



Dietary Diversity and Micronutrient Intake of Adult Women in Ogun State, Nigeria (Case Study)

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ABSTRACT

Micronutrient malnutrition is likely to be widespread in underdeveloped areas of the world when there is undernourishment brought on by lack of dietary diversity. This study is a community-based cross sectional and descriptive design. The sample size and study population comprised of 170 respondents selected using a multistage sampling technique in Odeda Local Government Area of Abeokuta, Ogun State in Nigeria. Data on the socio-economic, sociodemographic, food and nutrient intake and minimum dietary diversity for women were gathered using a well-structured questionnaire that was administered by an interviewer. Utilizing Nutri-Survey, micronutrient intakes were calculated based on 24-hour dietary intake recall. Statistical Product and Service Solutions (SPSS) version 20.0 was used to analyze the data. The findings were displayed as frequency, percentage, mean, and standard deviation. The respondents' sociodemographic and socioeconomic data revealed a mean age of 33.5 years. The average Dietary Diversity Score was 3.92, and the majority (71.8%) of the respondents had poor scores for dietary diversity while 28.2% had low scores. While the respondents' intake of some micronutrients, such as zinc and phosphorus, was adequate, it was below the recommended dietary intake for others, including vitamin A, vitamin E, vitamin B1, vitamin B2, total folic acid, vitamin C, sodium, potassium, calcium, magnesium, and iron. The study indicates that the women residing in this community consume a diet that has a low diversity, consistent with a diet low in micronutrients, however, the phosphorous and zinc status were adequate.

Keywords: Malnutrition, Dietary Diversity, Micronutrients, Nutrient Intake, Adult women

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INTRODUCTION

Dietary diversity is the consumption of variety of foods from diverse food groups that enables obtaining enough vital nutrients to support both physical and mental growth (**Kuma *et al.*, 2021; Weerasekara *et al.*, 2020**). A result of emerging evidences that no single meal can provide the precise quantity of nutrients required to maintain optimal health, dietary diversity has been recognized as a crucial component of high-quality diets (**Verger *et al.*, 2021**). Micronutrient deficiency is likely to be widespread in underdeveloped areas of the world when there is undernourishment brought on by lack of dietary diversity (**Udoh and Udoh, 2019**). Diverse foods are a good source of different macro and micronutrients and are the most effective way to ensure nutritious adequacy (**Weerasekara *et al.*, 2020**). They are also advantageous for enhancing nutritional status, cardiovascular health, the outcomes of pregnancy, and vision, among other things (**Blakstad *et al.*, 2021**). An essential step in minimizing the effects of micronutrient deficits is increasing consumption of foods that are rich sources of micronutrients. Fruits and vegetables are significant sources of micronutrients, antioxidants and soluble fibers, yet most households, particularly those in low-income countries, frequently consume less of them than is advised (**Saaka *et al.*, 2021**).

The diversity of foods adds a number of aspects to human health. As a result, the prevalence of chronic diseases declines (**Mokherjee *et al.*, 2018**). It also promotes biodiversity and sustainability, permits adequate nutrition, reduces the harmful effects of food on health, and lastly promotes interest in food. Numerous studies have demonstrated that a diversified diet improves the diet's overall nutritional quality (**Boedecker *et al.*, 2019**). A diet that is unbalanced can have a negative impact on a person's health, happiness, and development by hindering cognitive growth, reproductive abilities, and even social abilities, in addition to diminishing physical capabilities and infection resistance (**Mokherjee *et al.*, 2018**). In the vast majority of underdeveloped third world nations, nutritional issues are mostly quantified; nevertheless, the issue of dietary diversity or food variety is also crucial. Low-income households typically don't have diversified meals and have a restricted assortment of foods, which leads to diets that are nutritionally inadequate and frequently deficient in essential micronutrients (**Lubeka *et al.*, 2020**).

To date, studies on dietary diversity in Nigeria focuses on infants and children (**Anna *et al.*, 2020**), as adequate nutrition from gestation to the first 24 months of life is critical for physical and cognitive development (**Das *et al.*, 2016**). The nutritional status of the mother has a direct bearing on the long-term health status of the infant, and poor nutritional status can result in restrictive growth leading to low birth weight, increasing the risk of childhood infections and mortality, as well as increasing the risk of stunting, wasting, and impaired cognitive development in later life, if not addressed (**Anna *et al.*, 2020**). Due to their greater micronutrient requirements and the physical demands of pregnancy and lactation, women of reproductive age (15–49 years

old) are particularly vulnerable (Custodio et al., 2020). Therefore, this study offers details on the variety of diets and micronutrient intake among adult women.

MATERIALS AND METHODS

The study is a cross-sectional and descriptive design that evaluated the respondents' dietary diversity and intake of micronutrients in the villages of the Odeda Local Government Area in Nigeria. The study selected 170 respondents who are adult women between the ages of 18 and 59 residing in the Odeda Local Government Area. A Multistage Sampling Technique was used for this study where five out of ten wards in Odeda Local Government Area in Abeokuta were initially selected. One community each from the five wards were further selected. Simple random technique was used to select 34 respondents from each community selected to make a total of 170 respondents. Women under the age of 18 and those who did not reside in the Odeda Local Government Area in Abeokuta, Ogun state, were excluded from the study. Adult women with severe degenerative disorders that potentially affect nutritional status were also excluded from the study.

Data collection

Information regarding demographics and socioeconomic status was collected at baseline using an interviewer-administered questionnaire. This included participant age, education level achieved, and estimated income. Household information included the number of family members and the number of rooms in the house, house ownership, structure material water source and family structure.

The Minimum Dietary Diversification-Women (MDD-W) described by Food and Agriculture Organization of the United Nation (FAO), (2018) was used to evaluate respondents' dietary diversity. According to the ten (10) food groups listed in the MDD-W, respondents were asked if they had eaten at least five (5) of the ten (10) specified food groups the day before or the night before (FAO, 2021). The MDD-W and food group diversity score were calculated based on the ten food groups: grains, pulses, nuts and seeds, dairy, meat-poultry and fish, eggs, dark green leafy vegetables, other vitamin A-rich fruits and vegetables, other vegetables, other fruits. Food group consumption was recorded by entering "1" if the food group was consumed and "0" if it was not. A minimum quantity of 15 g was required for a food group to be recorded. A food group diversity score was calculated out of ten.

A 24-hour dietary recall performed by the interviewer was used to determine respondents' nutritional intake. and was compared to the Recommended Dietary Allowance in order to determine micronutrient intake. All respondents provided informed consent before the data gathering process. Written on the questionnaire, the informed consent also contained a verbal description of the study's goals, its confidentiality policies, and the respondents' right to decline participation.

Data Analysis

Descriptive statistics are presented for the respondents' socioeconomic and demographic characteristic, MDD-W score and nutrient intake. These were calculated using the Statistical Product and Service Solutions (SPSS) version 20.0 software

RESULTS AND DISCUSSION

The socio-demographic and economic characteristics of the respondents that were analysed in this research include age, religion, ethnic group, marital status, occupation, level of education, estimated monthly income, family structure and family size. The result of this analysis shows that the mean standard deviation age of the respondents was- 33.5 ± 9.38 years with 22.4% of the respondent within the age range of 18-25 and 38.2% within the age range of 26-35 years. Also, 22.9% of the respondent were found to be within the age range of 36-45 and 16.5% within the age range >45. The majority (72.9%) of the respondent practice Christianity, 27.1% practice Islam. About 81.2% were married, 14.1% were single, 4.1% were widow and 0.6% was divorced. Majority of the respondent (75.3%) were Yoruba, 6.5% were Igbo, 2.4% were Hausa and 15.9% were from other tribes. About 12.4% of the respondents were Civil Servant, 13.5% were into Farming, 35.3% were Traders, 21.8% were Artisan and 17.1% of the respondents were Housewife. Also, 21.8% of the respondents gets the highest payment within the range (> #40000), 17.1% received (30001-40000), 30.6% received (20001-30000), 18.8% received (10001-20000) and 11.8% gets the lowest payment which is less than #10000. It was observed that 14.7% of the respondent had No Formal Education, 20.6% had Primary Education, 34.7% had Secondary Education, 27.6% had Tertiary Education and 2.4% had Post Tertiary Education. Below average of the respondents (42.9%) Owned a house while 56.5% Rented a house and 0.6% neither owned a house nor rent a house. Majority (65.3%) of the respondent were Monogamous, 34.1% were Polygamous while 0.6% is Polyandry. The result recorded showed that 19.4% had 1 to 3 family size, 50.6% had 4 to 6 family size and 30% had a family size Greater than 6.

The minimum dietary diversity for women scores in table 1, showed that majority (71.3%) of the respondent had a low dietary diversity score and 28.2% of the respondents had a minimum dietary diversity score.

Table 1: Minimum Dietary Diversity for Women Score of the Respondent

Variable	Frequency	Percentage
Low Dietary Diversity	122	71.8
Minimum Dietary Diversity	48	28.2
Total	170	100
Mean =3.92		

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Information on the micronutrient intake and micronutrient adequacy of the respondents (table 2) showed that the majority of the respondents had inadequate intake of Vitamin A, Vitamin B2, Vitamin B6, Total Folic Acid, Vitamin C, Sodium, Potassium, Calcium, Magnesium, Iron. More than one-eight (27.6%) and (21.8%) of the respondents had inadequate intake of Phosphorus and Zinc respectively. (56.5%) had excess intake of phosphorous, 63.5% had excess intake of Zinc. It was observed that 5.9% of the respondents had adequate intake of Vitamin A and Vitamin B1, 1.2% had adequate intake of Vitamin E, 9.4% had adequate intake of Vitamin B2, 13.5% had adequate intake of Vitamin B6, 0.6% had adequate intake of Total Folic Acid, 4.7% had adequate intake of Vitamin C, 2.4% had adequate intake of Sodium, 5.3% had adequate intake of Potassium, 1.2% had adequate intake of Calcium, 8.2% had adequate intake Magnesium, 15.9% had adequate intake of Phosphorus, 17.1% had adequate intake of Iron, and 14.7% had adequate intake of Zinc.

Table 2: Micronutrient Intake of the Respondents

Nutrients	Mean±SD	RDA	% Mean RDA	Inadequate		Adequate		Excess	
				N	%	N	%	N	%
Vitamin A (mcg)	353.21±2034.88	700	50.46	149	87.6	10	5.9	11	6.5
Vitamin E (mg)	2.43±2.544	15	16.2	165	97.1	2	1.2	3	1.8
Vitamin B1 (mg)	0.54±1.260	1.1	49.09	151	88.8	10	5.9	9	5.3
Vitamin B2 (mg)	0.59±0.992	1.1	53.64	139	81.8	16	9.4	15	8.8
Vitamin B6 (mg)	0.56±0.378	1.3	43.08	134	78.8	23	13.5	13	7.6
Total Folic acid (mcg)	56.21±55.695	400	14.05	167	98.2	1	0.6	2	1.2
Vitamin C (mg)	18.87±45.919	75	25.16	150	88.2	8	4.7	12	7.1
Sodium (mg)	768.71±819.357	2300	33.42	146	85.9	4	2.4	20	11.8
Potassium (mg)	932.41±760.943	4700	19.83	149	87.6	9	5.3	12	7.1
Calcium (mg)	188.52±159.207	1000	18.852	166	97.6	2	1.2	2	1.2
Magnesium (mg)	187.11±159.477	315	59.4	127	74.7	14	8.2	29	17.1
Phosphorous (mg)	656.81±402.270	700	93.83	47	27.6	27	15.9	96	56.5
Iron (mg)	14.60±12.655	18	81.11	91	53.5	29	17.1	50	29.4
Zinc (mg)	12.72±13.30	8	157	37	21.8	25	14.7	108	63.5

In order to evaluate the impact of dietary diversity and micronutrient intake among women, this study was conducted in communities in Odeda local government. The result of this analysis shows that majority of the respondents fall between the ages of 18-45 years and majority of these women are married. Majority of these women are active in either of the following work categories; Civil Servant, farming, Traders and Artisan. Majority of these women earn more than the current country's monthly minimum wages of 18 thousand naira. This could be due to the fact that majority of the women have at least primary education with more than half of the respondents having more than secondary school education and surprisingly one-fifth of the population have tertiary education despite residing in a rural community. The mean age of the respondents was 33.5years, which is in close agreement with the study conducted by **Darboux et al., 2022** on Assessment of the nutritional status and dietary intake of women of childbearing age in the city of Comè, Benin.

The minimum dietary diversity for women score showed that majority (71.3%) of the respondent had a low dietary diversity score and 28.2% of the respondents had a minimum dietary diversity score. It has been demonstrated that dietary variety scores are reliable and affordable markers for evaluating nutritional quality at the population level (**Oladoyinbo et al., 2017**). This study's mean DDS (3.92) was lower than the mean DDS reported by earlier research. In Pakistan, a mean DDS of 6.17 was reported, a mean of 4.02 was observed in South Africa (**Oladoyinbo et al., 2017; Labadarios et al., 2011; Ali et al., 2014**), and a mean DDS of 8.29 was reported in Iwo Local Government Area, Osun State in Nigeria. However, the mean DDS found in a study by **Blackstad et al., 2019** demonstrates that the mean DDS is closely related to the mean DDS discovered in the study. Only 28.2% of the respondents had a minimum level of dietary diversity, according to the study, which is in line with a 2019 study by **Blackstad et al.** on dietary diversity among rural Tanzanian women predicted by neighbour home gardening. **Udoh and Udoh (2019)** also revealed that dietary diversity scores were generally low, with 71.8% of respondents having low dietary diversity. This may be because the diet of many African households is primarily plant-based and consists primarily of starchy staples with little to no protein of animal origin and fresh fruits and vegetables. As a result, the majority of respondents who reported having a low dietary diversity eat primarily starchy staples with little to no protein and fresh fruits and vegetables. Additionally, in this study, less than one in four women met the FAO's definition of a sufficient intake of micronutrients, which is a diet that includes at least five different food groups each day.

The survey also showed the respondents' recommended dietary requirement for micronutrients consumption. Surprisingly, the findings reveal that the intake of zinc and also for phosphorus was higher than the RDA. The daily requirements for zinc for an adult range from 8 to 11 mg, with pregnant and lactating women needing the greatest intakes at 11 to 13 mg daily, according to **Dibaise et al., 2019**. Zinc is incredibly beneficial to biological systems and is necessary for a variety of physiological activities, including optimal immunological function, sexual function, and neurosensory functions like cognition and vision. It is also involved in many metabolic

processes that support life. Zinc deficiency or excess, however, can control a series of metabolic processes that have a negative impact on human health (Shams et al., 2021). Similar results were found in Iwo Local Government Area, Osun State, Nigeria (Oladoyinbo et al., 2017), where respondents' intakes of some micronutrients, including vitamin C, sodium, potassium, calcium, and magnesium, were below the Recommended Dietary Intake. This might have happened as a result of the respondents' low consumption of fruits, eggs, and dairy products as well as the fact that a large portion of the population ate primarily carbohydrate-dense staples like maize, rice, cassava, and potatoes, which have low concentrations of essential micronutrients needed to maintain health (Blakstad et al., 2021). According to Oladoyinbo et al. (2017), dairy products, eggs, fruits, and chicken are excellent providers of potassium, calcium, magnesium, and phosphorus. However, the lack of dietary diversity among communities has had negative effects on nutrition, particularly micronutrient deficits. Amoda et al.'s study from 2022, however, had a similar conclusion that vitamin A, vitamin B1, vitamin B2, and vitamin B6 intake did not satisfy the guidelines. Vitamin B1, B2, and B3 levels were low in both South African and Kenyan women.

CONCLUSION

The respondents' micronutrient adequacy data revealed that the majority of respondents had insufficient consumption of the micronutrients with the exception of zinc and phosphorus. A limitation of this study is that it was unable to determine if the minimal dietary variety score and the recommended daily allowance for micronutrients that the respondents met were related.

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