Original Research Article

Prevalence and determinants of malnutrition among under-five children in Southwest, Nigeria

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ABSTRACT

Background: Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients or impaired nutrient utilization. Around 45% of deaths among children under-five years are linked to undernutrition which mostly occurs in low and middle-income countries. This study aimed to determine the prevalence and assess determinants of undernutrition among under five children in South West of Nigeria.

Methods: A cross sectional study design, multi stage sampling method and sample size of 327 under-five children were utilized for the study.

Results: The prevalence of underweight was 30.6%, overweight was 2.1% and normal weight for age nutritional status was 67.3%. More males (19.6%) than females (11%) accounted for prevalence of underweight. Majority (25.7%) of underweight under five years children were in the age group of 0-11 months, 4.6% in age group 12-29 months and 0.3% in age group 30-39 months. This study revealed statistically significant association between underweight nutritional status and child's sex (male, p=0.006), knowledge of importance of vaccination against vaccine preventable diseases (VPD) on nutrition (p=0.01) and presence of clinical signs of malnutrition (hair changes p=0.003, swelling of legs 0.006 and pallor of mucus membrane p=0.006).

Conclusions: There is need to implement urgent nutritional intervention to reduce the high prevalence of malnutrition in Ede North LGA. Food security should be improved and high levels of inflation should be reduced to enable mothers to have access to food items. Health education should be intensified to educate mothers on prevention of early malnutrition and importance of vaccination against VPDs.

Keywords: Determinants, Malnutrition, Prevalence, Underweight, Vaccine

INTRODUCTION

Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients or impaired nutrient utilization. The double burden of malnutrition consists of undernutrition; and overweight and obesity, as well as diet-related noncommunicable diseases. Undernutrition manifests in four broad forms: wasting, stunting, underweight, and micronutrient deficiencies.[1]

In 2014, approximately 462 million adults worldwide were underweighted, while 1.9 billion were either overweighted or obese. In 2016, an estimated 155 million children under the age of 5 years were suffering from stunting, while 41 million were overweight or obese. Around 45% of deaths among children under-five years of age are linked to undernutrition. These mostly occur in low- and middle-income countries. At the same time, in these same countries, rates of childhood overweight and obesity are rising.[1]

Women, infants, children, and adolescents are at particular risk of malnutrition. Optimizing nutrition early in life (including the 1000 days from conception to a child's second birthday) ensures the best possible start in life, with long-term benefits. People who are poor are more likely to be affected by different forms of

malnutrition. Also, malnutrition increases health care costs, reduces productivity, and slows economic growth, which can perpetuate a cycle of poverty and ill-health.[1]

There has been a consistent increase in the level of malnutrition among children across the continent. This probably is due to an increasing level of poverty across developing countries, where Nigeria is notable.[2] Trend in the national prevalence of moderate and severe underweight nutritional status showed an increase from 24.2% and 9% in 2011 to 31.5% and 11.5% in 2017 respectively, trend in national prevalence of moderate and severe stunting nutritional status increased from 35.8% and 19.3% in 2011 to 43.6% and 22.8% in 2017 respectively and trend in national prevalence of moderate and severe wasting nutritional stabilized between 10.2% and 3.1% in 2011 and 10.8% and 2.9% in 2017 respectively.[3,4] Trend in prevalence of moderate and severe underweight nutritional status in Osun state increased from 11% and 1.6% in 2011 to 18.7% and 6.6% in 2017 respectively, trend prevalence of moderate and severe stunting nutritional status in Osun state increased from 22.2% and 6.6% in 2011 to 23.5% and 6.8% in 2017 respectively and trend in prevalence of moderate and severe wasting nutritional status in Osun state increased 6.6% and 0.8% in 2011 to 8% and 2.2% in 2017 respectively. The prevalence of moderate and severe underweight, stunting and wasting nutritional status in Osun state has been consistently above the national average.[3,4]

Malnutrition is a severe global public health challenge which has been directly associated with increased mortality and morbidity rate especially in many parts of the developing countries.[2] In addition, recurrent infections contribute to the pathogenesis of malnutrition and it is logical that vaccination may play an important role in preventing malnutrition.[5]

In this study we determined the prevalence of undernutrition and assessed its determinants. Undernutrition manifests in four broad forms: wasting, stunting, underweight, and micronutrient deficiencies however the study was focused on underweight. Underweight is defined as low weight-for-age and is a composite index of weight-for-height and height-for-age reflecting both acute (wasting) and chronic (stunting) undernutrition. A child who is underweight may be stunted, wasted or both. The mortality risk is increased in children who are even mildly underweight, and the risk is even greater in severely underweight children.[6]

We determined the prevalence of underweight by comparing weight among children under-five age years living in Ede North Local Government Areas (LGA) against the World Health Organization Child Growth Standards reference population.[6] A well-nourished population will be similar to the reference population, while a poorly nourished population will differ from the reference population. The World Health Organization

classified underweight prevalence less than 2.5% as very low, 2.5 to less than 5%: as low, 5 to less than 10% as medium, 10 to less than 15% as high and more than or equal 15%: as very high.[6] We also assessed the determinants of underweight nutritional status by computing the level of association between sociodemographic characteristics, Child's Family Characteristics, Child's Nutritional History, Mother's knowledge of clinical signs of Malnutrition, presence of signs of malnutrition, Immunization Status and Mother's knowledge of importance of immunization against VPDs to nutrition.

METHODS

We adopted the descriptive cross-sectional design for this study to determine the prevalence of malnutrition among children under-five years in Ede North LGA in South West, Nigeria. Ede North LGA has a projected population of 134,463 people based on the 2006 population census figure with a population of 26,892 children under-five years. It has the following eleven Wards: Olaba/Atapara, Abogunde/Sagba, Ologun/Agbaakin, Olusokun, Alusekere, Sabo/Agbongbe, Sabo /Agbongbe, Isibo/Buari-isola, Apaso, Asunmo and Bara Ejemu

The study participants were children under-five years of age attending immunization sessions at 10 focal primary health centres (PHC) comprising of PHC Owode, PHC Apaso PHC Asunmo, PHC Aipola, PHC Oja-Timi, PHC Isale-Oyeku, PHC Adodo, PHC Abere, PHC Osun-Agbeni and PHC Oke-Gada between May 24th and June 21st 2022.

Sample size of 327 was calculated using the formula $pq/(e/1.96)^2$ where z=level of significance of 5%, p=proportion of underweight under five children of 19%, q=1-p and 4.45% as precision (e).[4,7]

We randomly selected 10 Focal PHCs from 11 Focal PHCs in Ede North LGA in first stage and then from then purposively selected 327 children under five years of age from the ten focal PHC

Data collection was carried out with the use of questionnaires and through observational method. The questionnaire was used to collect information on sociodemographic characteristics of the child, mother and father. Information on child family, nutritional history, nutritional knowledge and immunization history were also collected. The observational method was utilized to collect anthropometric data during routine immunization sessions and physical examination data

The questionnaire was pre-tested in two PHCs in Ede South LGA, which is sociodemographically similar to Ede North LGA area chosen for the study.

Data entry and analysis were done using the IBM-Statistical package for social sciences (IBM-SPSS)

version 26. Frequency distribution of variables, prevalence of malnutrition, levels of association and significance of association between dependent and independent variable using Chi Squared statistics were computed

Ethical approval for the study was obtained from Osun State Primary Health Care Development Board.

RESULTS

Majority (25.7%) of under five children studied were between the ages of 0-11 months followed by 4.6% between the age of 12-29 months and 0.3% were 30-39 months. The bulk (52.6%) were males while 47.4% were females. Majority (90.8%) of mothers of under-five children, 7.3% were single, 1.2% were separated and 0.6% were divorced. A moderate proportion (61.5%) of mothers had secondary education, 27.8% had tertiary education, 4.6% had primary education, 3.7% had Koranic education while 2.4% no education. A bulk (38.5%) of mothers engaged in petty trading, 8.9% engaged in large scale trading, 8.3% were full house wife, 8.3% were civil servants and 3.1% engaged in farming. A

high proportion (96.6%) of the mothers had monthly income below N60,000, 2.1% had monthly income between N61,000-N120,000, 0.6% had monthly income between N120,000-180,000, 0.3% had monthly income between N181,000-240,000 while 0.3% had monthly income between N241,000-N300,000. More (28.7%) fathers of under-five children fell within the age group of 31-35 years, 19.6% were between 36-40 years, 14.4% were between 26-30 years, 9.5% were less than 20 years while 9.2% were between 21-25 years. The bulk of (45.9%) fathers had secondary education, 38.5% had post-secondary education, 5.8% had primary education, 5.8% no education and 4% had Koranic education. A bulk (27.8%) fathers engaged in skilled labour, 14.4% were in the civil service, 12.8% were professionals, 8.3% were civil servants and 11% engaged in farming while 8.9% engaged in unskilled labour while 25.1% of fathers engaged in other types of occupation. Majority (44.6%) of the fathers had monthly income above N20,000, 7% of fathers had monthly income between N15,000-N20,000, 6.7% of fathers had average monthly income less than N5,000, 5.8% of fathers had monthly income between N101,000-150,000 while 30.9% of fathers' monthly income were unknown by the respondents (Table 1).

Table 1: Frequency distribution of children's' sociodemographic characteristics.

Variables	Category	Frequency	Percent
Child's sex	Male	172	52.6
	Female	155	47.4
	Total	327	100.0
Child's age	0-11 months	270	82.6
	12-29 months	51	15.6
	30-39 months	5	1.5
	40-49 months	1	0.3
	Total	327	100.0
Mother's age	15-25 years	27	8.3
	21-25 years	82	25.1
	26-30 years	122	37.3
	31-35 years	66	20.2
	36-39 years	14	4.3
	40-45 years	16	4.9
	Total	327	100.0
Mother's education	None	8	2.4
	Koranic	12	3.7
	Primary	15	4.6
	Secondary	201	61.5
	Tertiary	91	27.8
	Total	327	100.0
Mother's religion	Islam	267	81.7
	Christianity	59	18.0
	Traditional	1	0.3
	Total	327	100.0
Mother's marital status	Married	297	90.8
	Single	24	7.3
	Divorced	2	0.6
	Separated	4	1.2
	Total	327	100.0

Continued.

Variables	Category	Frequency	Percent
Mother's occupation	Full time house wife	27	8.3
	Petty trading	126	38.5
	Large scale trading	29	8.9
	Farming	10	3.1
	Civil service	27	8.3
	Others	108	33.0
	Total	327	100.0
Mother's income	0-60000	316	96.6
	61000-120000	7	2.1
	121000-180000	2	0.6
	181000-240000	1	0.3
	241000-300000	1	0.3
	Total	327	100.0
Father's age	<=20 years	31	9.5
	21-25 years	30	9.2
	26-30 years	47	14.4
	31-35 years	94	28.7
	36-40 years	64	19.6
	41-45 years	42	12.8
	46-50 years	13	4.0
	51-55 years	6	1.8
	Total	327	100.0
Father's education	None	19	5.8
	Koranic	13	4.0
	Primary	19	5.8
	Secondary	150	45.9
	Post-secondary	126	38.5
	Total	327	100.0
Father's occupation	Farming	36	11.0
	Unskilled labour	29	8.9
	Skilled labour	91	27.8
	Professional	42	12.8
	Civil service	47	14.4
	Other	82	25.1
	Total	327	100.0
Father's income	Don't know	101	30.9
	<N5000	22	6.7
	N5100-10,000	16	4.9
	N10100-15000	19	5.8
	N15000-20000	23	7.0
	>N20000	146	44.6
	Total	327	100.0

The prevalence of normal weight for age nutritional status was 67.3%, the prevalence of underweight was 30.6% while the prevalence of overweight was 2.1%. More males (19.6%) accounted for bulk of underweight under-five years children compared to 11% which are females. Majority (25.7%) of underweight under five years children were between the age of 0-11 months followed by 4.6% between the age of 12-29 months and 0.3% were 30-39 months (Table 2).

There was statistically significant association between underweight nutritional status and child's sex (p=0.006). The odds (OR=1.96) of being male was about twice higher to being females among those underweight (Table 3).

There was statistically significant association between underweight nutritional status and knowledge of importance of vaccination against vaccine preventable disease to nutrition (p=0.01). The odds (OR=0.19) of having knowledge that vaccination against vaccine preventable disease achieves good performance of children in school was 19% less than among those underweight (Table 3).

Table 2: Prevalence of malnutrition (underweight <2 SD and overweight >2 SD of median weight (WHO).

Variable	Category	Frequency	Percent
Overall Nutritional Status	Underweight	100	30.6
	Normal	220	67.3
	Overweight	7	2.1
	Total	327	100.0
Underweight nutritional status by sex	Male underweight	64	19.6
	Female underweight	36	11.0
	Total	100	30.6
Underweight nutritional status by age	0-11 months underweight	84	25.7
	12-29 months underweight	15	4.6
	30-39 months underweight	1	0.3
	40-49 months underweight	0	0.0
	50-59 months underweight	0	0.0
	Total	100	30.6

There was statistically significant association between underweight nutritional status and presence of clinical signs of malnutrition. The odds (OR=3.7, p=0.003) of hair changes were about 4 times higher among those underweight, the odds (OR=4.8, p=0.006) of presence of swelling of legs were about 5 times higher among those underweight and the odds (OR=4.8, p=0.006) of presence of pallor of the mucus membrane were about 5 times higher among those underweight (Table 3).

There was no statistically significant association between underweight nutritional status and child's age (p=0.86), mother's age (p=0.19), mother's marital status (p=0.12), mothers' religion (p=0.09), mothers' educational status (p=0.67), mothers' occupation (p=0.67), mothers' average monthly income (p=0.61), father's age (p=0.35), fathers' educational status (p=0.79), fathers' occupation (p=0.75) and fathers' average monthly income which had p=0.26 (Table 4).

There was no statistically significant association between underweight nutritional status and number of mother's children (p=0.43), mother living with child's father (p=0.37) and mother only wife of child's father which had a p=0.95 (Table 4).

Table 3: Determinants of underweight nutritional status.

Variable	Category	Under weight	Not underweight	Total	Odd's ratio	Chi square value	P value
Child's Sex	Male	64	108	172			
	Female	36	119	155	1.96	7.51	0.006
	Total	100	227	327			
Knowledge that vaccination against VPDs achieves good performance of child in school	Yes	83	210	293			
	No	8	4	12			
	Don't know	9	13	22	0.19	9.17	0.01
	Total	100	227	327			
Presence of Hair changes	Yes	12	8	20			
	No	88	219	307	3.7	8.69	0.003
	Total	100	227	327			
Presence of swelling of legs	Yes	8	4	12			
	No	92	223	315	4.8	7.64	0.006
	Total	100	227	327			
Presence of pallor of mucous membranes	Yes	8	4	12			
	No	92	223	315	4.8	7.64	0.006
	Total	100	227	327			

There was no statistically significant association between underweight nutritional status and types of feeding before the age of six months (p=0.46) and how often child feeds daily a p=0.14 (Table 4).

There was no statistically significant association between underweight nutritional status and knowledge of clinical features of malnutrition (stunting of growth (p=0.16),

fluffiness hair (p=0.39), abdominal protrusion (p=0.24) and soreness of angle of month a p=0.44 (Table 4).

There was no statistically significant association between underweight nutritional status and presence of clinical signs of malnutrition [swelling of cheeks (p=0.12) and protrusion of abdomen (p=0.09) and skin changes a p=0.28] (Table 4).

Table 4: Association between undernutrition and independent variables.

independent variables	Categories	Dependent variable	Chi squared value	P value
Socio demographic variables	Child's sex	Underweight	7.51	0.006
	Child's age	Underweight	0.77	0.86
	Mother's marital status	Underweight	5.83	0.12
	Mother's religion	Underweight	4.79	0.09
	Mother's educational status	Underweight	3.20	0.67
	Father's educational status	Underweight	1.70	0.79
	Mother's income	Underweight	2.72	0.61
	Father's income	Underweight	6.57	0.26
	Mother's age	Underweight	7.46	0.19
	Father's age	Underweight	7.77	0.35
	Mother's occupation	Underweight	3.20	0.67
	Father's occupation	Underweight	2.67	0.75
	Number of children	Underweight	3.82	0.43
	Mother live with husband	Underweight	0.81	0.37
	Mother only wife of husband	Underweight	0.004	0.95
Nutritional history	Feeding before the age of six months	Underweight	4.62	0.46
	How often does the child feed daily	Underweight	14.7	0.14
Knowledge of signs of effects of malnutrition	Stunting of growth	Underweight	3.69	0.16
	Fluffiness of the hair	Underweight	1.86	0.39
	Soreness of angle of month	Underweight	1.63	0.44
	Abdominal protrusion	Underweight	2.83	0.24
Presence of signs of malnutrition	Hair changes	Underweight	8.69	0.003
	Swelling of legs	Underweight	7.6	0.006
	Swelling of checks	Underweight	2.38	0.12
	Protrusion of abdomen	Underweight	2.72	0.09
	Skin changes	Underweight	1.19	0.28
	Pallor of mucous membranes	Underweight	7.64	0.006
Immunization status	All immunization doses up to date	Underweight	1.38	0.24
	Received the last vaccination	Underweight	0.92	0.34
	Received oral polio vaccine 3	Underweight	2.82	0.09
	Received pentavalent 3 vaccine	Underweight	2.82	0.09
	Received 2nd dose of measles vaccine	Underweight	3.19	0.07
Knowledge of importance of VPD vaccination to nutrition	Achieves adequate height for age	Underweight	4.20	0.122
	Achieves adequate weight for age	Underweight	2.72	0.26
	Achieves adequate food intake	Underweight	3.77	0.15
	Achieves good performance of child in school	Underweight	9.17	0.01

There was no statistically significant association between underweight nutritional status and child receiving all immunization doses up to date (p=0.24), child receiving last vaccination (p=0.34), child receiving oral polio vaccine-3 (p=0.09), child receiving pentavalent-3 vaccine (p=0.09), child receiving 2nd dose of measles vaccine a p=0.07 (Table 4).

Malnutrition and knowledge of importance of vaccination against VPDs to nutrition

There was no statistically significant association between underweight nutritional status and knowledge of importance of vaccination against VPDs (achieving adequate height for age (p=0.12), achieving adequate weight for age (p=0.26) and achieving adequate food intake a p=0.15 (Table 4).

DISCUSSION

The prevalence of underweight, overweight and normal weight for nutritional status was 30.6%, 2.1% and 67.3% respectively. This means there is high prevalence of moderate underweight (weight for age more than two standard deviations below the median of the reference population) among children under the age of five years in Ede North LGA.[6] This finding is surprisingly higher than the state averaged of 18.7% but lower than the national average of 31.5% reported in 2017.[4] This increase in prevalence of moderate underweight is likely to be as a

result of the worsening economic situation in the country. This result is similar to the finding in a study in Evbuotubu community, Egor local government area of Edo state which reported high prevalence of underweight of 36.1% and the study in Ile-Ife, Nigeria which reported prevalence of underweight of 14.1%.[8,9] However the findings from this study is in contrast to the study in Enugu, south east in Nigeria which reported low prevalence of underweight of 8.3% and a study in Benue state which reported the prevalence of underweight of 6.5%.[10,11] Another study in Edo state also reported low prevalence of underweight of 2.5%.[12] A study in Asia reported the prevalence of underweight of under-five children of 34.8% in India and 22.6% in Bangladesh.[13]

More males (19.6%) accounted for bulk of underweight under-five years children compared to 11% females. This aligns with the national pattern where males accounted for prevalence of underweight of 33.1% and females accounted for prevalence of underweight of 29%.[4] Also, this finding is similar to result of prevalence of 20.6% among boys and 15.4% among girls out of prevalence of 36.1% among underweight children under-five years.[8]

This study revealed statistically significant association between underweight nutritional status and child's sex (p=0.006) which deduces that child's sex is a determinant of underweight nutritional status. This is similar to the study where male children under-five years (3.2%) were more likely to be underweight compared to their female (2.2%) counterparts.[12]

In addition, this study revealed statistically significant association of underweight nutritional status and knowledge of importance of vaccination against vaccine preventable diseases to nutrition revealed statistically significant association (p=0.01). This infers that knowledge of importance of vaccination against vaccine preventable diseases on nutrition can help prevent development of malnutrition.

Statistically significant association was also detected between underweight nutritional status and presence of clinical signs of malnutrition (hair changes, p=0.003, swollen legs, p=0.006 and pallor of mucus membrane, p=0.006) which denotes that some clinical feature of malnutrition such as hair changes, swelling of legs and pallor of mucus membrane are more likely to be present in underweight children. This can help to detect presence of malnutrition and therefore quick intervention.

Our study showed no statistically significant associations between sociodemographic characteristics (p>0.05) (except for child's sex, p<0.05), family characteristics (p>0.05), nutritional history (p>0.05), knowledge of clinical features of malnutrition (p>0.05) and underweight nutritional status. Also, there was no statistically significant associations between presence of clinical signs of malnutrition (p>0.05) (except for presence of hair changes, skin changes and pallor of mucus membrane,

p<0.05). No statistically significant associations existed between knowledge of importance of vaccination against VPDs on nutrition (p>0.05) (except for knowledge that it achieves good performance for children in school, p<0.05). In addition, no statistically significant associations were discovered between underweight nutritional status and Immunization status (p>0.05)

These findings are in contrast to results of the study which observed that mother's level of education was a significant predictor (p=0.042 AOR: 2.3) for weight-for-age.[8] Also, children who skipped or reduced meals because of insufficient finances were four times (OR=4.177, 95% CI=1.96-8.96) more likely than the children who ate regularly to be underweight.[9] The prevalence of underweight under-five children among the poor in India was 39.3% and 28.4% in Bangladesh higher than among the non-poor with prevalence of 26.0% in India and 18.3% in Bangladesh.[13] Prevalence of underweight among under-five years children in families with size of 1 to 2 children were 32.3% in India and 27.6% in Bangladesh which are less compared to families with more than 2 children which had prevalence of 38.7% in India and 20.6% in Bangladesh.[13] Prevalence of underweight among under-five children whose parents are not working were 33.2% in India and 21.5% in Bangladesh were higher compared to professional which had prevalence of 18.5% in India and 13.6% in Bangladesh.[13]

Prevalence of underweight among under-five children of Hindu religion in India was 37.0% and 22.4% in Bangladesh compared to 33.8% in India and 22.6% in Bangladesh of Muslim religion.[13] Also, a study in Enugu reported statistically significant association between underweight and number of people in the household (p=0.027), cases of diarrhea (p=0.004), exclusive breast feeding (p=0.008), age of father (p<0.001) and average family income which had p<0.001.[10]

CONCLUSION

This study confirms high level of moderate undernutrition in Ede North LGA reflecting both acute (wasting) and chronic (stunting) undernutrition. Children who are mildly underweight have increased risk of mortality and the risk is even greater in severely underweight children.

Therefore, there is need to implement urgent nutritional intervention to reduce the high prevalence of malnutrition in Ede North LGA. Also, food security should be improved while level of inflation should also be reduced by the Government to enable mothers have access to food items. Health education should be also be intensified to educate mothers on the clinical signs of malnutrition so that they can detect malnutrition in time and mitigate its impacts. Also, mothers should be educated on the importance of vaccination against vaccine preventable diseases as it appears to protects against malnutrition.

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