abruptly weaned compared with those who were gradually weaned (21). In a study of mother-child pairs in Akwa-Ibom State, South-South Nigeria, 37.4% of the children were stunted, the prevalence of wasting was 13.1%, and the proportion of underweight children was 18.2% (19). In a cross-sectional study among under-fives in rural communities in Imo State, South-East Nigeria, the prevalence of wasting, stunting, and underweight was 23.6%, 28.1%, and 28.6%, respectively, while 9.8% were overweight/obese (22). Malnutrition was strongly associated with educational status and the maternal occupation (22).

Under-five morbidity/mortality levels reflect a country's state of socio-economic development. Frequent studies on the nutritional status of under-fives in the community and maternal nutrition knowledge cannot be overemphasized. There is a need to expand coverage of and repeatedly conduct community surveys to determine current trends, as these data will aid the tracking of progress and the design of strategies, including advocacy and policy development, to address nutritional problems among children. This study aimed to determine the prevalence of malnutrition among under-fives in Oghara, Delta State, Nigeria, and to assess the association between maternal/caregiver characteristics and nutritional status of under-fives in that semi-urban community.

METHODS

Study area

The study was conducted in Oghara, the headquarters of Ethiope-West Local Government Area of Delta State, South-South Nigeria. Oghara is made up of seven communities, which have a high level of homogeneity between them. The town hosts several institutions, including the Delta State University Teaching Hospital, the Delta State Polytechnic, the Western Delta University, and the Nigerian Navy Logistics Command Headquarters. It also has facilities – a gas plant/flow station and petrol storage tanks/wells - belonging to several petroleum companies. Most of the people of Delta State are farmers. Cassava, yams, maize, rice, and oil palm produce are cultivated for local consumption. Others are traders, artisans, civil servants, healthcare workers, and students. There are minor industries in fishing (23–26). The total population of Oghara was 30,962 (27).

Study population

The study population was children under five years of age (0 – 59 months) in Oghara with an estimated population size of about 5,264 based on the conventional calculation of 17% of the total population (28).

Study design and sample size calculation

A cross-sectional study design was used, with the minimum sample size derived using Fisher's formula as follows.

$$n = (Z_{\alpha/2})^2 (p) (1-p)/ d^2$$

where

n = minimum sample size required for the study

p = 13.1 % (proportion of children with wasting in a study conducted in Akwa-Ibom, South-South Nigeria) (19).

d = 5% margin of error

$Z_{\alpha/2}$ = 1.96 (corresponding to 95 % level of confidence, two-tailed test)

n = (1.96)2 × (0.131) × (0.869)/ (0.05)2 = 174.9.

An anticipated non-response rate of 10 % was compensated for by employing the formula below:

ns = n/ (1 - 0.1) = 174.9/0.9= 194.4

This was rounded off to 195 child-mother/caregiver pairs

Sampling technique

A two-stage sampling technique was employed to select participants. In the first stage, a list of all the communities was drawn up, and two were selected by simple random sampling using the balloting method. In the second stage, the two selected communities were divided into clusters based on streets. One cluster was selected from the list of clusters in each community. All the under-fives, at least six months of age, in the households in the selected clusters were recruited for the study. Children whose mothers/caregivers were not available were excluded. There was a total of 200 child-mother/caregiver pairs.

Method of data collection

Data collection took place between September and December 2020. Data was collected using an interviewer-administered questionnaire developed and pre-tested by the researchers, with the following items: child's sex, age, immunization status, whether exclusively breastfed or not; and mother/caregiver's socio-demographic data, and nutrition knowledge. The nutrition knowledge of mothers/caregivers was assessed using questions that elicited responses on awareness and appreciation of nutrition, malnutrition, and balanced diet; exclusive breastfeeding; consequences of malnutrition; the risks associated with obesity; the daily fruits and vegetables requirement; and appropriate feeding practices. Child anthropometric measurements (weight and height) were carried out using standard procedures and recorded in a part of the questionnaire.

Using the WHO standard procedure (29), weight measurements were taken using a calibrated Hana analogue weighing scale (maximum capacity of 120kg), with the children wearing no clothing or shoes. Children younger than two years, and those who could not stand without support, were placed comfortably sitting or lying in the centre of the tray of a Momert analogue basinet weighing (maximum capacity of 20kg). All measurements were read and recorded to the nearest kilogram (29). For children who could stand without support, their heights were measured while they stood erect with their hands by their side. Their heads were placed directly against a measuring board with a slide above the head to mark the height (29). For children less than two years, their lengths were taken while lying supine on a measuring board with a calibrated rule by the side of the board. An assistant held their knees and ankles down on the board to ensure they were straightened out. Caregivers positioned their heads with their hands cupped over their ears. A measurement was read and recorded when a child's head, shoulders, back, knees, and ankles were straight and flat on the board. All measurements for height were read and recorded to the nearest metre (29).

The weight-for-age, height-for-age, and weight-for-height for each child were compared with the respective median values using the World Health Organisation (WHO) child growth standards (30). The WHO child growth standards include Z-score curves (3, 2, 0, -2, and -3) for length/height-for-age, weight-for-age, and weight-for-length/height, respectively, that were developed using data collected in a WHO multicentre growth reference study. The Z-score - the number of standard deviations (SD) from the median - was obtained for each anthropometric index per child, and nutritional status was ascertained.

Data analysis

The independent variables were the sociodemographic and other characteristics of children and mothers/caregivers, and the nutrition knowledge of mothers/caregivers, each of which was categorized. The dependent variable was 'child nutritional status', and it was categorized as 'normal nutrition', 'undernutrition' (presence of wasting,

Table 1: Characteristics of under-fives and their mothers/caregivers

Variable	Frequency (n = 200)	Percentage
Under-5 Children		
Age		
6months - < 1year	41	20.5
1+ years	45	22.5
2+ years	39	19.5
3+ years	44	22.0
4 years - 59months	31	15.5
Sex		
Male	78	39.0
Female	122	61.0
Immunization status		
Completed	132	66.0
Incomplete	48	24.0
Up to date	19	9.5
Not immunized	1	0.5
Exclusively breastfed		
Yes	137	68.5
No	63	31.5
Mothers/Caregivers		
Age		
15-24	24	12.0
25-34	152	76.0
35-50	24	12.0
Marital status		
Cohabiting	94	47.0
Married	93	46.5
Single	8	4.0
Divorced	3	1.5
Widowed	2	1.0

stunting or underweight), or 'overweight' based on the observed Z-scores from the WHO growth charts. These categorical variables were summarized as frequencies and percentages. The chi-square test was used to determine if there was an association between independent variables and child nutritional status. The level of significance was set at 0.05. Data were analysed using IBM SPSS Statistics version 25.

Ethical consideration

Ethical approval was obtained from the Health Research Ethics Committee of the Delta State University Teaching Hospital, Oghara (Approval Number: HREC/PAN/2020/061/0402). Written informed consent was obtained from mothers/caregivers.

RESULTS

Most of the under-fives studied (61%) were females. Approximately 90% of the children had completed their routine vaccination or were up to date with vaccination. Almost 70% were exclusively breastfed. Over three-quarters (76%) of the mothers/caregivers were within the age bracket of 25 - 34 years; 46.5% were married and 47% were cohabiting; and 65% had secondary education. The majority of the mothers/caregivers (55%) were self-employed, and only 59% of mothers/caregivers had good nutrition knowledge (Table 1).

There was wasting in 41.5% of the children (21.5% were severely wasted), while stunting was present in 25% of the children (15% were severely stunted). There was underweight in 34% of the children (15% were severely underweight) (Table 2).

The proportion of mothers/caregivers with primary, secondary, and tertiary education who had undernourished children was 66%, 48.5%, and 48.6%, respectively. There were undernourished children for 68% of mothers with poor nutrition knowledge, 61.4% of mothers with fair nutrition knowledge, and 43.2% of mothers with good nutrition knowledge. Mothers'/caregivers' level of education and nutrition knowledge were strongly associated with nutritional status, unlike age, marital status, or employment status of mothers/caregivers (Table 3).

Table 2: Anthropometric indices of under-fives

Anthropometric indices	Frequency (200)	Percentage (%)
Weight-for-Height *		
>2SD but <3SD below median	40	20.0
>3SD below median	43	21.5
Normal	105	52.5
>2SD but <3SD above median	9	4.5
>3SD above median	3	1.5
Height-for-Age*		
>2SD but <3SD below median	20	10.0
>3SD below median	30	15.0
Normal	119	59.5
>2SD but <3SD above median	14	7.0
>3SD above median	17	8.5
Weight-for-Age*		
>2SD but <3SD below median	30	15.0
>3SD below median	38	19.0
Normal	115	57.5
>2SD but <3SD above median	12	6.0
>3SD above median	5	2.5

SD = Standard Deviation

* Based on WHO Growth Standards (30)

Table 3: Association between mother/caregiver characteristics and nutritional status of under-fives

Variable	Undernutrition	Adequate Nutrition	Over-nutrition	Total	χ^2	p-value
Age						
15-24	15	8	1	24	4.47	0.346
25-34	75	65	12	152		
35-49	13	7	4	24		
Level of education						
Primary	22	9	2	33	14.5	0.0001
Secondary	63	60	7	130	2	
Tertiary	18	11	8	37		
Marital status						
Cohabiting	51	40	3	94	12.3	0.138
Married	45	34	14	93	1	
Single	4	4	0	8		
Divorced	1	2	0	3		
Widowed	2	0	0	2		
Employment status						
Self employed	56	47	7	110	8.73	0.189
Employed (private)	23	20	8	51		
Unemployed	22	10	1	33		
Employed (Government)	2	3	1	6		
Nutrition Knowledge						
Good	51	61	6	118	21.7	0.0001
Fair	35	12	10	57	3	
Poor	17	7	1	25		

DISCUSSION

One of the conditions needed for high-burden regions to set out on the right path of achieving the global targets for 2025 is to keep track of prevailing levels and underlying causes (31). This study's contribution has been to provide needed data for Oghara, the headquarters of Ethiope West LGA of Delta State, Nigeria. As expected, the prevalence of over-nutrition was far lower than that of undernutrition. This study showed high levels of wasting, stunting, and underweight in the study population that fall short of the Global Nutrition Targets set by WHO, e.g., "reduce and maintain childhood wasting to less than 5%" (31,32). Though not exactly similar, these unacceptably high values are in keeping with the · ndings of the most recent Nigeria Demographic and Health Survey (NDHS) and other studies done in Nigeria and various developing countries (11,14,15,17–22). However, unlike most of these studies where the proportion of children with wasting was lower than that of stunting and underweight, the prevalence of wasting in this study far surpassed that of stunting and underweight as was observed in the NDHS and the study carried out among under-· ves of urban slums in Odisha, India (17). This similarity with the Indian study and the fact that a far greater proportion of the children studied were exclusively breastfed (68.5%), completed or were up to date with immunisation (75.5%), and had mothers who had gainful employment (83.5%) may suggest that beyond causes of wasting such as inadequate care

and feeding practices and poor access to healthcare, the contributory factors to undernutrition in this study population could be related to inadequacies in safe water, hygiene, and environmental sanitation.

In this study, there was no relationship between maternal occupation and malnutrition, as opposed to the · ndings in Imo State, Southeast Nigeria, and Damot Gale, South Ethiopia (20,22). Maternal levels of education and nutrition knowledge were strongly associated with the nutritional status of children. This is similar to what has been observed in other parts of the developing world (15,17,18,21,22). However, it is striking that only 59% of mothers/caregivers had good nutrition knowledge and undernutrition was rampant despite all the mothers/caregivers in this study having at least primary education, and 83.5% having at least a secondary education. The explanation may be that formal education does not necessarily translate to good nutrition knowledge.

Unlike stunting which is essentially an irreversible consequence of chronic or repeated nutritional deprivation with long-term effects on individuals and society, wasting is an acute process marked by a high immediate risk of severe morbidity and mortality (from infectious diseases such as diarrhoea, pneumonia, and measles) which is amenable to and requires urgent attention. Severely wasted children have an eleven-fold increase in risk of death relative to those who are healthy (31). As such, with a prevalence of severe wasting of 21.5%, the instituting of measures by the Delta State Government for early identi· cation (in Oghara in particular, and other parts of Ethiope West LGA in general), and for wasted children to receive timely and appropriate life-saving treatment is crucial (31,32).

A limitation of this study is its use of a cross-sectional design to assess the burden of wasting, an acute condition, and one with seasonal peaks. The snapshot from a cross-sectional study is unlikely to capture the total number of cases over a year, for example, thereby underestimating the actual proportion of affected children (31). However, this further underscores the need for urgent intervention. Longitudinal studies that ascertain incidence (the number of new cases over time) are needed to provide more accurate estimates of wasting, especially for advocacy and planning of interventions. A major component of policy and interventions should be training, behavioural change communication, and provision of knowledge/technical skills on child health care among women in the communities, irrespective of their level of formal education (33).

CONCLUSION

There was a signi· cant level of wasting, stunting, and underweight among under-· ves in Oghara, and nutritional status was related to maternal/caregiver level of education and nutrition knowledge. There is a need for measures aimed at the timely identi· cation/treatment of cases of malnutrition in the community. Interventions should also be geared towards training, behavioural change communication, and provision of knowledge/skills on childcare practices among women.

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