IBOM MEDICAL JOURNAL
Vol.18 No.2 | April - June, 2025 | Pages 240 - 248
www.ibommedicaljournal.org

Dietary Diversity Among Women of Reproductive Age Selling in Selected Markets within Uyo Metropolis, Nigeria

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Abstract

Context: Poor dietary intake practices often observed among market traders can impact negatively on dietary diversity, and subsequently on nutritional problems of women of reproductive age selling in markets.
Objective and Method: Dietary diversity, measured using the Minimum Dietary Diversity - Women was assessed among women of reproductive age selling in four selected open markets in Uyo metropolis in a descriptive cross-sectional study. Consumption of ≥5 food groups was considered to meet the requirement for adequate dietary diversity.
Results: A total of 325 women with a mean age of 32.20 years participated in the study. Dietary intakes were based primarily on starchy staples (100.0%) and flesh foods (45.2%), with moderate intakes of pulses (35.4%); nuts and seeds (29.2%) and vitamin A-rich dark green leafy vegetables (25.4%). Only 16.6% of women attained adequate dietary diversity. Consumption of individual food groups differed significantly based on the following factors: nuts and seeds ($p = 0.042$); eggs ($p < 0.001$) and other fruits ($p = 0.007$) differed across markets; other vegetables group ($p = 0.016$) differed based on age groups; nuts and seeds ($p = 0.008$) differed based on education; flesh foods ($p=0.006$) and eggs ($p = 0.013$) differed based on income while consumption of all dairy ($p = 0.044$) differed based on marital status.
Conclusion: Dietary intakes of women in this study were restricted to few food groups, hence low dietary diversity. Nutrition education package that emphasizes the importance of diversified diets, and include meal planning guides with cooking demonstrations can improve dietary diversity in the setting.

Keywords: Minimum Dietary Diversity - Women; Women of reproductive age; Food groups; Market traders; Uyo.

Introduction

Adequate nutrition for women of reproductive age (WRA) is essential to support the body's physiological functions, prevent nutritional deficiencies, and foster healthy reproductive outcomes[1-2]. However, hormonal changes, pregnancy, menstruation, lactation, and increased energy and nutrient demands often place unique nutritional challenges on WRA[3]. Malnutrition in all its forms is often prevalent among WRA,[4] and can have serious and far-reaching consequences, impacting not only the WRA themselves but also potentially resulting in negative health outcomes for their offsprings. For example, selected nutritional deficiencies, including protein, energy, zinc, vitamin D, and omega-3 fatty acids can adversely affect reproductive health through hormonal changes[5]. The consequences include, but not limited to pre-eclampsia, and eclampsia, miscarriage or stillbirth, intrauterine growth retardation, and preterm delivery[1-2].

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DOI: 10.61386/imj.v18i2.659

A high-quality diet furnishes the body with essential nutrients needed to function optimally while preventing diseases to support long-term health. Dietary diversity is a crucial component of diet quality and has widely been acknowledged in many dietary guidelines[6]. A varied diet increases the probability of meeting daily nutrient requirements by

improving nutrient intake from different items within major food groups, thus often considered a reliable indicator of nutrient adequacy[7]. The focus is to incorporate a broad range of food items within and across major food groups. The importance of dietary diversity in meeting women's nutritional needs has long been emphasized[6-7], leading to the development of dietary diversity indicators designed to evaluate micronutrient adequacy for intakes at individual levels. The Minimum Dietary Diversity – Women (MDD-W), updated from the Women's Dietary Diversity Score, is a dichotomous indicator based on 10 food groups. The MDD-W ascertains the likelihood that women aged 15 to 49 years consume at least five out of the ten designated food groups within a 24-hour reference period[6,8].

However, a single score obtained as dietary diversity score does not indicate the specific food groups consumed. Whereas, the emphasis on diverse diets often stresses the importance of incorporating foods from all sub-groups within each of the major food groups[9]. For instance, a healthy dietary pattern that meets criteria for vegetable consumption is described as one that incorporates foods from all five vegetable subgroups—dark green; red and orange; beans, peas, and lentils; starchy; and other vegetables[9]. For WRA, it is crucial to plan a diet that includes nutrient-dense options from a broader array of food groups in order to address specific nutrient requirements essential for optimal reproductive health. For instance, a WRA age whose diet is lacking in dairy products stands a higher risk of complications of childbirth linked to vitamin D and calcium deficiencies[10].

Maternal and young child malnutrition continues to persist at all levels. Beside the alarming rates of child malnutrition indices, the global prevalence of low birthweight, and anaemia in WRA stood at 14.6% in the year 2015 and 29.9% in the year 2019 respectively, indicating no likelihood of meeting the set global nutrition targets by 2025[11]. The situation within the African region is worse, as no progress was recorded for any country towards meeting the set targets; whereas, Nigeria has one of the highest rates for anaemia (55.1%) among WRA[11]. In light of these, poor dietary intakes can disproportionately put WRA selling in markets at disadvantage. This is because time constraint to prepare and consume healthy meals and over reliance on snacks and street foods resulting from unhealthy food environment within the market setting[12-13]; long sitting durations[13] and physical inactivity leading to fatigue and other related-health problems[14] can all predispose these women to unhealthy dietary intake patterns, putting them at increased risks of adverse health outcomes. The burden can be more challenging on WRA who are characteristically less informed of the right health seeking approaches as market traders[15-16], beside low economic status. These make it difficult for women to seek and receive help on time before complications arise.

Tackling nutrition-related health challenges among WRA selling in markets require multi-sectoral approaches that can address all underlying contributory factors. However, information on the nature and extent of nutritional inadequacies is necessary to formulate impact bearing policy interventions. While several studies have been conducted to assess dietary diversity among different groups in Nigeria[17-22], the dearth of information on dietary diversity among WRA in Akwa Ibom State, especially market traders, remains obvious. This study aimed at providing information on the diversity dietary (measured by MDD-W) of WRA selling in open markets. Consumption rates for specific MDD-W food groups over the reference period was also examined to identify the most important food groups consumed among these women, thereby revealing areas in need of improvement. The study also examined possible associations of selected socio-demographic factors with women dietary intakes. Obtaining adequate information on dietary intakes in this group is essential for informing public health strategies and interventions that will improve access to nutritious foods and empower women to make healthier food choices. For WRA selling in markets, such information can spur greater interest in investigating and understanding the dynamics of, and the environmental factors that impact their dietary intakes. This study was conducted to assess dietary diversity among WRA selling in selected open markets in Uyo, Nigeria.

Materials and Methods

Study setting: Uyo, the capital city of Akwa Ibom State, located in the South-South region of Nigeria, is situated between latitudes 4°58'N and 5°04'N and longitudes 7°51'E and 8°01'E. It covers an area of about 214.31 square kilometers. The city is a fast-growing metropolitan setting, serving as a major economic hub in the State. The study was conducted in four selected open markets with daily operations namely-Akpan Andem, Ifa, Etuk Street markets, as

well as Urua Okpopko. These markets serve as vital economic centers for Uyo Metropolis, servicing different segments of the population. While Akpan Andem and Etuk Street markets are the most commercialized and diverse, Ifa market, and Urua Okpokpo maintain strong community-based trading activities with more focus on agricultural produce and essential household items.

Study population: Participants consisted of consenting women, aged 15 to 49 years old, selling in selected markets for at least the past two years and whose usual intake as at the time of the study was not altered. Pregnant women and lactating mothers were excluded from the study.

Study design: The study adopted a descriptive cross-sectional design to assess dietary diversity among women of reproductive age selling in selected markets in Uyo Metropolis, Akwa Ibom State, Nigeria.

Sample size determination: Using a 5% precision level, 95% confidence interval, 10% prevalence of iron deficiency anemia among WRA in in four African countries[23] and 10% non-response rate, the minimum sample size was calculated using the Cochran formula[24] as shown.

$n = z^2 x (pq)/d^2$

where;

n = represents the minimum sample size;
z = the normal deviate corresponding to the desired confidence interval = 1.96
p = the proportion of elements in the study population with the key attribute being measured = 0.1
q = the proportion of elements in the study population without the key attribute being measured = 1-q =1-0.1 = 0.9
d = the desired degree of accuracy = 0.0025

The minimum sample size calculated was 152. However, the sample size was increased to 325 during data collection for the study.

Sampling technique:
A multistage sampling technique was adopted in selecting participants for the study. Four markets were randomly selected from the list of all open markets operated within the major streets in Uyo metropolis. Within each market, systematic random sampling was used to select market stalls for inclusion in the study. Traders found within selected stalls were included in the study as participants.

Study instrument and data Collection
A semi-structured questionnaire, consisting of two sections, was used to obtain information for this study. Section A was used to obtain information on socio-economic and demographic information, including markets, business line, sex, age, education, income, and marital Status. Section B consisted of a 24-hour dietary recall instrument, used in assessing dietary intakes over the immediate past 24 hours. Information was obtained on all foods, beverages and mixed dishes. Food quantities were estimated using simple household measures to ascertain the 15g minimum intake for each food group.

Data Analyses
Dietary Intake Analysis: Information obtained during dietary intake assessment was used to report dietary diversity and consumption of individual food groups based on the MDD-W. A food group was counted as consumed if the total quantities of foods consumed within such food group amounted to at least 15g[6,8]. To derive dietary diversity, a point was assigned to each food group consumed that met the criteria for consumption. The sum of all food groups consumed from the 10 food groups in MDD-W was calculated as the Dietary Diversity (MDD-W) score. The MDD-W score ranges between 0 to 10; consumption up to 5 or more food groups were classified as adequate; less than 5 food groups were classified as inadequate.

Statistical Analyses
All data were analyzed using the IBM-SPSS statistical software package, version 20. Quantitative data were summarized as mean and standard deviation while categorical data were summarized as frequencies and percentages. Chi-square test was used to assess the association between categorical variables and statistical significance was determined at $p < 0.05$.

Ethical considerations
This study was conducted following the World Medical Association's Helsinki declarations. Informed consent was sought and obtained from each participant prior to the study after a brief explanation

on the purpose of the study. Information obtained from each participant was handled with utmost confidentiality and used solely for the purpose of the study. The report obtained from the study was not linked to participants' identities. Participation in the study to the end was not mandatory and participants were duly informed.

Results

Socio-demographic Characteristics

A total of 325 women of reproductive age, with mean age, 32.2 ± 7.8 years, participated in the study (table 1). Majority, 297 (91.4%) attained at least secondary education and consisted of either single 102 (31.4%) or married 205(63.1%) women. About 44.3% earned below ₦30,000.00 monthly. Information on selected markets are shown in figure 1. The largest number of women in this study were drawn from Akpan Andem and Okpokpo markets. The most popular business line reported in this study was "mixed food items" where women traded on assorted food items (Figure 2). Those who traded on wears (including clothing and foot wears), as well as "meat and other proteins" constituted substantial proportion of women.

Consumption of MDD-W food groups and dietary diversity

Consumption of "all starchy staples" (figure 3), was recorded for all (100.00%) WRA. This was followed by "flesh foods" (45.2%). Pulses (35.4%), nuts and seeds (29.2%), and "vitamin A dark leafy vegetables"

Table 1: Socio-demographic Characteristics of women of reproductive age in Uyo

Variable	Number	Percent
Age Group (years)		
≤ 30	155	47.7
≥31	170	52.3
Mean±SD = 32.2 ± 7.8		
Education		
None	1	3.0
Primary	27	8.3
Secondary	219	67.4
Tertiary	78	24.0
Marital Status		
Single	102	31.4
Married	205	63.1
Separated/divorced	3	9.0
Widowed	15	4.6
Income		
≤ 29,000	144	44.3
30,000 - 50,000	138	42.5
51,000 -99,000	36	11.1
≥100,000	7	2.2

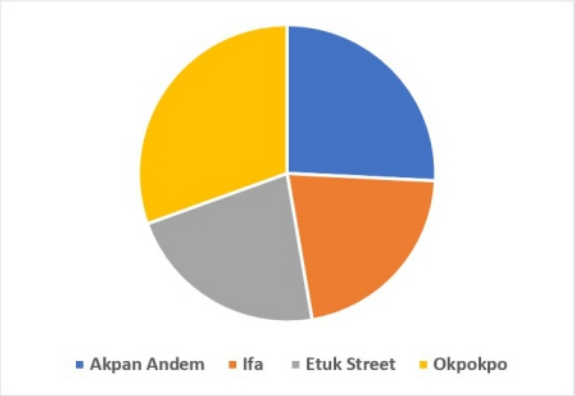

Figure 1: Distribution of participants based on selected markets

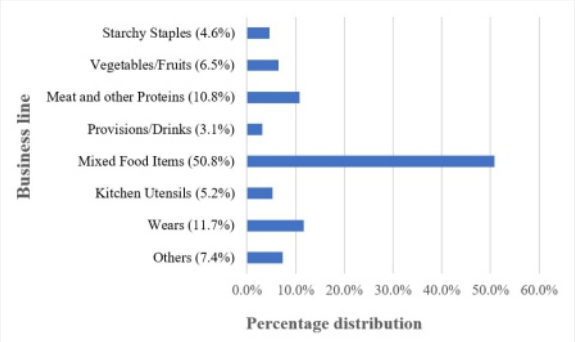

Figure 2: Percentage distribution of women's business lines

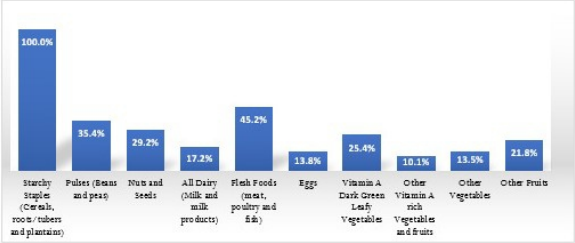

Figure 3: Consumption of MDD-W food groups among women

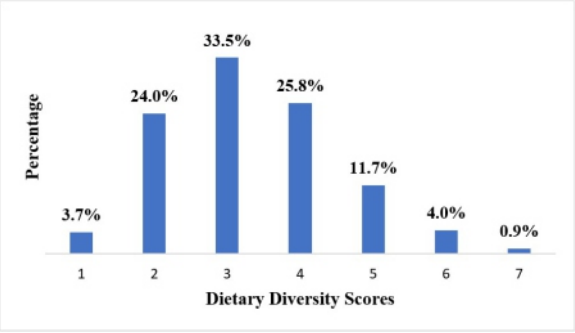

Figure 4: Minimum dietary diversity – Women scores

Table 2: Factors associated with Consumption of MDD-W food groups among women of reproductive age in Uyo

Variable	All Starchy Staples	Beans and Peas	Nuts and Seeds	All Dairy	Flesh Foods	Eggs	Vitamin A Dark Green Leafy Vegetables	Other Vitamin A Vegetables	Other Vegetables	Other Fruits
	No (%)	**No (%)**	**No (%)**	**No (%)**	**No (%)**	**No (%)**	**No (%)**	**No (%)**	**No (%)**	**No (%)**
Market										
Akpan Andem	84 (100.0)	27 (32.1)	25(29.8)	16 (19.0)	43 (51.2)	20 (23.8)	35 (41.7)	9 (10.7)	11 (13.1)	15 (17.9)
Ifa Market	70 (100.0)	24 (34.3)	21 (30.0)	12 (17.1)	27 (38.6)	2 (2.9)	39 (55.7)	13 (18.6)	14 (20.0)	9 (12.9)
Etuk Market	72 (100.0)	29 (40.3)	29 (40.3)	17 (23.6)	34 (47.2)	4 (5.6)	29 (40.3)	17 (23.6)	5 (6.9)	14 (19.4)
Okpokpo	99 (100.0)	35 (35.4)	20 (20.2)	12 (12.1)	43 (43.4)	19 (19.2)	38 (38.4)	17 (17.2)	14 (14.1)	33 (33.3)
p-value	NA	0.759	0.042*	0.263	0.440	<0.001*	0.126	0.200	0.157	0.007*
Age Group										
≤ 30 Years	155 (100.0)	61 (39.4)	46 (29.4)	25 (16.5)	66 (42.6)	24 (15.5)	73 (47.1)	28 (18.1)	16 (10.3)	40 (25.8)
≥ 30 Years	170 (100.0)	54 (31.8)	49 (28.8)	32 (18.8)	81 (47.6)	21 (12.4)	68 (40.0)	28 (16.5)	28 (16.5)	31 (18.8)
p-value	NA	0.153	0.866	0.523	0.359	0.414	0.197	0.704	0.016*	0.099
Education										
None	1 (100.0)	0 (0.0)	1 (100.0)	0.(0.0)	0 (0.0)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)
Primary	27 (100.0)	9 (33.3)	2 (7.4)	9 (33.3)	12 (44.4)	2 (7.4)	12 (44.4)	6 (22.2)	2 (7.4)	4 (14.8)
Secondary	219 (100.0)	78 (35.6)	62 (28.3)	34 (15.5)	92 (42.0)	26 (11.9)	96 (43.8)	40 (18.3)	29 (13.2)	46 (21.0)
Tertiary	78 (100.0)	28 (35.9)	30 (38.5)	14 (17.9)	43 (55.1)	17 (21.8)	33 (42.3)	10 (12.8)	13 (11.7)	20 (25.6)
p-value	NA	0.894	0.008*	0.139	0.184	0.114	0.834	0.592	0.639	0.164
Marital Status										
Single	102 (100.0)	39 (38.2)	30 (29.4)	18 (17.6)	42 (41.2)	14	46 (45.1)	18 (17.6)	10 (9.8)	22 (21.6)
Married	205 (100.0)	69 (33.7)	60 (29.2)	32 (15.6)	95 (46.3)	28 (13.7)	90 (43.9)	34 (16.6)	30 (14.6)	47 (22.9)
Separated/divorced	3 (100.0)	2 (66.7)	3(100.0)	2 (66.7)	2 (66.7)	1 (33.3)	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)
Widowed	15 (100.0)	5 (33.3)	4 (26.7)	5 (33.3)	15(100.0)	2 (13.3)	5 (33.3)	4 (26.7)	3 (20.0)	2 (13.3)
p-value	NA	0.585	0.995	0.044*	0.630	0.840	0.382	0.652	0.397	0.655
Income										
≤ 29,000	144 (100.0)	57 (39.6)	34 (23.6)	24 (16.7)	47 (32.6)	11 (7.6)	63 (43.8)	22 (15.3)	14 (15.3)	35 (24.3)
30,000 - 50,000	36 (100.0)	13 (36.9)	9 (25.0)	5 (13.9)	25 (69.4)	6 (16.7)	21 (58.3)	8 (22.2)	4 (11.1)	7 (19.4)
51,000 -99,000	138 (100.0)	44 (31.9)	51 (37.0)	25 (18.1)	70 (50.7)	28 (20.3)	56 (40.6)	26 (18.8)	114 (82.6)	110 (79.7)
≥100,000	7 (100.0)	1 (14.3)	1 (14.3)	3 (42.9)	5 (71.4)	0 (0.0)	1 (14.3)	0(0.0)	2 (28.6)	1 (14.3)
p-value	NA	0.359	0.064	0.315	0.006*	0.013*	0.105	0.436	0.116	0.786

No (%) = Number (Percent); NA = Not Applicable; * = differences between groups are statistically significant

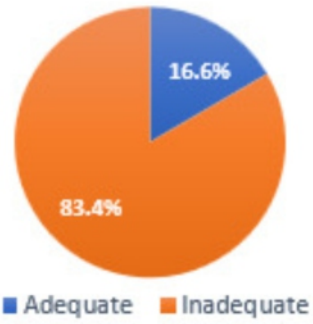

Figure 5: Dietary diversity adequacy among women

(25.4%) received moderate consumptions. Consumption of "other fruits" (21.8%), was a little higher than those of dairy (17.2%), eggs (13.8%), "other vegetables" (13.5%) and "other vitamin A rich fruits and vegetables" (10.1%), respectively.

Minimum dietary diversity scores obtained from this study ranged from a minimum of one to a maximum of seven (Figure 4), with a mean score of 3.37±1.2. The most common was three (3), recorded for 109 (33.5 %); followed by four (4) and two (2), reported for 84 (25.8 %) and 66 (24.0 %) WRA, respectively. The least scores were seven and one, recorded for 3 (0.9 %) and 12 (3.7 %) of the women, respectively. Only 16.6% of the WRA attained adequate dietary diversity in this study, (figure 5).

Table 3: Factors associated with Dietary Diversity Adequacy among Women of reproductive age in Uyo

Variable	Dietary Diversity Adequacy		p-value
	Yes	No	
	No (%)	No (%)	
Market			
Akpan Andem	16 (19.0)	68 (81.0)	0.781
Ifa Market	13 (18.6)	57 (81.4)	
Etuk Market	11 (15.3)	61 (84.7)	
Okpokpo	14 (14.1)	85 (85.9)	
Age Group			
≥ 30	28 (18.1)	127 (81.9)	0.301
31 - 49 Years	26 (15.3)	144 (84.7)	
Education			
None	0 (0.0)	1 (100.0)	0.331
Primary	2 (7.4)	25 (92.6)	
Secondary	35 (10.0)	184 (84.0)	
Tertiary	17 (21.8)	61 (78.2)	
Marital Status			
Single	17 (16.7)	85 (83.3)	0.868
Married	34 (16.6)	171 (83.4)	
Separated/divorced	1 (33.3)	2 (66.7)	
Widowed	2 (13.3)	13 (86.7)	
Income			
≤ 29,000	15 (10.4)	129 (89.6)	0.019*
30,000 - 50,000	11 (30.6)	25 (69.4)	
51,000 -99,000	27 (19.6)	111 (80.4)	
≥100,000	1 (14.3)	6 (85.7)	

No (%) = Number (Percent); * = differences between groups are statistically significant

Factors associated with Consumption of MDDS-W food groups and dietary diversity

Information on factors associated with consumption of specific food groups and dietary diversity are presented in tables 2 and 3, respectively. Consumption of nuts and seeds, ($p = 0.042$); eggs, ($p < 0.001$) and other fruits, ($p = 0.007$) differed significantly across markets. When compared to other markets, consumption of "nuts and seeds" was less common among WRA selling at Okpokpo market, consumption of eggs was more common among those selling at Akpan Andem and Okpokpo. Consumption of "other fruits" was higher in Okpokpo. Consumption of "other vegetables", differed significantly between age groups, $p = 0.016$, and was higher among older women. Consumption of "nuts and seeds" was associated with education, $p = 0.008$, while that of dairy differed significantly across marital status, $p = 0.044$. Consumption of flesh foods ($p = 0.006$) and eggs ($p = 0.013$) were associated with income, respectively. Table 3 gives information on factors relating to dietary diversity adequacy. Dietary diversity adequacy among WRA in this study differed significantly across income levels, $p = 0.019$.

Discussion

This study provided information on the most important food groups that made up overall daily consumptions, as well as the dietary diversity of WRA selling in selected markets in Uyo metropolis, Akwa Ibom State, Nigeria. The demographic information revealed a population of respondents that are considerably literate as most WRA obtained formal education up to secondary level. The study also revealed a substantive proportion of WRA that earned below the official minimum wage in the country as at the time of data collection for the study. These findings have implications for women's food choices and subsequent health. Education empowers women for better nutrition knowledge, desirable health seeking behaviours, greater economic power through employment, and healthier dietary choices[25]. Higher income guarantees better access to healthier food choices, leading to healthier dietary practices[26]. The proportion of married women recorded in this study gives insight into the proportion of the whole who are probably undergoing one form of reproductive condition or the other, reiterating the importance of adequate nutrition in the population.

One notable characteristic of traditional Nigerian diets is the predominant consumption of starchy staples (such as roots, tubers, cereals, and their products like swallows - gari, fufu, pounded yam, etc.; porridges; and pottages). This observation was evident in this study and aligns considerably with findings from selected household surveys where prevalent consumptions of starchy staples were noted[22]. In line with findings from the present study, consumption of foods from this group was reported for all WRA participating in a similar study in a south west region in Nigeria[27]. Starchy staples constitute one of the nutrient dense food items, particularly if consumed in minimally processed form. However, there is a growing popularity in consumption of processed and ultra processed food products in most settings, robbing consumers of the nutritional benefits of unprocessed and minimally processed foods, while predisposing them to chronic health conditions[28].

Consumption of protein sources, especially flesh foods, beans and peas were notable among WRA in this study. Besides providing good quality protein, these foods can contribute immensely to the probability of meeting the required daily intake of essential micronutrients. Furthermore, beans and peas are good sources of dietary fibre and antioxidants. Similar findings have been reported on the predominant consumption of these food groups among WRA age in Ekiti State, Nigeria[27] and in Southeast Nigeria[29]. Considerable consumption of foods from pulses noted in this study may have been attributed to cowpeas, a widely consumed legume across the country. It is often eaten as boiled beans, and can also be made into puddings - popularly known as moi - moi and Akara in Nigeria; beside other uses. Other pulses (Bambara beans, pigeon pea, African yam bean Lima and kidney beans, etc.) are relatively underutilized in Nigeria, hence do not make significant contributions to intakes[30]. The underutilization of other pulses undermines the principle of food variety across and within major food groups in the diet[9].

Consumption of fruits and vegetables were not popular among WRA in this study. It is obvious from the findings that, vegetables other than the green leaves are less popular in the population.

The trend in fruit and vegetables consumption across all sub-groups in this study is similar to those reported in a similar study in Ekiti, south west Nigeria[27]. Fruits and vegetables consumption are influenced by several factors, ranging from personal, familial, socio-cultural and environmental[31]. Of particular reference to the respondents in this study, environmental

factors, including physical availability and affordability could have exerted much influence on consumption of these nutrient dense items. Some of the dietary challenges of market traders include time constraints to prepare and eat homemade meals, making them rely more on street foods and excessive snacking[13].

Egg constituted one of the least consumed food groups in this study. A report on food consumption patterns in Nigeria identified egg consumption as an important dietary insufficiency in the country[32]. The rate of egg consumption in this study exceeded 4.8 to 9.6% range reported among WRA from four eastern States in Nigeria[29] but was lower than 21.3% reported among women in Ekiti State, Nigeria[27]. In addition to providing high-quality protein, eggs are also great sources of lutein and zeaxanthin, choline, omega 3 fatty acids, and vitamin D amongst others. These nutrients are essential for women's overall health and reproductive well-being. The chances of women missing out on the nutritional and health benefits of this food item is evident in low consumption levels in the group. As well, consumption of items from the dairy group was notably low in this study, but higher than 4.3% reported for WRA in south west Nigeria[27]. These observations fall in line with the notion that dairy products do not constitute important food ingredients in typical Nigerian diets[32]. The importance of dairy consumption in reproductive health cannot be overemphasized and needs timely action to safeguard women's health.

Dietary diversity in the present study was low, reflecting the probability of poor diet quality among WRA in the study. The study in Ekiti State reported 22.2% dietary diversity adequacy among WRA[27]. Women of reproductive age in south east Nigeria were reported to consume diets that had moderate diversity[29]. Similarly, it has also been reported that, the dietary intakes of WRA in developing countries is of low diversity[4]. Implications of these findings boarder on inadequate nutrients intakes, especially those of micronutrients. The MDD-W as an indicator, is specifically designed to reflect dietary adequacy, especially micronutrients intakes of WRA[6,8]. Low dietary diversity in the study population calls for appropriate actions to improve dietary practices of the population under study. Nutrition sensitive agricultural practices that encourage women to cultivate home gardens has been linked to improved dietary diversity among women[34-35].

Reports from this study indicates that, women's intakes, to some extent may have been predicted by the types of foods sold in each market. Consumption of eggs and other fruits were higher in two markets, whereas low consumption of nuts and seeds was noted in a market. The influence of food environment on food intake could have played out in this scenario. The types of food available in the neighbourhood food environment often predict to some extent the types of specific foods consumed and the dietary intake practices adopted by consumers within such environment[36-37]. Consumption of other vegetables; nuts and seeds; flesh foods, eggs and dairy were shown to associate with higher age, higher education, income and marital status, respectively. This reiterates importance of these factors in accessing good quality diet[36,38]. Long term interventions can target education and income to improve women's access to healthy diets.

A more easily identified strength of this study is the use of MDD-W in assessing dietary diversity among WRA. First, this index was specifically developed as a proxy of nutrient adequacy for women aged 15 - 49 years old. Secondly, the minimum 15g requirement for a food group to be counted ensures foods are consumed in amounts adequate to make significant contributions to nutrients intakes. The study also brought to focus, the contribution of specific food groups to the overall dietary diversity. This can spur interventions to increase consumptions of items within the identified food groups. However, reporting the consumption frequencies and the total quantities of each food group consumed could have revealed the food groups where consumptions were in excess, or and those on border line needing improvements. Also, information on the most consumed foods within each food groups can reveal the composition and nature of foods consumed that may be linked to certain health conditions. For instance, consumption of ultra processed foods can be revealed for appropriate intervention. Dietary intake assessment that depended on a one-day measurement does account for the day-to-day variations in intakes, hence does not represent a usual intake pattern.

Conclusion and recommendation

The study revealed low dietary diversity among women of reproductive age in this study. Dietary intakes of WRA in the study were based primarily on starchy staples, flesh foods (meat, fish and poultry), pulses (beans and peas), and to some extent on nuts and seeds, vitamin A rich vegetables and fruits, as well

as other fruits. Low dietary diversity and low intakes of selected food groups calls for sustainable approaches, both in the market place and at the community levels to enhance diversity in intakes and improve dietary patterns in the population. Nutrition education that includes importance of diversified diets, along with guides on simple but culturally appropriate meal planning guides and cooking demonstrations can sustain success in improving dietary diversity in the setting.

Acknowledgement
The authors wish to acknowledge all research assistants who participated in the course of data collection and analyses for this study.

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