

## Dietary Pattern and Prevalence of Malnutrition among Lactating Mothers and their Under-five Children Attending Primary Health Centres in Owo, Ondo State

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### Abstract

**Background:** The lactation period is crucial in developing countries due to its positive impact on infant health and nutrition.

**Objective:** This study assessed the dietary patterns and malnutrition among lactating mothers and their under-five children attending primary health centres in Owo, Ondo State.

**Method:** A simple random sampling method was used to select 250 healthy lactating mothers with infants aged 0-59 months. Information on socio-demographic variables, health-seeking behaviours, food consumption patterns, and nutritional status was obtained using a well-structured questionnaire. Data were analyzed using SPSS, version 25. The chi-square test determined associations between variables, with significance considered at  $p < 0.05$ .

**Result:** The study revealed that 68.4% of the mothers were aged 20-29, 94.4% were married, and 48.0% had household sizes of 1-3. About 97.6% of the mothers had babies of normal birth weight, while 54.0% received health services at the health centres. Approximately 89% of the mothers did not consume alcohol, and 55.2% ate cereal or cereal products daily. The Food Consumption Score (FCS) showed that 53.6% had an acceptable score, while 8.4% had a poor score. For the Dietary Diversity Score (DDS), 73.6% had a highly diverse diet, while 19.6% had low dietary diversity. The prevalence of obesity among the mothers was 31.2% based on BMI, 38.8% based on waist circumference, and 68.0% based on waist-hip ratio. Among the children, 17.4% of males and 11.1% of females were underweight, while 72.0% had a normal weight for their age. Only 14% were overweight, and stunting was observed in 16% of the children, more prevalent among males. Wasting was seen in 10.0% of the under-five children.

**Conclusion:** There was a high prevalence of a double burden of malnutrition among the mothers and their children.

**Keywords:** *stunting, wasting, lactating mothers, underweight, obesity*

### Introduction

The quantity and absorption of particular nutrients from foods to support bodily maintenance, growth, and physiological condition (for example, lactation) are often considered aspects of diet quality. The variety (diversity) of diets, which are primarily made up of plant-based foods and may be weak in essential nutrients like proteins, vitamin A, iron, and zinc (1).

Nutrient intake is the main determinant of nutritional status, and inadequate nutrition is related to several chronic diseases that greatly impact morbidity, mortality, and quality of life (2). Nutritional status is an indication of the overall well-being of a population (3). It has been reported that lactation has different effects on maternal nutritional status depending on its duration, intensity, and diet quality (4). Maternal malnutrition is a global problem and is still an unattended health problem in developing countries where maternal mortality, low birth weight, and childhood stunting are the major health problems (5, 6).

Food insecurity is a recurring issue in Nigeria, and Nigeria still has a high frequency of socially deprived and food insecure households despite being gifted with a variety of natural and human resources (7, 8). Lack of food or insufficient access to food can have a variety of effects, including a disruption in eating habits, which in turn lowers diet quality and jeopardises long-term access to essential nutrition and wellbeing (9).

The ability of a woman to make enough high-quality milk to sustain an infant's growth is resilient and typically unaffected by her consumption of nutrients. However, the nutritional status and body composition of nursing mothers are typically impacted by milk production, and lactating mothers have higher dietary needs (9). According to FAO, WFP, and UNICEF, 815 million people suffered from hunger in 2016, a 38 million increase compared to the previous years, and about 155 million children had stunted growth due to poor nutrition (10).

Women are responsible for generating food security for their family members in developing countries (11). A review of reports on women in sub-Saharan Africa revealed that their role in both subsistence food production and food preparation may give them more control over their own and their children's dietary consumption than in some other regions of the world; however, this comes at the cost of extremely long and energy-demanding work days (10). The poor nutritional status of Nigerian women and their relationship to tradition, customs, and various cultural practices affect their health in many ways (11).

Under the patrilineal nature of Nigerian society, the major role of women is the maintenance of their households (12). Severely malnourished mothers have reduced lactation performance, contributing to the increased risk of child mortality (13).

Good care practices and access to sufficient basic health services at national and household levels have been recognised as conditions for lowering under-five mortality (8). Due to their susceptibility to dietary and environmental changes, under-five children's nutritional status at the household level has been widely utilised to assess population health. Additionally, it has been determined that access to adequate basic health services, good care practices, and national and household food security are necessary conditions for lowering under-five mortality (13).

The nutritional status of a well-fed child is reflected in the positive growth in height and weight. Inadequate consumption of food and nutrients, among other factors, results in malnutrition, which has a deleterious impact on the physical growth and development of the child. Nutritional status indicators for children include height-for-age, weight-for-age, and mid-upper-arm circumference. Underweight is characterised by a weight-for-age Z score of below minus two standard deviations (-2 SD), and severely underweight is characterised by a weight-for-age Z score of less than minus three standard deviations (-3 SD) (14).

There is a paucity of research assessing the food consumption score and nutritional status of lactating mothers and the impact on the nutritional status of their under-five children. Furthermore, limited research has examined the impact of maternal diet quality during lactation in Ondo State, which may provide different insights into growth trajectories and chronic disease risk. Therefore, the purpose of the present study is to evaluate the dietary pattern and prevalence of malnutrition among lactating mothers and their under-five children attending primary health centres in Owo, Ondo State.

## **Methodology**

### **Study Design**

The study was a descriptive cross-sectional study in design

### **Study area**

The study was carried out in Owo local government area of Ondo State, south west Nigeria between December, 2020- February, 2023 within Owo metropolis. When Ondo State was established in 1976 from the ancient western state, Owo is one of the first local governments to be established. Located roughly between latitudes 7° 11' and 7° 18' 31" and longitudes 5° 35' and 5° 58' 31" East of the Greenwich meridian is the city of Owo and its location. It is located at the southern edge of the Yoruba Hills (1,130 feet (344 meters) above sea level), and at the junction of the roads leading to Akure, Kabba, and Benin City (15). The local government has a total population of 218,886, of whom 108,457 are women and 110,429 men, according to the National Population Commission (16). But recently adjudged to have a population of more than 500,000 thousand inhabitants and while farmers and traders predominate in rural areas civil servants make up the majority of the population in the local government headquarters. Christianity and Islam are the two main religions practiced by the people of Owo. The Federal Medical Centre, Achievers University, Rufus Giwa Polytechnic, Owo, formerly Ondo State Polytechnic, and a host of other financial institutions are located within the Local Government.

### **Study Population/sampling technique**

A simple random sampling method was used in the selection of four (04) primary care centres within Owo metropolis. Seventy-five (75) lactating mothers with at least one under-five child were purposively selected for the study from each of the randomly selected primary health care centres making a total of two-hundred and fifty lactating mothers who were apparently healthy and their children.

### **Inclusion criteria and Exclusion criteria**

Inclusion criteria include women of child bearing age (15-49 years) having children (0-59 months) and were not pregnant at the time of data collection and had been living within Owo metropolis for the past 12 months while women who were sick and under-five children who were ill were excluded from the study

### **Data Collection**

#### **Questionnaire**

Data for this study was collected between December to February, 2023. A validated questionnaire was used to elicit information from mothers who at least have one under-five child. The mothers completed an interviewer administered structured, and pretested questionnaire on socio-demographic and socio-economic characteristics of mothers, health seeking behavior, dietary diversity and food consumption score and food frequency questionnaire.

### Food Consumption Score

Participants were asked to recall the food consumed in the previous seven days. Each food items were given a score of 0 to 7, depending on the number of days it was consumed.

| Food group                     | Weight (A) | Days eaten in past 7 days (b) | Score =A*B |
|--------------------------------|------------|-------------------------------|------------|
| Cereals, tubers and root crops | 2          | 7                             | 14         |
| Pulses                         | 3          | 1                             | 3          |
| Vegetables                     | 1          | 2                             | 2          |
| Fruits                         | 1          | 0                             | 0          |
| Meats and fish                 | 4          | 0                             | 0          |
| Milk and milk products         | 4          | 1                             | 4          |
| Sugar and fruits drink         | 0.5        | 4                             | 2          |
| Oils, fats and butter          | 0.5        | 2                             | 1          |
| Composite score                |            |                               | 26         |

### Food Consumption Score Analysis

Food items are grouped according to food groups and the frequencies of all the food items surveyed in each food group are summed. Any summed food group frequency value over 7 is recorded as 7. Each food group is assigned as weight, reflecting its nutrient density for each participant street food consumption score was calculated by multiplying each food group frequency by each food group weight, and then the summing the score into one composite score. Scores less than 28 was regarded as poor food consumption while scores within 28 to 42 was regarded as borderline food consumption score and scores greater than > 42 were considered as acceptable food consumption score in line with the method described by Lloyd, & Gage-Brandon (12).

### Dietary diversity score

Minimum dietary diversity for women questionnaire was adapted and used to obtain data on dietary diversity. Minimum dietary diversity for women (MDD-W) was calculated as the sum of the number of different food groups consumed by the mothers in the 24 hours prior to the survey. Foods were categorized into 12 groups based on FAO recommendations (17), food consumed were incorporated into each food group. The response categories were “Yes” if at least two food items in a group were consumed and was scored one point while in case where a food item was not consumed in a group, zero (0) point was given representing “No”. Dietary diversity was obtained by summing the number of food and food items consumed in each group separately. The total score was calculated and this ranged from 0-12.

Terciles of DDS was used to classify into low ( $\leq 4$ ), medium (5-8) and high (9-12). These cutoffs were used due to lack of national and international guidelines on which to base cut-offs (18).

### Food consumption pattern

Habitual food intake was derived using a 7-day food frequency questionnaire (FFQ) of selected foods from different food groups. The food frequency questionnaire (FFQ) comprised of a list of commonly consumed foods in the locale. The pattern of food consumption was computed based on meal frequency for each day in a week. Food frequency was established to regular if taken more than four times a week (19)

### Anthropometric measurements of the under five children

Height, length and weight for each child were determined using standard techniques. Heights of the children were measured by a Stadiometer (a light portable wooden board with a graduated tape measure), length was measured with infantometer while, a SECA electronic scale was used to record weight of the children (20).

### Weight and Height measurement

The weight of the subjects was measured using a portable bathroom scale (HANSON model), to the nearest 0.1kg with the subjects standing upright on the scale barefooted at shoulder level, arms by the side and the head straight in line with using standard methods (21, 22). The height of the participants was measured by Stadiometer with the subject standing erect and barefoot on the height meter with back to the height meter and looking straight in a Frankfurt position. The height was taken and recorded to the nearest 0.1cm (21, 22).

### Waist and Hip circumference

Waist circumference measurement was taken using in line with the WHO protocol using a non-stretch tape measure (Butterfly, China) the tape rule was placed at the midway between the lower rib margin and iliac crest. Measurements were taken and recorded to the nearest 0.1cm (23). Hip Circumference measurement was taken by placing the tape horizontal plane around the hip at the point of the greatest circumference with the measurement taken to the nearest 0.1cm (23).

### Data analysis for mothers

Truncal obesity was determined with Waist –Hip- Ratio (WHR) and waist circumference (WC). Waist –Hip- Ratio (WHR) was calculated by dividing the waist circumference by the hip circumference. WHR >0.85 for females was considered as abnormal while lesser values were regarded as normal (23). Abnormal WC was defined as >88 cm for females while lesser values will be normal (23). Body mass index was calculated using the formula  $BMI (kg/m^2) = \frac{weight (kg)}{height (m^2)}$  (22). Body Mass Index was classified as underweight BMI (<18.5), Normal within (>18.5  $\leq$ 24.99), Overweight (>25 $\leq$

29.99) and Obesity BMI ( $>30\text{kg/m}^2$ ) (22). Normal Waist-Height ratio(WHtR) was defined as  $<5$  for females while the abnormal WHtR was defined as  $\geq 0.5$  (22; 23)

#### **Data analysis for children**

Anthropometric measurements were converted to sex specific Z-scores using WHO Anthro Plus Software. The three indicators assessed were weight-for-age, height-for-age and weight-for-height Z -scores for all the children. Children with weight-for-age, height-for-age and weight-for-height between  $-2\text{SD}$  to  $+2\text{SD}$  was classified as normal, those with greater than  $+2\text{SD}$  were regarded as overweight, tall and obese, while Z-scores between  $-3\text{SD}$  to  $-2\text{SD}$  was classified as underweight, stunted and wasted, respectively (23, 24).

#### **Statistical Analysis**

The questionnaire was collected, Collated and coded on Microsoft Excel spreadsheet; the coded data was then be analyzed using Statistical Package for Social Sciences (Version 25). Descriptive statistics such as frequencies, percentages, mean and standard deviation was used to analyze socio-demographic characteristics and all anthropometric data. The World Health Organization Anthro software (version 3.2.2, 2007), was used to convert the anthropometric data into Z-scores for HAZ,

WHZ, and WAZ indices. Chi-square and correlation were employed to determine the relationship. Level of significance was considered at  $p < 0.05$ .

#### **Results**

##### **Socio-demographic characteristics of the lactating mothers**

Table 1 shows the socio-demographic characteristics of the lactating mothers. Result shows that more than half (68.4%) of respondents were between the ages of 20 - 29 years while only few (1.6.0%) were between the ages of 40-49 years. Majority of the respondents (94.4%) were married while very few (4.0%) were separated. Large proportion (74.8%) of the respondents were Christians, 24.8% were Muslims while only 0.4% were traditional worshippers. The result also shows that about (50.8%) lived in personal house while 48.8% rented an apartment. Majority (75.2%) were Yoruba. Household size shows that 48.0% were 1-3 while 8.4% were above 7. More than half (68.4%) had secondary education while 21.6% had tertiary education. In terms of employment status, 9.6% and 33.6% were predominantly civil servants and artisan, respectively. Nearly all the children (96.4%) had a normal weight status when they were delivered.

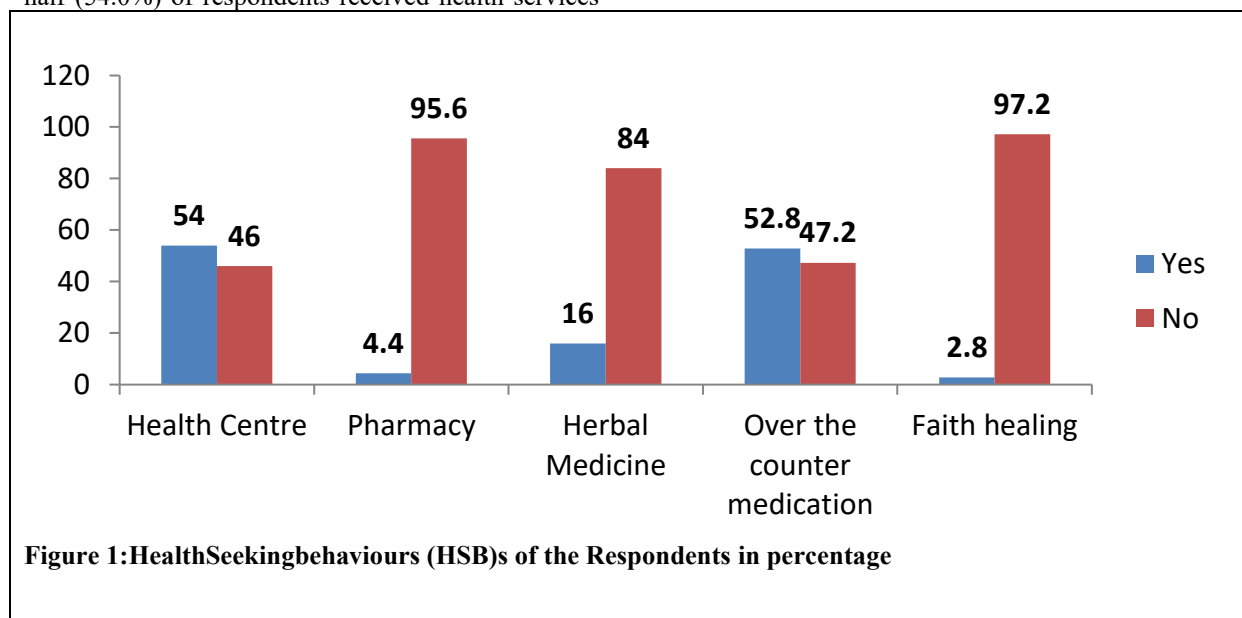
**Table 1: Socio-demographic characteristics of the Respondents**

| <b>Variables</b>                     | <b>Frequency (no)</b> | <b>Percentage (%)</b> |
|--------------------------------------|-----------------------|-----------------------|
| <b>Age of children (month)</b>       |                       |                       |
| 7-11                                 | 100                   | 40.0                  |
| 12-23                                | 70                    | 28.0                  |
| 24-35                                | 50                    | 20.0                  |
| 36-47                                | 20                    | 8.0                   |
| 48-59                                | 10                    | 4.0                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Sex</b>                           |                       |                       |
| Male                                 | 115                   | 46.0                  |
| Female                               | 135                   | 54.0                  |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Weight of baby after delivery</b> |                       |                       |
| Low birth weight                     | 9                     | 3.6                   |
| Normal Weight                        | 225                   | 96.4                  |
| <b>Age of mothers (years)</b>        | <b>250</b>            | <b>100.00</b>         |
| 15-19                                | 11                    | 4.4                   |
| 20 - 29 years                        | 160                   | 64.0                  |
| 30 - 39 years                        | 75                    | 30.0                  |
| 40 -49 years                         | 4                     | 1.6                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Marital Status</b>                |                       |                       |
| Married                              | 236                   | 94.4                  |
| Widow/Widower                        | 2                     | 0.8                   |
| Separated                            | 12                    | 4.8                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Religion</b>                      |                       |                       |
| Christianity                         | 187                   | 74.8                  |
| Islam                                | 62                    | 24.8                  |
| Traditional                          | 1                     | 0.4                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Type of housing</b>               |                       |                       |
| Personal                             | 127                   | 50.8                  |
| Rented                               | 122                   | 48.8                  |
| Others                               | 1                     | 0.4                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Ethnicity</b>                     |                       |                       |
| Yoruba                               | 188                   | 75.2                  |
| Igbo                                 | 35                    | 14.0                  |
| Hausa                                | 11                    | 4.4                   |
| Others (Ebira)                       | 16                    | 6.4                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Household number</b>              |                       |                       |
| 1 – 3                                | 120                   | 48.0                  |
| 4 – 6                                | 109                   | 43.6                  |
| 7 and above                          | 21                    | 8.4                   |
| <b>Highest level of education</b>    |                       |                       |
| No formal Education                  | 14                    | 5.6                   |
| Primary                              | 11                    | 4.4                   |
| Secondary                            | 171                   | 68.4                  |
| Graduate                             | 54                    | 21.6                  |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Employ status</b>                 |                       |                       |
| Civil Servant                        | 24                    | 9.6                   |
| Artisan                              | 84                    | 33.6                  |
| Traders                              | 86                    | 34.4                  |
| Farmer                               | 20                    | 8.0                   |
| Unemployed                           | 36                    | 14.4                  |
| <b>Total</b>                         | <b>250</b>            | <b>100.0</b>          |
| <b>Source of water</b>               |                       |                       |
| Personal Borehole                    | 150                   | 60.0                  |
| River/Lake/Stream                    | 6                     | 2.4                   |
| Well                                 | 85                    | 34.0                  |
| Community Supply                     | 9                     | 3.6                   |
| <b>Total</b>                         | <b>250</b>            | <b>100.00</b>         |

### Health-seeking behaviours (HSBs) of the Respondents

Table 2 shows the health-seeking behaviours (HSBs) of lactating mothers. The result shows that more than half (54.0%) of respondents received health services

at the health centre, while only a few (4.4%) visit the pharmacy for care, 16% visit herbal medicine. More than half (52.8%) use over-the-counter medication while only 2.8% are addicted to faith healing.



### Food frequency table of the respondents

Table 2 presents the food frequency data of the respondents. Approximately 55.2% consume cereal/cereal products 5-7 times weekly, 30.0% consume cereals more than 7 times, and 6.8% consume cereals less than 3 times. Additionally, 18.4% never eat roots and tubers, while 35.2% consume roots and tubers 3-4 times weekly. About 3.2% eat vegetables less than 3 times, 0.6% consume vegetables 3-4 times, and 65.6% eat vegetables 5-7 times weekly. Fruit consumption was adequate, with

30.4% eating fruits less than 3 times and 16.0% eating fruits 5-7 times weekly. The data also shows that 90.0% never drink alcoholic beverages, while only 2.0% consume alcoholic beverages less than 3 times weekly. The table further reveals that 22.0% eat nuts and seeds 3-4 times, while 10.0% consume nuts and seeds 5-7 times weekly. Lastly, 2.4% add condiments/spices less than 3 times to their food, while 27.2% use condiments/spices more than 7 times.

**Table 2: Food frequency of the Respondents**

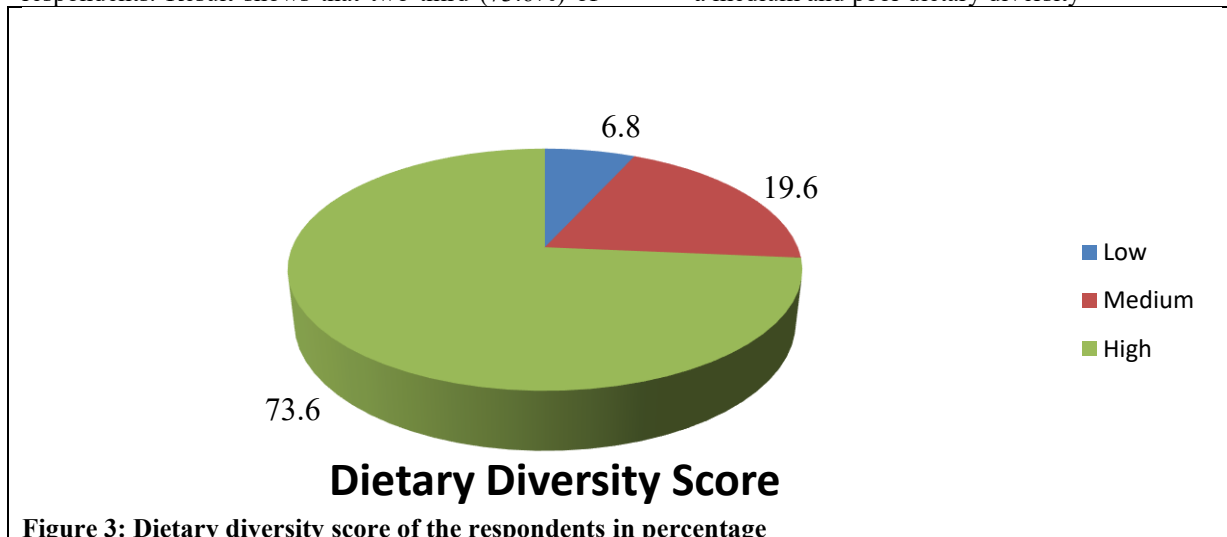
| Food group              | < 3 times<br>F (%) | 3-4 times<br>F (%) | 5-7 times<br>F (%) | >7 times<br>F (%) | None<br>F (%) |
|-------------------------|--------------------|--------------------|--------------------|-------------------|---------------|
| Cereal/Cereal Products  | 17(6.8)            | 20(8.0)            | 138(55.2)          | 75(30.0)          | 0(0.0)        |
| Roots and Tubers        | 39(15.6)           | 88(35.2)           | 58(23.2)           | 19(7.6)           | 46(18.4)      |
| Vegetables              | 8(3.2)             | 9(3.6)             | 164(65.6)          | 63(25.2)          | 6(2.4)        |
| Milk and dairy Products | 42(16.8)           | 73(29.2)           | 47(18.8)           | 3(1.2)            | 85(34.0)      |
| Fruits                  | 76(30.4)           | 76(30.4)           | 40(16.0)           | 10(4.0)           | 48(19.2)      |
| Legumes and pulse       | 54(21.6)           | 88(35.2)           | 27(10.8)           | 1(0.4)            | 80(32.0)      |
| Meat and meat products  | 20(8.0)            | 34(13.6)           | 135(54.0)          | 47(18.8)          | 14(5.6)       |
| Egg                     | 48(19.2)           | 56(22.4)           | 22(8.8)            | 0(0.0)            | 124(49.6)     |
| Fat and Oil             | 4(1.6)             | 2(0.8)             | 154(61.6)          | 84(33.6)          | 6(2.4)        |
| Non-Alcoholic Beverages | 24(9.6)            | 84(33.6)           | 61(24.4)           | 7(2.8)            | 74(29.6)      |
| Alcoholic Beverages     | 5(2.0)             | 12(4.8)            | 6(2.4)             | 2(0.8)            | 225(90.0)     |
| Fish and products       | 48(19.2)           | 79(31.6)           | 45(18.0)           | 15(6.0)           | 63(25.2)      |
| Nut and seeds           | 70(28.0)           | 55(22.0)           | 25(10.0)           | 2(0.8)            | 98(39.2)      |
| Condiments/spices       | 6(2.4)             | 1(0.4)             | 165(66.0)          | 68(27.2)          | 9(3.6)        |



**Dietary Diversity Score of the respondents**

Figure 3 shows the dietary diversity score of the respondents. Result shows that two-third (73.6%) of

the respondent consumed a diverse diet 24 hours before the data collection while 19.6% and 6.8% had a medium and poor dietary diversity

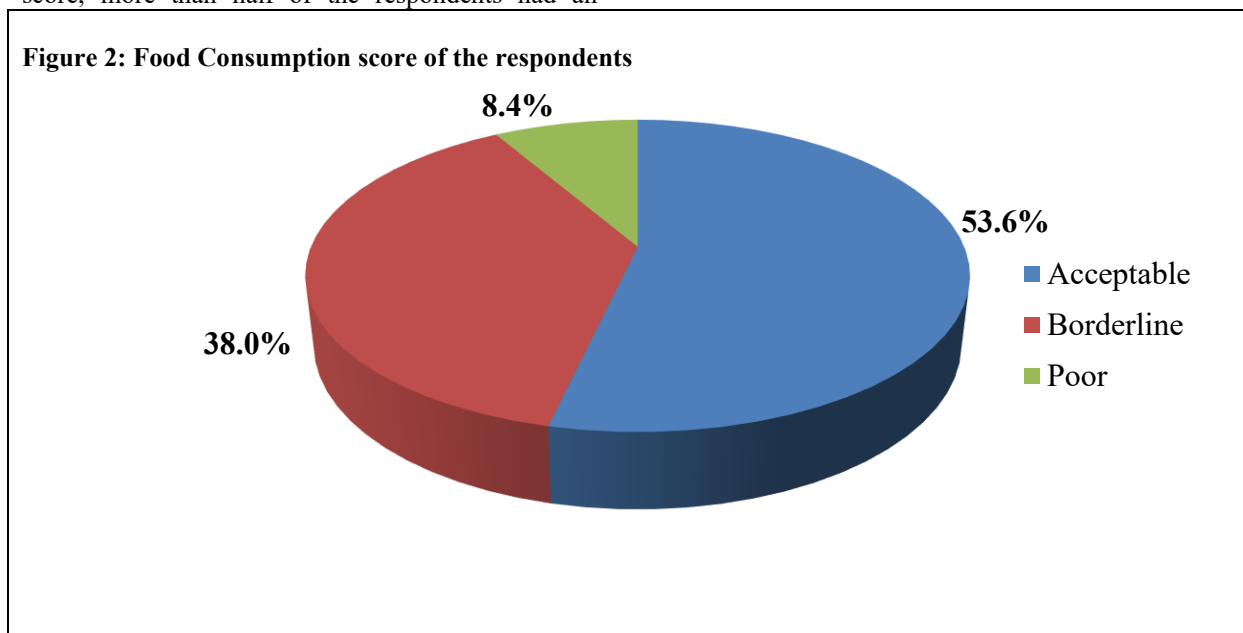


**Figure 3: Dietary diversity score of the respondents in percentage**

**Food Consumption score of the respondents**

Figure 2. Shows food consumption score of the respondents. From the analysis, food consumption score, more than half of the respondents had an

acceptable consumption pattern (53.6%) while about 38.0% were borderline and less than 10% had poor consumption score



**Figure 2: Food Consumption score of the respondents**

**Nutritional status of the lactating mothers**

Table 3 shows the nutritional status of the lactating mothers. Result for body mass index shows that large proportions 41.2% of the lactating mothers were normal, 0.4% were underweight, 41.2% were overweight while 19.6% were class 1 obesity, 11.6% were class II obesity respectively. Result for waist

circumference shows that large proportions 61.2% of the lactating mothers were normal while 38.8% were centrally obese. Mid upper arm circumference shows that large proportions 93.6% of the lactating mothers had good nutritional while 6.4% had poor nutritional status. Result for waist hip ratio shows that large

proportions 68.0% of the lactating mothers were centrally obese while 32.0% were normal.

**Table 3: Nutritional Status of the respondents**

| Characteristics                           | Frequency (no) | Percentage (%) |
|---|----------------|----------------|
| <b>Body Mass Index (BMI)</b>              |                |                |
| Underweight                               | 1              | 0.4            |
| Normal                                    | 64             | 25.6           |
| Overweight                                | 103            | 41.2           |
| Class I Obesity                           | 49             | 19.6           |
| Class II Obesity                          | 29             | 11.6           |
| Class III Obesity                         | 4              | 1.6            |
| <b>Total</b>                              | <b>250</b>     | <b>100.0</b>   |
| <b>Waist circumference</b>                |                |                |
| Normal                                    | 153            | 61.2           |
| Central Obese                             | 97             | 38.8           |
| <b>Total</b>                              | <b>250</b>     | <b>100.0</b>   |
| <b>Mid Upper Arm Circumference (MUAC)</b> |                |                |
| Poor Nutritional Status                   | 16             | 6.4            |
| Good Nutritional Status                   | 234            | 93.6           |
| <b>Total</b>                              | <b>250</b>     | <b>100.0</b>   |
| <b>Waist Hip Ratio</b>                    |                |                |
| Normal                                    | 80             | 32.0           |
| Central Obesity                           | 170            | 68.0           |
| <b>Total</b>                              | <b>250</b>     | <b>100.00</b>  |

**Table 4: Association between food consumption score and nutritional status mothers**

| Variables                    | Acceptable | Borderline | Poor     | X <sup>2</sup>           | P-value       |
|------------------------------|------------|------------|----------|--------------------------|---------------|
| <b>Body Mass Index (BMI)</b> |            |            |          | <b>9.858</b>             | <b>0.453</b>  |
| Underweight                  | 1(100.0)   | 0(0.0)     | 0(0.0)   |                          |               |
| Normal                       | 27(42.2)   | 27(42.2)   | 10(15.6) |                          |               |
| Overweight                   | 58(56.3)   | 40(38.9)   | 5(4.9)   |                          |               |
| Class I Obesity              | 29(59.2)   | 16(32.7)   | 4(8.2)   |                          |               |
| Class II Obesity             | 17(58.6)   | 10(34.5)   | 2(6.9)   |                          |               |
| Class III Obesity            | 2(50.0)    | 2(50.0)    | 0(0.0)   |                          |               |
| <b>Waist circumference</b>   |            |            |          | <b>1.090<sup>a</sup></b> | <b>0.027*</b> |
| Normal                       | 79(51.6)   | 62(40.5)   | 12(7.8)  |                          |               |
| Central Obese                | 55(56.7)   | 3(34.0)    | 9(9.3)   |                          |               |
| <b>(MUAC)</b>                |            |            |          | <b>6.435<sup>a</sup></b> | <b>0.040*</b> |
| Poor Nutritional Status      | 6(54.7)    | 6(37.5)    | 4(25.0)  |                          |               |
| Good Nutritional Status      | 128(54.7)  | 89(38.0)   | 17(7.3)  |                          |               |
| <b>Waist Hip Ratio</b>       |            |            |          | <b>0.708<sup>a</sup></b> | <b>0.702</b>  |
| Normal                       | 44(55.0)   | 1(38.8)    | 5(6.2)   |                          |               |
| Central Obesity              | 90(52.9)   | 64(37.6)   | 16(9.4)  |                          |               |

\*Significance at p<0.05

**Table 5: Association between Dietary diversity Score and food consumption score the mother**

| Variables                      | Acceptable       | Borderline      | Poor           | Total             | X <sup>2</sup>           | P-value       |
|--------------------------------|------------------|-----------------|----------------|-------------------|--------------------------|---------------|
| <b>Dietary Diversity Score</b> |                  |                 |                |                   | <b>7.477<sup>a</sup></b> | <b>0.016*</b> |
| Low                            | 5(29.4)          | 11(64.7)        | 1(5.9)         | 17(6.8)           |                          |               |
| Medium                         | 30(61.2)         | 17(34.7)        | 2(4.1)         | 49(19.6)          |                          |               |
| High                           | 99(53.8)         | 67(36.4)        | 18(9.8)        | 184(73.6)         |                          |               |
| <b>Total</b>                   | <b>134(53.6)</b> | <b>95(38.0)</b> | <b>21(8.4)</b> | <b>250(100.0)</b> |                          |               |



Significance at  $p < 0.05$

Table reveals the nutritional status of the under-five children by gender. The result revealed that weight for age-z score of the under-five children showed that 17.4% males and 11.1% females were underweight, while 72.0% had normal weight for age. Only 14% were overweight at the time of data collection.

Stunting was observed among 16% of the under-five children but more prevalence among the male children. The weight for height-z score of the under-five children showed that 10% were wasted while 82% had normal weight for height.

**Table 6: Nutritional status of the under-five children**

| <b>Anthropometric indices</b> | <b>Male</b>       | <b>Female</b>     | <b>Total</b>      | $X^2$        | P-value       |
|-------------------------------|-------------------|-------------------|-------------------|--------------|---------------|
| <b>Weight for age</b>         | <b>F(%)</b>       | <b>F(%)</b>       | <b>F (%)</b>      |              |               |
| Underweight                   | 20(17.4)          | 15(11.1)          | 35(14.0)          | <b>7.863</b> | <b>0.013*</b> |
| Normal                        | 80(69.6)          | 100(74.1)         | 180(72.0)         |              |               |
| Overweight                    | 15(13.0)          | 20(14.8)          | 35(14.0)          |              |               |
| <b>Total</b>                  | <b>115(100.0)</b> | <b>135(100.0)</b> | <b>250(100.0)</b> |              |               |
| <b>Height for age</b>         |                   |                   |                   | <b>0.588</b> | <b>0.569</b>  |
| Stunted                       | 25(21.7)          | 15(11.1)          | 40(16.0)          |              |               |
| Normal                        | 85(74.0)          | 110(81.5)         | 195(78.0)         |              |               |
| Very Tall                     | 5(4.3)            | 10(7.4)           | 15(6.0)           |              |               |
| <b>Total</b>                  | <b>115(100.0)</b> | <b>135(100.0)</b> | <b>250(100.0)</b> |              |               |
| <b>Weight for height</b>      |                   |                   |                   | <b>9.946</b> | <b>0.129</b>  |
| Wasted                        | 9(7.8)            | 16(11.9)          | 25(10.0)          |              |               |
| Normal                        | 91(79.1)          | 114(84.4)         | 205(82.0)         |              |               |
| Overweight                    | 15(13.1)          | 5(3.7)            | 20(8.0)           |              |               |
| <b>Total</b>                  | <b>115(100.0)</b> | <b>135(100.0)</b> | <b>250(100.0)</b> |              |               |

\*Significance at  $p < 0.05$

### Discussion

The study aimed to assess the food consumption score and nutritional status of lactating mothers and their under-five children attending a primary health centre in Owo. The current result showed that the age range (20–29 years) of the majority of lactating women is consistent with the findings of an earlier study of a similar population in Nigeria (26). According to Umeora and Egwuatu (27), this age range reflects the lactating age when milk will be sufficient for an infant. The data obtained also indicate that a large proportion of the lactating women had a high literacy level, income, and occupation. In developing countries, it has been reported that the income of a household is an important determinant of its access to food, which in turn is a major determinant of child and maternal nutrition and wellbeing. More than half of the mothers had an acceptable food consumption score, and this might be due to their involvement in energy-demanding workloads during the whole course of lactation, which required more energy. Food consumption score is a predictor of energy intake, and it is recommended that all types of food be consumed by the lactating mother to replenish the body store and fulfil the demand for nutrition in the infant (28). In this present study, it was observed that a large proportion of mothers consumed varieties of foods like tubers, cereal, legumes, fruits, and vegetables. However, it could also be deduced from the study that the main food consumed is starch-based, with

unlimited consumption of fruits and vegetables (65.6%). This observation could be attributed to the adjustments being undertaken in Nigeria (31). In developing countries, several studies have reported that communities of households are indeed an important determinant of child and maternal nutritional wellbeing (29) and that purchasing food items dictates the types of diets consumed by household members (30). Dietary diversity scores obtained in this study are consistent with the findings from six Nigerian states (31). The value of a diverse diet has over time been recognised and is highly recommended since it is strongly and positively associated with nutrient adequacy (32). The high dietary diversity score (73.6%) observed in this study could be explained by the fact that the respondents consumed a variety of foods. The study was conducted in the season of plenty. This finding is in contrast to the findings of Onyeji (33), who reported a lower score for good dietary diversity and a higher score for both moderate and poor dietary diversity. Likewise, the value obtained in this study was higher than the reported value obtained by Saaka (34) in his work. However, several studies have shown that better socioeconomic status is linked to a higher dietary diversity score in households in developing countries. In addition, limited access to nutritious foods like eggs, milk, and milk products in this study area could be attributed to economic constraints and a lack of knowledge and information, which could predispose

households to deficiencies in protein, vitamin A, iron, and calcium. Micronutrient deficiencies have adverse effects on human health and nutrition (35).

Women and children are especially vulnerable because they have particularly high micronutrient requirements (36). Dietary information found in this study showed that the consumption of cereal, nuts and legumes, roots and tubers, fruits and vegetables, meat and fish, eggs, milk and dairy products, fats and oils, sugar, and beverages has increased as compared to that from the national surveys (37). Although consumption of alcoholic beverages is discouraged during lactation, only a few (2.0%) drink alcohol. A value smaller than the one found in this study was also recorded (38).

From their food frequency table, animal sources of protein were consumed more than seven times on a weekly basis by less than twenty mothers. Proteins are fundamental components of the body. They are essential in the diet for the growth and repair of tissue and can be obtained from foods such as meat, fish, eggs, and milk. During lactation, the dietary recommendation of protein has increased from 55 g/day to 77.9 g/day (39).

The nutritional status of the lactating mothers showed that large proportions of the respondents were overweight. This result corresponds with the findings of Fabunmied al. (40), who reported a similar proportion (40.5%) of overweight mothers among lactating mothers. In African culture, being overweight is socially acceptable as a sign of wealth and good living (41). In Nigeria, among the 'Yoruba' tribe where this study was carried out, it was reported that weight gain during the lactation period is considered normal (41). Chronic undernutrition was also observed among the mothers, although less than 1% lower than 11.6 percent of lactating mothers at the national level (42). The reason for this discrepancy could be linked to the method of data collection and sample size of this study, as well as interventions on maternal health, nutrition, and other women-empowering programmes by the government as well as other non-governmental organisations in the study area. Obesity was also prevalent among lactating mothers, and this was also in consonance with reports by Fabunmied al. (40). This finding was also comparable with the findings of the Ethiopian Health and Nutrition Research Institute (43). Obesity is significant as a risk factor for serious non-communicable diseases, including cardiovascular disease, hypertension and stroke, diabetes mellitus, and various forms of cancer. The influence of the food consumption score on the women's nutritional status revealed a positive significant association. The majority of lactating mothers who had an acceptable score (42.2%) were normal. This is consistent with the findings of previous studies, which established that places where lactating mothers lived are more likely to have an effect on the nutritional status of mothers (44). The significant effect of underweight in this study,

which is more prevalent in poor food consumption scores, is also being established by the research on the determinants of maternal malnutrition in Nigeria (45).

Malnutrition in terms of underweight, stunting, and wasting was prevalent among under-five children in this study. The Nigerian demographic and health survey in 2018 reported a prevalence of 20.0%, 37.0%, and 7.0% for underweight, stunting, and wasting, respectively. However, the results from this study were lower than the reported findings of the Nigerian demographic and health survey, except in wasting, where 8% of the under-five children were wasted, as against 7% reported by the NDHS (42). But it was higher than the reported values by Ukegbuet al. (26) and Olagunju et al. (5), who reported that 2.7% were underweight, 11.5% were stunting, and 5.4% were wasting.

Likewise, this report was lower compared to the findings of Francis et al. (46) in their study on the nutritional status of under-five children in Ondo North, who reported 33.6% and 20.0% for stunting and underweight, respectively, except for wasting (1.7%), which was lower than the findings from this study. Stunting is a chronic malnutrition that implies a long-term deprivation of food and remains a problem more concerning than acute malnutrition (47). Acute malnutrition is usually due to insufficient dietary intake caused by food shortages or other events, provided there are no severe food shortages or illnesses as a result of opportunistic infection (48), and nutritional deficiencies can lead to mortality or chronic diseases in later life (47, 48).

#### Conclusion

The study showed that large proportions of lactating mothers food consumption scores were adequate. Based on the nutritional status, there was evidence of a double burden of malnutrition among the mothers. There was a record of stunting, underweight, and wasting among the under-five children, with stunting more prevalent among the male children and wasting seen more among the female children. Therefore, interventions such as nutrition education during pregnancy and adequate support from relatives during lactation will not just improve the nutritional status of the children but also maternal nutrition knowledge.

#### Ethical Approval

Prior to the survey, permission was obtained from Nutrition and Dietetics department, Rufus Giwa Polytechnic, Owo. Oral consent was sought and obtained for the study from the office of the director of health services, Owo local government with approval letter number (OW/PH/DC/AP/102). Oral consent from the participant was obtained after the objective of the study was explained to them.

#### Declaration of interest

The authors hereby declare no conflict of interest on this manuscript

### Author's contributions

The first author brought the idea of the research and analysis the data collected, the second author supervised and wrote the manuscript, the third author proof read and thoroughly edited the manuscript while the fourth author collected the data.

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