HOUSEHOLD FOOD SECURITY, DIETARY PATTERNS AND NUTRITIONAL STATUS OF YOUNG CHILDREN IN A NIGERIAN COMMUNITY: SITUATION OF POST-COVID-19 LOCKDOWN

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ABSTRACT

The emergence of the novel Coronavirus in late 2019 led to disruptions in the food, economic and health systems. There are projections that the pandemic will worsen hunger and malnutrition in families with young children and women of reproductive age in Low- and Middle-Income Countries (LMICs). Therefore, this study investigated household food security status, dietary patterns and nutritional status of children in a Nigerian community during the COVID-19 pandemic. A total sample of 200 mother-child pairs was selected from a Nigerian community using a multi-stage sampling technique. A semi-structured interviewer-administered questionnaire, which had four sections, was used for data collection. A food security survey questionnaire was used to assess household food security, and a food frequency questionnaire was used to capture child food patterns. Dietary diversity was assessed using 24-hour dietary recall, and nutritional status was measured using anthropometric parameters. Data were analysed using descriptive and inferential statistics. The level of significance was set at $p<0.05$. Almost half (48.5%) of the mothers were aged between 24 and 35 years, with a mean age of 31.63 $\pm$6.3 years. The majority of the children (69%) were between 24 and 60 months-old, with a mean age of 29.80 $\pm$15.48 months. Most participants (73.7%) were food insecure. Cereals, roots and tubers (79.5%), and sugar and junk (61.4 %) were the most frequently consumed food groups by children, while dairy products (15.8 %), vegetables (18.1%), and fruits (19.3 %) were the least frequently consumed. The majority had a low dietary diversity score (61.4%), and the prevalence of stunting, wasting and underweight was 41.3%, 27.2% and 3.3%, respectively. There was a statistically significant ($p=0.013$) relationship between maternal age and child dietary diversity. This study reveals that most households with mothers and children 6-59 months-old were food insecure. More than half of the children had low dietary diversity, and the consequences of poor diet quality are becoming evident as wasting and stunting are high. Therefore, an urgent public health intervention is needed to improve food security in vulnerable households.

Key words: Household food security, Dietary pattern, Nutritional Status, COVID-19

INTRODUCTION

The outbreak of the deadly Coronavirus in late 2019 led to the infection of millions of people worldwide [1]. Since the onset, the death toll globally is alarmingly high, claiming 4,265,903 lives as of 6th August 2021 [2]. As the pandemic began to grow at the initial phase, mandatory lockdowns with consequent closure of schools and non-essential businesses, and cancellation of out-of-home leisure-time activities and social gatherings forced children and parents to stay at home for a prolonged time [3]. It was a challenging time globally for both children and adults. Nevertheless, the impact of COVID-19 will differ from one country to another depending on epidemiological situations, levels of socio-economic development and health care systems, among others [4]. In Nigeria, before the pandemic, there existed a food demand-supply gap [5], a rise in unemployment and underemployment [6], and an increase in poverty level with an estimated 87 million people living on less than $1.90 a day [7]. This situation contributed to the widespread malnutrition in the country [8]. The ongoing pandemic will further disrupt the fragile food, economic and health systems, and worsen all forms of malnutrition [9].

Food security at the household level has become a challenge due to limited access to food as a result of the pandemic, which has forced most traders and farmers to stay indoors. The restrictive measures put in place to stop the virus's spread, while necessary, had an impact on everyone's feeding. They resulted in widespread hunger and malnutrition, particularly among communities' most vulnerable households [10]. Indeed, if urgent steps are not taken, the pandemic is expected to worsen hunger and malnutrition in families with young children and women of reproductive age for years to come [11, 12].

Unlike adults who can fend for themselves or at least manage to cope with the little available, children are dependent on adults for sustainability [13]. The lockdowns imposed in response to the COVID-19 pandemic affected children the most, as the recommended foods to boost their immune system were not readily available and accessible [14]. As a result, parents were forced to ration what was available to keep their children alive, rather than for nutritional value. A lack of nutritious food during a child's growing period harms their physical and mental well-being [15] and makes them more vulnerable to infectious diseases [16]. In addition, it leads to behavioural problems, poor academic performance and low intellectual outcomes once the children become school-age [17].

Before the pandemic, food materials were available and accessible compared to the imposed difficulties experienced in the year 2020 [18]. Several articles have been published on the impact of COVID-19 on the global and national economies and international trade. However, there is limited information about the impact of the pandemic on the food security of vulnerable households. Therefore, this study investigated household food security status, dietary patterns and nutritional status of children in Nigeria during the ongoing COVID-19 pandemic.

METHODOLOGY

Study design and setting

The study employed a descriptive cross-sectional design and was conducted in Emure town, Ekiti State, Nigeria. Ekiti State is one of Nigeria's 36 states. It is located in the country's south-western region. It has sixteen local government areas (LGAs). Emure is a large town and the administrative centre of the Emure LGA, which consists of districts and villages. It is located at GPS coordinates 7.43^0 North and 5.46^0 East and shares borders with the states of Osun and Ondo. It has a total population of 148,413 people, with a 4% annual population change, and 5,936 children under the age of five. The Yoruba are the LGA's dominant ethnic group, but other ethnic groups such as the Hausa and the Idoma are also present. The town is served by one secondary health facility, ten primary health centres, and four health posts, all of which provide a comprehensive range of health services. Farmers, traders, artisans, and civil servants make up the majority of the population.

Participants

The study participants were households with mother-child pairs living in Emure town, Ekiti State. All mothers with children between 6 and 59 months-old were eligible for the study. A sick mother or child was excluded from the study.

Sample size determination and sampling technique

The sample size was determined using formula for a single population proportion $[n = Z^2 p(1-p)/d^2]$, where n is the calculated minimum sample size, Z is 1.96 representing the standard normal deviation of α at a 95% confidence level, p is 12%, i.e. the proportion of Nigerian households that were food secure (as obtained from previous study; [20]) and d is 5% level of precision [19]. After estimating a non-response rate of 10%, the total sample size was rounded up to 200. The respondents were selected using a multi-stage sampling technique. In the first stage, out of the 16 LGAs in Ekiti State, Emure LGA was selected using the purposive sampling technique. This choice was due to the large size and the

affluent nature of the LGA. In the second stage, out of ten (10) wards, four (4) were selected using a simple random sampling technique. In the third stage, five (5) streets were selected from each ward by simple random sampling technique (balloting method). From each of the streets, eligible households were identified via house listing which served as the sampling frame. In the fourth stage, ten (10) eligible households were selected using a systematic random sampling technique. If a household had more than one under-five child, one was selected by a simple random sampling technique.

Data collection techniques and measurement of variables
A semi-structured interviewer-administered questionnaire was used for data collection. The questionnaire contained four main sections which assessed the respondent's socio-demographic characteristics, household food security status during the pandemic, child food pattern and dietary diversity. Household food security status was measured using the six-items food security scale [21]. Responses of "often" or "sometimes" are coded as affirmative or "Yes". Responses of "almost every month" and "some months but not every month" are also coded as "Yes". The answer "Yes" is assigned a score of 1, while a response of "Never true" or "No" is 0. The sum of affirmative answers to the six questions in the item is the household raw score. A household with a raw score of 0-1 is food secure, while one with a score ≥ 2 is food insecure.

Child food pattern was measured using food frequency questionnaire. Seven food groups, namely cereals, roots and tubers, legumes and nuts, vegetables, fruits, dairy products, meat and fish, and sugar or sweet were captured in the questionnaire. The frequency of consuming each food group in the past month was rated as every day, 5-6 times/day, 2-4 times/day, 1day/week, 1-3day/month and never. The results were presented in the form of frequencies and percentages.

The dietary diversity of the child, which is a proxy of nutrient adequacy, was assessed using 24-hour dietary recall. The mother provided information about the foods and drinks the child had taken 24 hours before the study, and they were classified based on food groups. A dietary diversity score for each child was calculated by summing the number of food groups consumed over 24 hours. A child with a score below the median score of 4 is classified as having a low dietary diversity and above the median score as having a high dietary diversity.

The weight of the child was measured using a Seca-880 digital floor weighing scale to the nearest 0.1 kg. The height or length of the child was measured with a

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standard measuring tape to the nearest 0.1 cm. In addition, tared weighing was performed to obtain the weights of some infants [22].

Data analysis

IBM's Statistical Product and Service Solutions (SPSS) version 25 was used to analyse the data. The results of univariate analysis were presented in the form of frequencies and percentages. The chi-square test was used to identify sociodemographic factors affecting children's dietary diversity, with a significance level of $p < 0.05$. The nutritional status of the subjects was determined using the WHO Anthro software. Stunting, wasting and underweight were defined as <-2 SD.

RESULTS AND DISCUSSION

The socio-demographic characteristics of respondents are shown in Table 1. The mean age (+SD) of mothers were 31.63 +6.3 years. A majority (84.8%) were married and living together with their spouse. The participants were predominantly of the Yoruba tribe (88.9%) and were Christians (79.5%). More than half (57.9%) of the participants had a family size of at most four, had secondary school education (42%) and were traders (41%). More than half (59.1%) receive less than 30,000 naira ($73) as monthly income. Table 1 also shows the parameters of the index child. The majority (69%) were between 24 and 60 months-old, with a mean age (+SD) of 29.80 +15.48 months. Most of the children were females (54.4%) and were between 1st and 3rd position among children in the family.

The sociodemographic data of the mothers agree with the national data where 70% of women aged 15 to 49 years are currently in a union and have an average household size of 4 [8]. The proportion of respondents with completed secondary school education is higher than the 23% reported at the national level [8]. Despite this educational achievement, the majority earn less than the agreed upon minimum wage to guarantee a decent living [23].
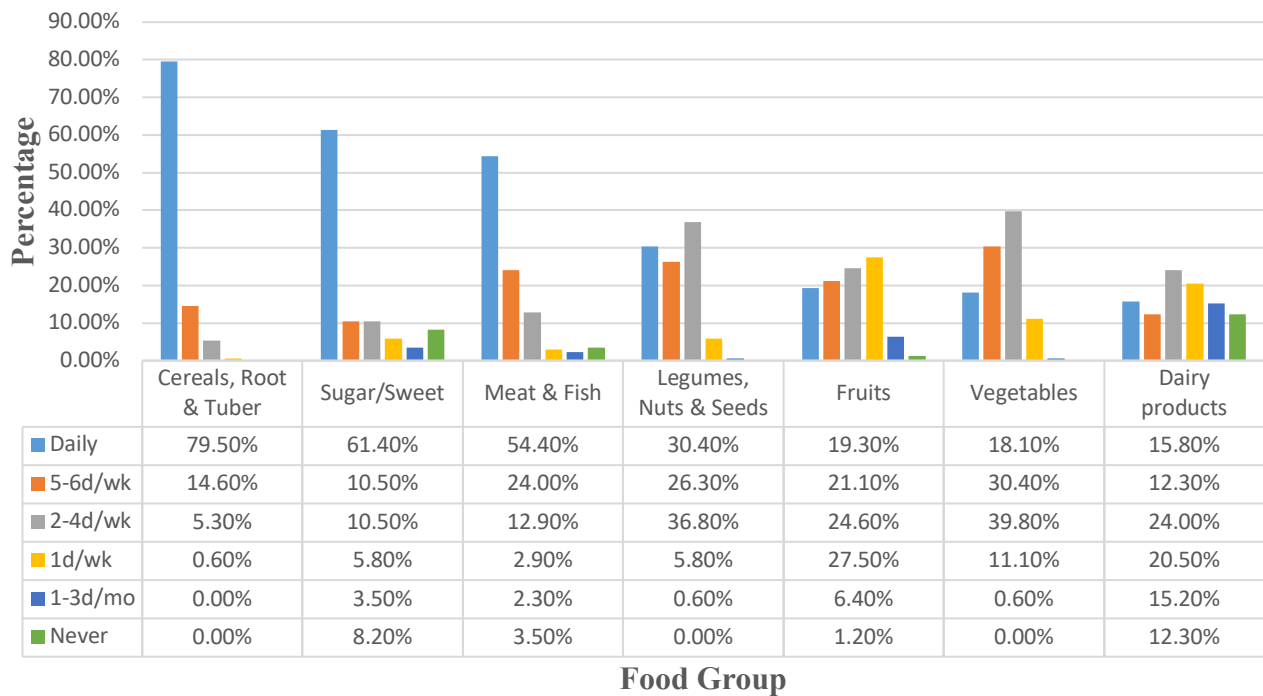
Table 2 shows the assessment of the food security status of households. The majority affirmed that the food they bought did not last (83.6%), they could not afford to eat a balanced diet (79.5%), ate less because money was not sufficient (77.7%) and were very hungry because there was not enough money for food (60.2%). The composite score of the food security status of the participants' households showed that most participants (73.7%) were food insecure.

A similar high prevalence of food insecurity was reported across the country during this pandemic [20]. In this study, the finding is much higher than what was reported

from studies conducted in Ekiti before the pandemic: 68.3% by Toluwalase *et al.* [24] and 64.7% by Oladeji [25]. This finding justifies the concerns that the WHO had on the potential impact of COVID-19 on the food and nutrition situation of the vulnerable groups, especially in developing countries [26]. Household food insecurity (HFI) is associated with several public health problems in the case of children. Studies have shown that HFI can lead to a family crisis [27], impact a caregiver's mental health [28] and increase chronic under-nutrition and susceptibility to infection as a result of poor feeding practices [16]. The pandemic, no doubt, has contributed to the high level of food insecurity among the studied population. It provides a warning sign to ensure all practical measures to strengthen the food production and supply chain are in place in every state for future occurrences.

Figure 1 shows the dietary pattern of the children during COVID-19 pandemic. Food groups that were most consumed daily were cereals, roots and tubers (79.5%), sugar and junks (61.4%) and meat and meat products (54.4%). The least consumed food groups daily were dairy products (15.8%), vegetables (18.1%) and fruits (19.3%). Only 28% of the children consume fruits once per week, and the dairy group was never consumed by 12.3%. A similar study conducted among households revealed an increase in the intake of high-calorie snack food, sweets and less healthy foods in the family during the COVID-19 era [29]. The similarity in findings could be due to the measures taken to curtail the spread of the virus, such as the stay-at-home orders, social restrictions and closure of businesses, which prevented people from assessing some healthy foods. Previous studies in Nigeria showed that most households consume cereals, roots and tubers and snacks often [30], but low quantities of dairy products and animal food sources [31], probably due to the high costs of these foods [32].

| Food Group	Cereals, Root & Tuber	Sugar/Sweet	Meat & Fish	Legumes, Nuts & Seeds	Fruits	Vegetables	Dairy products
Daily	79.50%	61.40%	54.40%	30.40%	19.30%	18.10%	15.80%
5-6d/wk	14.60%	10.50%	24.00%	26.30%	21.10%	30.40%	12.30%
2-4d/wk	5.30%	10.50%	12.90%	36.80%	24.60%	39.80%	24.00%
1d/wk	0.60%	5.80%	2.90%	5.80%	27.50%	11.10%	20.50%
1-3d/mo	0.00%	3.50%	2.30%	0.60%	6.40%	0.60%	15.20%
Never	0.00%	8.20%	3.50%	0.00%	1.20%	0.00%	12.30%

Wk (week), d (day), mo (months)

Figure 1: Dietary Pattern of Children

The dietary diversity of the children 24 hours before the study is shown in Figure 2. The findings show that the majority had a low dietary diversity score (61.4%). Although WHO recommended fresh and unprocessed foods such as fruits, vegetables, legumes, whole grains, and foods from animal sources for children to help boost their immunity against COVID-19 infection [14], this study showed that more than six out of ten children receive less than four food groups. This low dietary diversity is associated with household food insecurity, which was high among the households. Other studies conducted during this pandemic have also confirmed the interruptions in healthy nutrition and other essential services due to the pandemic [33]. It is a fact that this pandemic limited access to safe, affordable and nutritious foods globally. However, in Nigeria, the situation is compounded by a high level of insecurity and terrorism before the pandemic [34]. Previous national surveys showed low dietary diversity among young children 6 to 23 months-old [8,35]. This low dietary diversity implies that more children will consume low-quality diets, thereby increasing malnutrition.
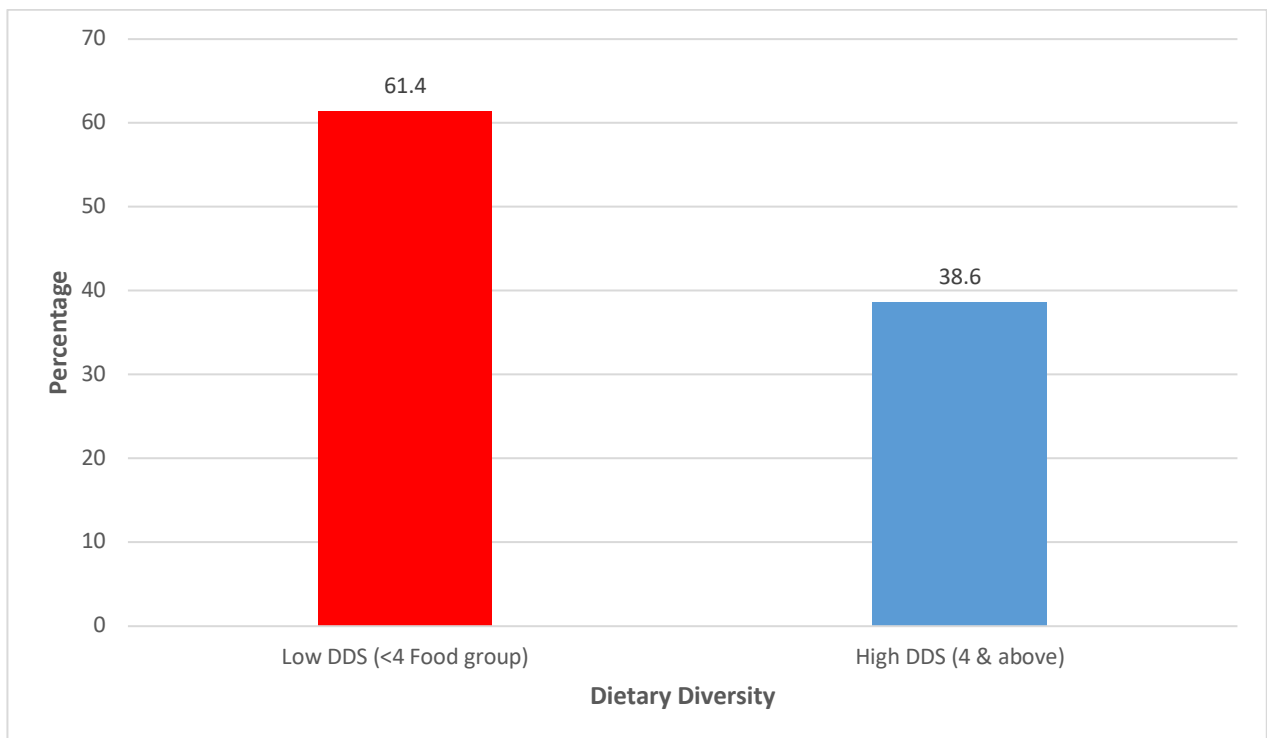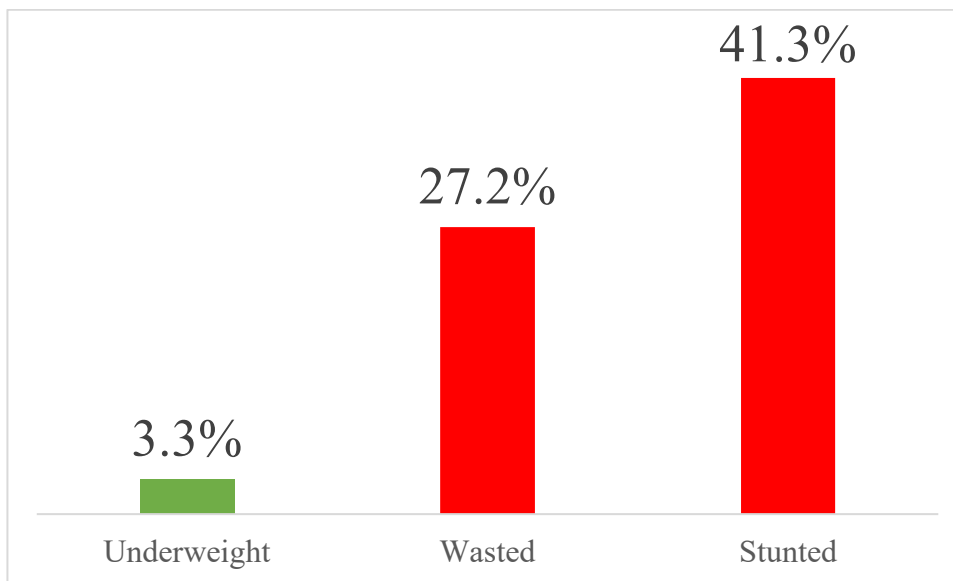
Figure 2: Dietary Diversity of Children

The current nutritional status of the children is shown in Figure 3. The prevalence of stunting, wasting, and underweight was 41.3%, 27.2%, and 3.3%, respectively. Previous national surveys in Nigeria showed that the rates of wasting and stunting ere high [8, 35], but the values obtained in this study were higher than the national average. In this study, the prevalence of wasting and stunting was far higher than for the State in the previous survey [35]. There was an earlier projection that due to the COVID-19 impact, wasting is likely to rise by 14.3% globally [33]. The bulk of this increase, about 80%, was expected to occur in sub-Saharan African and South Asian countries during the first 12 months of the pandemic [36]. Long before the outbreak of COVID-19, these regions were contending multiple issues such as poverty, poor infrastructural development, insecurity, political instability and weak health systems [37–39]. Aside from acute malnutrition, stunting has been projected to increase due to the pandemic [36]. Therefore, public health interventions are needed to address the high prevalence of stunting and wasting observed in young children in the studied population.

Figure 3: Nutritional Status of Children

Among all factors considered, only maternal age was found to be statistically significant for the dietary diversity of the children (p=0.013; Table 3). It was observed that a higher proportion of mothers aged 35 years and above had a higher level of education (p=0.025), earned more income (p=0.037) and had more children with high dietary diversity scores (p=0.002). Studies have shown that mothers' education, working status, residence, and household wealth index were significantly associated with children dietary diversity [40,41]. Therefore, interventions focusing on improving the diet quality of children should also target these maternal factors.

This study had some limitations. First, it was a descriptive cross-sectional study and did not show a cause-effect relationship. Second, the study sample was obtained from one LGA in Ekiti State and it may not be representing the whole State. Lastly, the responses were self-reported and may be subjected to a recall bias. However, the strength of this research is that it exposes how the ongoing pandemic has deteriorated household food security and worsened the dietary diversity of children in a community. Also, it was the first study done among households of mother-child pairs to show the influence of the COVID-19 pandemic.

CONCLUSION

This study revealed a high prevalence of food insecurity in households with mothers and 6 to 59 months-old children in the studied population. Dietary diversity, which is a measure of diet quality, was low in children during this pandemic. The consequences of poor diet quality are evident as wasting and

stunting are high. Although mothers' age was the key factor associated with the dietary diversity of children, improvement in mothers' socio-economic status and education would help address the low dietary diversification among children. Addressing this rising level of poor nutrition status in children requires a multi-dimensional approach. Governments must address the burning issue of insecurity of lives and property and improve investment in maternal and child nutrition. Independent donors, private sectors and non-governmental organizations should support the government in improving access to nutritious, safe and affordable foods for the vulnerable. The media need to amplify the messages on appropriate infant and young child feeding practices and the consequences of malnutrition in children. Families need to be enlightened on simple activities such as home gardening and the use of edible insects in child feeding, and to be cautious of large family sizes in the face of the current economic downturn.

Conflict of interest
The authors declared that they have no conflict of interest.

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Authorship
MDO, AAA, AOT, OJF, and BKA made substantial contributions to the conception, design and implementation of the study. All authors were involved in data collection, cleaning, analysis and interpretation. All authors read and approved the final manuscript.

Ethical consideration
The Health Research Ethics Committee, Institute of Public Health, Obafemi Awolowo University, reviewed and approved the protocol for the study. Permission to carry out the study was obtained from Emure LGA. Informed consent was obtained from the mothers before data collection, and they were assured of the confidentiality of the information they provided. Codes were used on the research instruments instead of names to protect the participants' identities.

Table 1: Socio-Demographic Characteristics of Respondents (N=171)

Variables	Frequency	Percentage
Mothers Age (yrs.)		
15-24	22	12.9
25-34	83	48.5
35-44	66	38.6
Mean (SD)	31.63 $\pm$ 6.324	
Marital Status		
Married & separated	26	15.2
Married & living together	145	84.8
Family Setting		
Monogamy	145	84.8
Polygamy	26	15.2
Ethnicity		
Yoruba	152	88.9
Igbo	9	5.3
Hausa	10	5.8
Religion		
Christianity	136	79.5
Islam	34	19.9
Traditional	1	0.6
Family Size		
≤ 4	99	57.9
>4	72	42.1
Mean (SD)	4.29 $\pm$ 1.076	
Mother's Education		
No formal	9	5.3
Primary	22	12.9
Secondary	71	41.5
Tertiary	69	40.4
Occupation		

None	10	5.8
Farming	15	8.8
Artisan	37	21.6
Civil Servant	39	22.8
Trading/ Business	70	41.0
Monthly Income		
<₦30000	101	59.1
>₦30000	70	40.9
Age of child (Months)		
<24	53	31.0
≥24	118	69.0
Mean (SD)	29. 80 ± 15.48	
Sex (Child)		
Male	78	45.6
Female	93	54.4
Birth order		
≤3	144	87.3
>3	21	12.7
Mean (SD)	2.20 ± 1.03	

Table 2: Assessment of Food Security Status of Households

Food security Questions	Often True/ Sometimes True n(%)	Never True n (%)
In the last 12 months, the food that I bought just didn't last, and I didn't have money to get more.	143 (83.6)	28 (16.4)
In the last 12 months, I couldn't afford to eat balanced meals	136 (79.5)	35 (20.5)
	Yes n(%)	No n (%)
Did you (or anyone in the family) skip meals because there wasn't enough money for food?	49 (28.7)	122 (71.3)
	Almost every month/ Some months but not every month	Only 1 or 2 months
If Yes to Q3, how often did this happen?	49 (28.7)	122 (71.3)
	Yes n(%)	No n(%)
In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	133 (77.7)	38 (22.2)
In the last 12 months, were you very hungry but didn't eat because there wasn't enough money for food?	103 (60.2)	68 (39.8)
Food secure	45 (26.3)	126 (73.7)

Table 3: Factors associated with dietary diversity of children

Variables	Dietary Diversity		Statistical Test χ^2	p-value
	Low n (%)	High n (%)		
Mothers Age (yrs.)				
15-24	16 (76.2)	5 (23.8)	8.628	0.013**
25-34	54 (67.5)	26 (32.5)		
35-44	28 (46.7)	32 (53.3)		
Marital Status				
Married & separated	16 (64.0)	9 (36.0)	0.122	0.727
Married & living together	82 (60.3)	54 (39.7)		
Family Setting				
Monogamy	82 (59.9)	55 (40.1)	0.398	0.528
Polygamy	16 (66.7)	8 (33.3)		
Family Size				
≤4	62 (66.0)	32 (34.0)	2.455	0.117
>4	36 (53.7)	31 (46.3)		
Mother's Education				
No formal	5 (55.6)	4 (44.4)	2.687	0.452
Primary	13 (61.9)	8 (38.1)		
Secondary	46 (67.6)	22 (32.4)		
Tertiary	34 (54.0)	29 (46.0)		
Monthly Income				
<₦30000	63 (63.6)	36 (36.4)	0.826	0.363
>₦30000	35 (56.5)	27 (43.5)		
Sex (Child)				
Male	45 (60.0)	30 (40.0)	0.045	0.833
Female	53 (61.6)	33 (38.4)		
Birth order				
≤3	83 (61.0)	53 (39.0)	0.115	0.735
>3	12 (57.1)	9 (42.9)		

** Significant

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