



A Study of Malnutrition-dependent Factors among Under-five Children in Ekureku Community, Abi Local Government Area of Cross River State, Nigeria

Etim, Kimboline Donatus^{1*}, Ejemot-Nwadiaro, Regina Idu¹ and Kalu, Randymay Eja²

¹Department of Public Health, University of Calabar, Calabar, Nigeria.

²Federal Medical Center, Yenogoa, Bayelsa State, Nigeria.

Authors' contributions

This work was carried out in collaboration between all authors. Author EKD designed the study and wrote the first draft of the manuscript under the supervision of author ENRI who read, edited and arranged the field experiments. Author KRE managed the literature databases and statistical analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

Malnutrition is the consumption of dietary nutrients either insufficiently or exclusively, and several socio-economic, ignorance, and educational factors are known to determine nutritional status of any community. This study aimed at examining the nutritional status and malnutrition-dependent factors in Ekureku Community. With a cross-sectional design, 380 mother-child pair respondents were selected using systematic sampling technique. Nutritional anthropometry and questionnaire were used to gather data. Data collected were entered and analysed using Statistical Package for Social Sciences. Student t-test and Chi-square were used to test for inferential statistics at 5% level of significance. Results show that 108(28.4%) of under-five children were stunted, 47(12.3%) wasted and 107(28.1%) underweight. Malnutrition was observed to be significantly higher among females than male children ($P < 0.05$). Children aged >24 months were more stunted (22.4%),

*Corresponding author: E-mail: kim.etim@yahoo.com;
Communication E-mail: kingenyi@gmail.com;

wasted (9.5%) and underweight (22.1%) than children <24 months. Most respondents (54.2%) had poor knowledge of child nutrition, while 45.8% had a fair knowledge. Respondents (35.0%) breastfed their babies exclusively, while 63.0% introduced complementary feeding when their children were less than six months old. Factors such as poor maternal education, sex of child, unemployed women, knowledge of child nutrition and poor feeding practice were found to be associated with malnutrition among under-five children. These findings indicate that malnutrition is high among under-five children and may increase child morbidity and mortality in the community.

Keywords: Nutritional status; malnutrition; under-five children; knowledge of nutrition; Ekureku community.

1. INTRODUCTION

Malnutrition is the consumption of dietary nutrients either insufficiently or exclusively. Different forms of malnutrition exist which include micronutrient malnutrition, under-nutrition and over-nutrition [1]. Children who are malnourished often fail to thrive, are more likely to suffer from impaired physical and intellectual growth which make them less productive during adulthood [1]. Also, poor school performance, school absenteeism, reduced intellectual achievement, delayed cognitive development morbidity and mortality are common effects of malnutrition among under-five children [2].

In low and middle income countries (LMICs), an estimated 10 million children die from treatable and preventable illnesses annually [3]. Estimates suggest that one-third of childhood mortality is attributable to malnutrition, and Sub-Saharan African and Southern Asian Countries bear a disproportionate burden of malnutrition (90%) among under-five children [4,5]. Existence of poverty, especially in poor countries drives the proliferation of malnutrition in children [6].

In Sub-saharan Africa, high rates of child mortality can result from factors such as low calories intake, high rates of HIV/AIDS, political instability, poor implementation of government policies, conflicts among groups, etc. For instance, in countries such as Malawi, Burundi and Madagascar, about 50% of children are stunted as a result of poor dietary intake or poor consumption of vital nutrients [7]. In Nigeria, it has been reported that 50% of childhood mortality is caused by malnutrition out of an estimated 80% mortality and 90% morbidity rates in under-five children, arising from four principal causes which include acute respiratory infection, malaria, diarrhoea and vaccine preventable diseases [8]. Country specific evidence shows that Nigeria has been identified as one of the most affected countries by malnutrition [9].

Malnutrition largely accounts for 49% school absenteeism and affects over 42% of children of school age in Nigeria [10].

Several empirical studies have identified factors that affect under-five children's nutritional status. These factors include poverty, failure to breastfeed exclusively, maternal factors such as poor nutrition during pregnancy, lack of appropriate weight gain, illnesses like diarrhoea, acute respiratory infection, poor consumption of vitamin supplements or fortified foods, large family size, poor sanitation, lack of education and information about good or adequate nutrition and food insecurity and safety [2,11,5,12,13]. The cycle of undernutrition continues to perpetuate especially in situations where malnourished mothers give birth to underweight babies [14].

Ekureku is a community in Abi Local Government Area of Cross River State, Nigeria. The inhabitants are significantly poor, and this affects many aspects of their livelihood including the nutritional status of their children. Moreover, no research on nutrition has ever been carried out in Ekureku community. Therefore, this study aimed at determining factors affecting nutritional status among under-five children in Ekureku community.

2. MATERIALS AND METHODS

2.1 Study Design

A descriptive-cross-sectional study was employed to identify the factors of nutritional status of children under-five years in Ekureku community, Abi Local Government Area of Cross River State.

The study population comprised all children between 0-59 months of age, and the sample size was determined using the formula $n = \frac{Zq^2p_q}{d^2}$, where n is sample size, Z is 95%

confidence interval, d is acceptable margin of error and q is probability of under-five children who are stunted [15]. This gave a sample size of 301. However, to make room for non-response and attrition bias, the desired sample size was increased by 30% giving a sample size of 390 that was used for the study.

2.2 Sampling Procedure

Systematic random sampling technique was used to select every household with children under-five years within the study area. This process started near the market square which is the entrance of the community and continued until 390 households were duly selected to participate in the study.

In each household, caregivers/mothers resident in sampled households with under-five children were administered a set of questionnaires. In polygamous homes with many under-five children from different mothers, only one mother with an under-five child was recruited to partake in the study using lottery method.

2.3 Instruments for Data Collection

The instrument for data collection was a semi-structured questionnaire that was administered to respondents with both open and closed ended questions. The questionnaire comprised five sections with 37 items. Sections A, B and C covered mother, child and household characteristics respectively, while sections D and E covered mother's nutritional knowledge and health seeking behaviour and child feeding practices, respectively.

2.4 Nutritional Status Assessment Using Anthropometry

Nutritional anthropometry is a technique that measures the physical dimensions and gross composition of the human body as a way of assessing nutritional status. Several variables such as child's age, sex, height and weight are measured to carry out the anthropometric analysis. These measurements were used in generating indices such as height-for-age, an index of stunting or small stature for the age, a reflection of chronic or longstanding undernutrition; weight-for-age, index of underweight a composite of acute and chronic undernutrition and weight-for-height, index of wasting a reflection of acute undernutrition. The indices generated were compared with WHO

standard classification system of malnutrition to obtain the Z-scores values. The Z-scores values were determined for under-five children of ages 0-12, 13-24, 25-36, 37-48 and 49-59 months. The cut-off values of prevalence of these undernutrition indices considered to be of public health significance are $\geq 20\%$ for stunting, $\geq 10\%$ for underweight and $\geq 5\%$ for wasting [1].

In obtaining the nutritional anthropometric indices, the percent underweight, percent stunting and percent wasting, the proportion of number of children with weight-for-age, number of children with height-for-age and number of children with weight-for-height to total number of children weighed, were respectively calculated.

In measuring the height, children who were yet to walk, were asked to lie on a board placed on a stable surface, and the measurement was taken to the nearest 0.1 cm. For children who were above two years, the height was measured using a meter rule and reading was taken in centimeters. Also, in measuring the weight, children were asked to stand on the middle of the weighing scale's surface. When the child was settled and the reading was stable, measurements were taken to the nearest 0.1 kg. For toddlers and infants, a salter hanging scale was used to take the measurement.

2.5 Method of Data Analysis

The data were analysed using the Statistical Package for Social Sciences Software (SPSS 20.0 Version, 2012). Results were expressed as percentages and presented in tables, charts and graphs. Students t-test and chi-square were used to test for the hypothesis stated at 5% level of significance.

2.6 Ethical Consideration

Ethical approval was obtained from Cross River State Research Ethics Committee, Ministry of Health. Informed consent was duly sought and obtained from the respondents who took part in the study. The research participants were assured of the confidentiality of the information obtained.

3. RESULTS

Out of 390 questionnaires that were administered to the respondents, 380 questionnaires were received for analysis, giving a respondent rate of 97.4%.

Table 1. Distribution of respondents by age, religion, education and marital status (N =380)

Variables	Number of respondents	Percentage
Age (in years)		
15-18	8	2.1
19-24	21	5.5
25-29	130	34.2
30-34	109	28.7
35-39	53	13.9
40-44	41	10.8
45-49	18	4.7
Total	380	100
Religion		
Christianity	359	94.5
Muslims	0	0.0
Traditional religion	21	5.5
Total	380	100
Education		
No formal education	58	15.3
Primary education	108	28.4
Secondary education	145	38.2
Tertiary education	69	18.1
Total	380	100
Marital status		
Single	82	21.6
Married	283	74.5
Widowed	0	0.0
Separated	15	3.9
Divorced	0	0.0
Total	380	100

3.1 Socio-demographic Characteristics of Mothers/Caregivers

The distribution of respondents by age, religion, education and marital status is represented in Table 1 above. The table shows that Christians were 359(94.5%) constituting the majority of respondents, followed by traditionalists 21(5.5%). About 108(28.4%) respondents reported to have attended primary school, 145(38.2%) secondary education, 69(18.1%) tertiary education while 58(15.3%) had no formal education. A larger proportion of the respondents 283(74.5%) were married while 82(21.6%) were single.

Table 2 shows the distribution of respondents by their occupation, level of income and number of children delivered. One hundred and fourteen (30.0%) were business women or traders, 89(23.4%) farmers and 71(18.7%) civil servants. 170(44.7%) were low income earners per month ranging from (Nigerian currency; Naira - ₦); ₦5,000- ₦18,000, 79(20.8%) middle income

earners (₦18,000-50,000), while only 25(6.6%) were high income earners (>₦50,000). About 163(42.9%) reported to have had 1-3 times deliveries, 140(36.8%) 4-6 times deliveries and 77(20.3%) above 6 deliveries.

Table 2. Distribution of respondents by their occupation, level of income and number of children delivered (N = 380)

Variables	Number of respondents	Percentages
Occupation		
Farmer	89	23.4
Business/trader	114	30.0
Unemployed	61	16.1
Civil servant	71	18.7
Full time housewife	45	11.8
Total	380	100
*Income level per month		
Low	170	44.7
Moderate	79	20.8
High	25	6.6
No response	106	27.9
Total	380	100
Number of children		
1-3	163	42.9
4-5	140	36.8
>6	77	20.3
Total	380	100

*Low income level = Less than ₦ 20,000; Moderate income level = ₦ 20,000-₦ 50,000; High income level = Above ₦ 50,000.

Exchange rate: 1US Dollars equivalent to 165 Nigerian Naira (₦) as at October 2015

Socio-economic characteristics of respondents

The socio-economic characteristics of respondents is represented in Table 3. In 335(88.1%) households, fathers were reported to be the heads of house while 45(11.9%) mothers were heads in other houses. Monogamous homes 316(83.2%) out-numbered polygamous homes 64(16.8%). About 195(51.3%) had household size between 1-3, 152(40.0%) 4-6 and 33(8.7%) 7-10. The family type predominant in the study area was nuclear family 275(72.4%) whereas about 105(27.6%) respondents resided with their extended families. Most respondents utilized pit latrine while 39(10.3%) used water system/closet. Their sources of drinking water were mainly from the streams 259(68.2%), tap/pipe borne 76(20.0%) and dug well 45(11.8%). More than half of the respondents 292(76.8%) reported substantial availability of food, whereas 88(23.2%) reported inadequate availability of food due to high cost of food stuff and lack of money 29(32.9%).

Table 3. Socio-economic characteristics of respondents (N = 380)

Variables	Number of respondents	Percentages
Head of household		
Father	335	88.1
Mother	45	11.9
Total	380	100
Type of home		
Monogamous home	316	83.2
Polygamous home	64	16.8
Total	380	100
Household size		
1-3	195	51.3
4-6	152	40.0
7-10	33	8.7
Total	380	100
Type of family		
Nuclear	275	72.4
Extended	105	27.6
Total	380	100
Toilet facility		
Pit latrine	291	76.8
Water system/closet	89	23.2
Total	380	100
Sources of drinking water		
Stream	45	11.8
Dug well	76	20.0
Tap/pipe borne	380	100
Total	380	100
Food availability		
Enough food available	282	76.8
Food available not enough	88	23.2
Total	380	100
Reasons for food inadequacy		
High cost of food stuffs	51	58.0
Lack of enough money to buy more food stuffs	29	32.9
Scarcity of food stuffs	8	9.1
Total	88	100

3.2 Nutritional Status of Under-five Children by Age and Gender

The nutritional status of under-five children based on weight-for-age (underweight), height-for-age (stunting) and weight-for-height (wasting) is represented in Tables 4, 5 and 6. Table 4 shows that a majority of children 272(71.6%) had normal Z-score for stunting, whereas 92(24.2%) and 16(4.2%) were moderately and severely stunted respectively. Children aged 37-48 months were more stunted than children of other age groups and the difference was not statistically significant ($p > 0.05$). The female children 202(53.2%) were more stunted than the male children 178(46.8%) with a statistically significant difference ($p < 0.05$).

With respect to weight-for-height (wasting) (Table 5), most under-five children 333(87.6%) had normal Z-scores while the remaining 45(11.5%) and 2(0.5%) were moderately and severely malnourished respectively. Children aged 25-36 months were more wasted than children of other age groups. Female children 27(7.2%) were more wasted than males 20(5.3%). There was significant difference ($p < 0.05$) in the mean Z-score for both males and females.

Table 6 indicates that most (underweight) under-five children 273(71.8%) had normal Z-scores, while the remaining 91(23.9%) and 16(4.2%) were respectively moderately and severely malnourished. Children aged 37-48 months were more underweight than children of other age groups but this was not statistically significant difference. There was significant difference ($p < 0.05$) between the Z-scores of the sexes.

The prevalence of stunting, wasting and underweight among the 380 under-five children is presented as 108 (28.4%), 47(12.3%) and 107(28.1%) respectively (Fig. 1).

Table 4. Stunting (height-for-age) among under-five children by gender (N = 380)

	Male (%)	Female (%)	Total (%)
Normal	132 (34.7)	140 (36.8)	272 (71.6)
Moderate	40 (10.5)	52 (13.7)	92 (24.2)
Severe	6 (1.6)	10 (2.6)	16 (4.2)
Total	178 (46.8)	202 (53.2)	380 (100)

3.3 Factors Affecting Malnutrition among Under-five Children

These factors are presented in Table 7. The table shows that sex ($p < 0.05$) and age ($p < 0.05$) of child, poor mothers' knowledge of child nutrition ($p < 0.05$), large household size ($p < 0.05$) and low income level ($p < 0.05$) were found to be statistically significantly associated with malnutrition among under-five children. While, low maternal education ($p > 0.05$), women unemployment ($p > 0.05$) and poor child feeding pattern ($p > 0.05$) were not statistically significant associated with malnutrition.

Table 5. Wasting (weight-for-height) among under-five children by gender (N = 380)

	Male (%)	Female (%)	Total (%)
Normal	158 (41.6)	175(46.1)	333 (87.6)
Moderate	18 (4.7)	27 (7.1)	45 (11.8)
Severe	2 (0.5)	0 (0.0)	2 (0.5)
Total	178 (46.8)	202 (53.2)	380 (100)

Table 6. Underweight (weight-for-age) among under-five children by gender (N = 380)

	Male (%)	Female (%)	Total (%)
Normal	132 (34.7)	141 (37.1)	273 (71.8)
Moderate	39 (10.3)	52 (13.6)	91 (23.9)
Severe	7 (1.8)	9 (2.4)	16 (4.2)
Total	178 (46.8)	202 (53.2)	380 (100)

4. DISCUSSION

This study of the nutritional status of under-five children of Ekureku Community revealed that the prevalence of stunting, wasting and underweight in under-five children were 28.4%, 12.3% and 28.1% respectively; malnutrition was significantly higher among female children than males (p=0.000). This finding is comparable with other studies carried out within and outside Nigeria

[16,17,18]. The prevalence of stunting in this study is lower than 48.7% in India [17], 30.7% in Ethiopia [18] and 46% in Oyo [16]. However, the prevalence was higher than 14.2% reported in Kaduna, Nigeria [19]. The differences might be attributed to the method of anthropometric assessment, study design used, number of study participants and study setting (urban or rural). However, our results show that undernutrition was a significant public health problem since all the prevalence for the three indices were above the cut-off values [1]. The older children were more at risk of being stunted than younger children, as children within the age group of 37-48 months were more stunted than children of other age groups. This may be attributed to factors such as poor caring practices, chronic low dietary intake, exposure to infection such as diarrhoea and poor breastfeeding practices.

Table 7. Factors influencing nutritional status among under-five children (N = 380)

Variables	Prevalence (%)				Critical χ^2	χ^2 0.05	df	P-value
	Stunting (n=108)	Wasting (n=47)	Under weight (n=107)	Total (n=262)				
Age (in months)					8.9910	15.51	8	0.000*
≤24	23(6.1)	11(2.9)	23(6.1)	57(15.0)				
25-36	26(6.8)	14(3.7)	24(6.3)	64(16.8)				
37-48	32(8.4)	12(3.2)	31(8.2)	75(19.7)				
49-59	27(7.1)	10(2.6)	29(7.6)	66(17.4)				
Sex					11.09	5.99	2	0.000*
Male	46(12.1)	20(5.3)	46(12.1)	112(29.5)				
Female	62(16.3)	27(7.1)	61(16.1)	150(39.5)				
Maternal education					18.1172	12.59	6	0.433
No formal	19(5.0)	15(3.9)	17(4.5)	51(13.4)				
Primary	40(10.5)	12(3.2)	41(10.8)	93(24.5)				
Secondary	39(10.3)	12(3.2)	38(10.0)	89(23.4)				
Tertiary	10(2.6)	8(2.1)	11(2.9)	29(7.6)				
Knowledge of child Nutrition					24.0122	5.99	2	0.002*
Have knowledge	52(13.7)	19(5.0)	49(12.9)	120(31.6)				
Do not have adequate knowledge	56(14.7)	28(7.4)	58(15.3)	142(37.4)				
Occupation					11.14	5.99	2	0.368
Employed	33(3.7)	23(6.1)	31(8.2)	87(22.9)				
Unemployed	75(19.7)	24(6.3)	76(20.0)	175(46.1)				
Income level					15.7200	9.49	4	0.004*
Low	70(18.4)	29(7.6)	69(18.2)	168(44.2)				
Moderate	29(7.6)	15(3.9)	29(7.6)	73(19.2)				
High	9(2.4)	3(0.79)	9(2.4)	21(5.5)				
Household size					4.8462	9.49	4	0.000*
1-3	47(12.4)	21(3.5)	47(12.4)	116(30.5)				
4-6	49(12.9)	20(5.3)	49(12.9)	119(31.3)				
>6	12(3.2)	6(1.6)	11(2.9)	27(7.1)				
Child feeding pattern					9.8712	5.99	2	0.234
Correct feeding pattern	53(13.9)	12(3.2)	50(13.2)	115(30.3)				
Incorrect feeding pattern	55(14.5)	35(9.2)	57(15.0)	147(38.7)				

*P<0.05 = Statistically significant

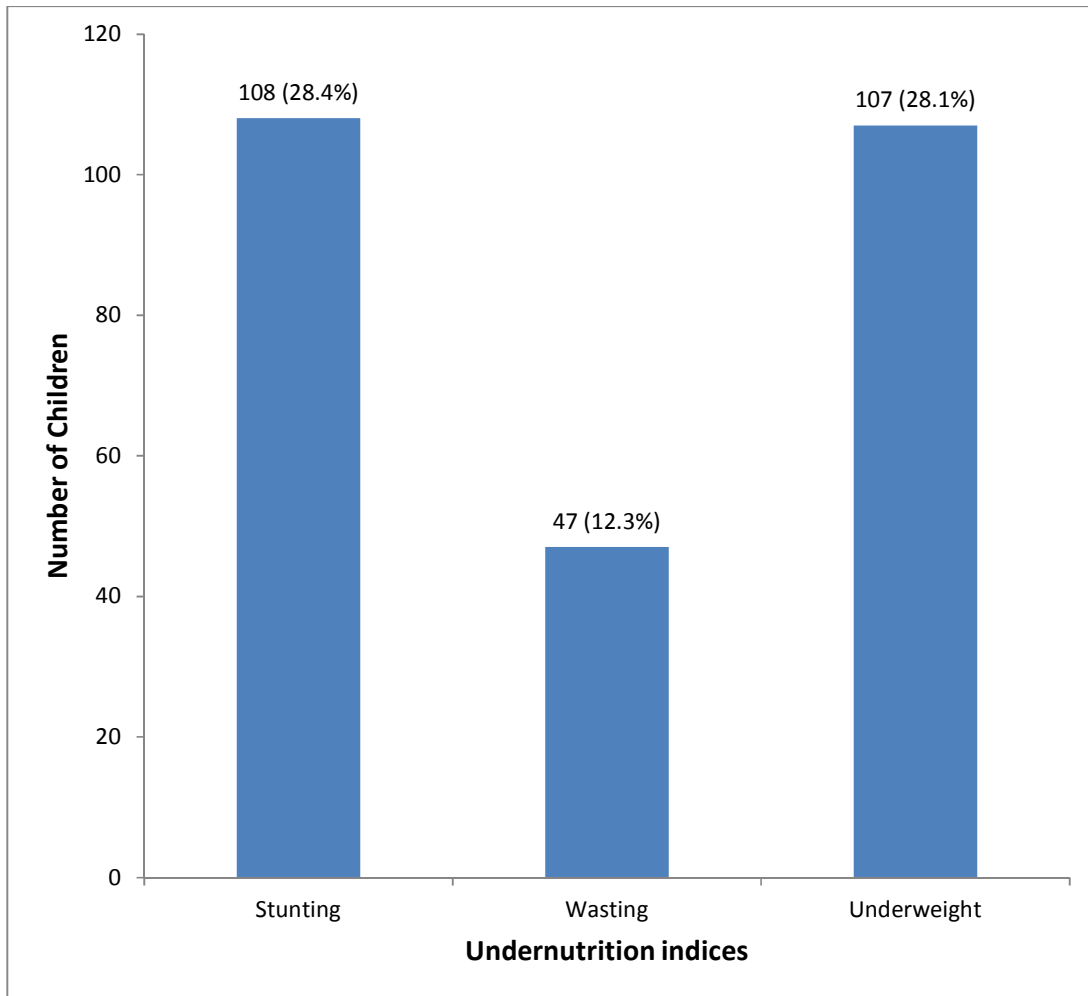


Fig. 1. Prevalence of malnutrition among children under-five years (N = 380)

This study shows that females (16.3%) were shorter than their male counterparts (12.1%) and the difference was statistically significant ($p < 0.05$) (Table 7). This report does not agree with an Indian study where girls were taller than boys [17]. The disparity could be attributed to gender bias, family set-up, diet pattern, parental preferences for male children [20,21] and could be genetic [22].

The prevalence of wasting in this study (12.3%) (Fig. 1) was higher than 3.7% reported in Northern Nigeria [23] and 5.5% in Botswana [24], but lower than 21% in Oyo, Nigeria [16], 14.8% in Ondo, Nigeria [25] and 19% in Sudan [26]. These differences could be associated with differences in extended periods of inadequate food intake, poor dietary quality, increased morbidity, household food insecurity, or a combination of these factors which were reported

by [27]. In this study, children within 25-36 months were more likely to be thinner than children of other age groups, indicating that older children have a higher risk of wasting than their younger counterparts. Female children (7.1%) appeared to be thinner than male children (5.3%). The gender differences in wasting was statistically significant ($p < 0.05$). This finding is at variance with that of Fetuga et al. [19] where boys were found to be thinner than girls.

In this study, the prevalence of underweight is higher than the ones reported in other works [24,2,23,25]. The difference in the prevalence of reported underweight may be attributed to the sample size, method of nutritional assessment and study design, study setting (urban and rural), dietary pattern, increase in morbidity and large family size. Weight-for-age appeared to increase progressively with age of which children aged 37-

48 months weighed more, and those within 0-12 months were heavier than other age groups. Male children (12.1%) were less underweight than their female counterparts (16.1%) and the difference was statistically significant ($p < 0.05$). This result contradicts the finding of Fetuga et al. [19]. The gender differences observed in underweight children could be attributed to state of health of children, exposure rate to infectious diseases, birth order, large family size, low food intake and lack of parental care.

Major factors affecting nutritional status were identified as sex of child, maternal education, knowledge of child nutrition, occupation, income level and child feeding practices. This study revealed that malnutrition was more prevalent among females than male children. Some other studies have proved otherwise [24,19]. In this study, however, the situation based on gender varies and may depend on child birth order, socio-economic status of parents, level of literacy and knowledge of good nutrition. In societies and cultures where male children are preferred to female children, nutrition plays a vital role in such gender disparity and consequently determines the growth of the child. Moreover, children from poorer homes tend to be susceptible to malnutrition than those from richer homes.

Maternal education also influences nutritional status among under-five children. It was observed in this study that children of mothers who had attained tertiary education were better nourished as compared to children whose mothers had low educational status (Table 7). This report was similar to that of Lawoyin et al. [27] where low parental education was associated with high risk of malnutrition. Most mothers with no formal education have been observed not to give colostrum and exclusive breastfeeding to their children [25], indicating that mothers with higher educational status tend to be more knowledgeable on the nutritional requirements of children at various stages of their growth.

Mothers' knowledge of child nutrition was identified as one of the factors determining malnutrition. This agrees with the studies of Nguyen and Nguyen [28] and Joshi et al. [29]. This indicates that effective dissemination of information on child nutrition will increase mothers' knowledge of the right kind of food to give their children at every stage of their growth and development.

Mothers' occupation was also identified as a risk factor associated with malnutrition in children. This agrees with other studies [28,29]. However, children whose mothers were gainfully employed were better nourished as well as fed than children whose mothers were unemployed, as observed in this study. Also, it was observed that children of high income earners appeared to be well-nourished than their counterparts (Table 7) as supported by [29,25]. Also identified as a determinant of nutritional status, was child feeding practice. Poor feeding practices increase children's susceptibility to malnutrition as reported by Ibrahim and Alshiek [26]. Mallik et al. [30] further report that children breastfed exclusively within their first six months of life tend to be better nourished than children who were not breastfed exclusively. Thus, children of mothers with lower socio-economic status have a higher risk of being malnourished than those whose mothers have higher socio-economic status. It is concluded that these factors, either synergistically or independently, can profoundly promote malnutrition in under-five children in Ekureku community.

5. CONCLUSION

Malnutrition is not a common factor in rural and some urban communities in developing countries where access to healthy and nutritious food is a problem. Coupled to this is the lack of adequate socioeconomic potentials that rural women have to cope with resulting in poor and undernourished homes and equally malnourished children under five years.

The world food programme addresses mostly war ravaged and famine struck areas of the world. There is a need however to extend the benefits of the programme to rural communities of developing economies to save starving children due to a general economic hardship afflicting mothers in these areas.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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