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Assessing Dietary Diversity Score and Nutritional Status of Rural Adult Women in Abia State, Nigeria

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Research Article

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Abstract

Aim: The aim of the study was to assess dietary diversity score and nutritional status of rural adult women in Abia State, Nigeria. A sample of 240 women was selected using simple random sampling in Umunneochi Local Government Area of Abia State. Anthropometric characteristics were measured, while socio demographic information and dietary habits were assessed using a pre-tested questionnaire. A standardized Food and Nutrition Technical Assistance Project (FANTA) published 24-hour diet recall questionnaire for calculating women dietary diversity score (WDDS) based on 9 food groups was adapted and used for the rural women. Data were analysed using descriptives and chi square. The prevalence of overweight and obesity were 30.8% and 10%, respectively. Total dietary diversity score was 2.9 ± 0.74 with rural diets predominantly composed of starchy staples (0.77 ± 0.27). Majority (84.6%) of the rural women had low DDS. No relationship was observed between DDS and BMI (X^2=5.846; p=0.119) (p>0.05**).** Dietary diversification and nutrition education should be emphasized to promote traditional diets.

Keywords: Dietary diversity; Score; Nutritional status; Rural; Women

Introduction

Monotonous diets based mainly on energy dense, but micronutrient poor starchy staples are common in food insecure areas and have contributed to the burden of malnutrition, particularly, inadequate micronutrient intake [1]. Micronutrient malnutrition i.e. vitamin and mineral deficiencies, affects one third of the population worldwide [2]. In resource poor environment across the globe, low quality monotonous diets are the norm [3]. When grain or tuber based staple foods dominate and diets lack vegetables, fruits and animal sources of food, the risk for a range of micronutrient deficiencies is high, and women of reproductive ages constitute one of the vulnerable groups [4]. Poor nutrient status among women is a global problem and is most severe for poor women. Diverse diet has been shown to protect women against chronic disease [5]. Malnutrition among women is likely to have a major impact on their own health as well as their children's health. More than 3.5 million women and under five children in developing countries die each year due to underlying causes of malnutrition [6]. Between 5 to 20 percent of women in various African countries are underweight [7]. Many African women display low weight-for- height by body mass index of less than 18.5kg/m^2 [7]. Women in low economic settings often consume inadequate amount of micronutrients, because of resource limitation [8]. They have a limited intake of animal source foods, fruits and vegetables, thus leading to intake of micronutrient that is less than recommended value and this increases women's risk of micronutrient deficiency [9].

Dietary diversity score is defined as the number of different food groups consumed in the 24 hours preceding the recall [10]. Longer reference periods have been reported to result in less accurate information. Food based strategy has been recommended as the first priority to meet micronutrient needs [3]. An essential element of food based approach involves dietary diversification (i.e. consumption of a wide variety of foods across nutritional distinct food groups) [11]. United State dietary guidelines recommend using a variety of grains as well as fruits and vegetables [12]. In developing countries, it has been advocated that methods for evaluating nutrient adequacy should be simple and practical [12]. Hatloy *et al.* [13] showed that dietary diversity score could give a fairly good assessment of the nutritional adequacy of the diet [14]. However, in rural areas of developing countries, the measurement of dietary diversity is complex because populations often receives little education and generally share food from communal bowl [15]. Consequently, dietary diversity is frequently assessed by the use of simple tools such as dietary diversity score [8]. These scores are promising measurement tools in industrialized as well as developing countries and studies have indicate that they are good proxies of overall dietary quality [16] and are also positively associated with the nutritional status of adults [17]. The aim of this research work was to assess the dietary diversity score (DDS) and nutritional status of rural adult women in Umunneochi Local Government Area in Abia State. This research work can provide base line information as regards dietary diversity in the area and serve as a tool for improving the nutritional status of rural adult women.

Materials and Methods

Study area

The study was carried out in Umunneochi Local Government Area (LGA) of Abia State. It is one of the seventeen Local Government Areas in Abia State as well as one of the 773 local Government Areas in the Federal Republic of Nigeria [18]. With a population of over 163,000 people, Umunneochi has rich land mass and is unique in having boundaries with all the four states of south east (Anambra, Imo, Ebonyi and Enugu). It has nine autonomous communities and the inhabitants are mostly farmers and traders. It is the home of cashew, besides all the other staple food crops available in South east and tropical belt. The crops mostly grown in Umunneochi are cassava and yam and they also rear animals.

Study population

The study population consisted of rural women in Umunneochi Local Government of Abia State and those targeted were women of reproductive age (15-49years) [3].

Sample Size determination

A sample size of 240 was calculated using FAO [19] formula: $Z^2xP\ (100\text{-}P)/Z^2$, where Z=critical standard z-score for estimated probability of 1.69 approximated to 2, P=proportion of women exhibiting low dietary diversity 18.3% [20], X=Margin of error (usually taken to be 5%), 100-p= number of estimated percentage.

Sampling technique

Simple random sampling was conducted among the nine autonomous communities in the Local Government Area and three autonomous communities were randomly selected. Balloting was used to select women of reproductive age (15-49years) from different households to obtain a sample size of 240.

Preliminary activities and market survey

Before embarking on the study, the traditional ruler of Umunneochi community was visited and enlightened on the reason for conducting the study. The women who were selected for the study were informed about the aims and objectives of the study and their consent (oral) and cooperation were solicited. A market survey was also done to identify local foods and commonly consumed mixed dishes as well as the ingredients used in the preparation to be included in the dietary diversity questionnaire.

Training of research assistants

Three research assistants were trained on questionnaire administration and anthropometric measurements. The research assistants were trained on how to conduct interviews, identify the food groups and the individual foods in each food group in order to place recalled foods appropriately into the food groups.

Data collection

Data collection involved the use of a questionnaire to obtain information on socio-demographic characteristics of the rural women and their dietary habits.

Anthropometric measurement

Anthropometric measurement of height, weight, mid upper arm circumference (MUAC), waist and hip circumference were taken using standard procedures. Body weight was measured with a Hanson body weight scale. This was adjusted to zero before weighing each woman. The weight measurement was taken to the nearest 0.1kg as described by WHO [21]. A vertical measuring wooden stick reading a maximum of 175cm was used to measure the height of the women. The women were bare footed, had their hand hanging loosely with feet parallel to each other, height measurement was taken to the nearest 0.1m as described by WHO [21]. The mid upper arm circumference was measured to the nearest centimeter with a non stretchable tape on the left arm of the subject. The arm circumference measurement was taken with the hands hanging freely by the side and the tape was placed round the arm without compressing the skin. The measurement was made between the tip of the acromium process of the scapular and the olecranon process of the ulna [22]. The waist circumference was measured at the midpoint between the lower margin of the last palpable rib and the top of the iliac crest, using a non stretchable tape. Hip circumference was measured at the widest portion of the buttocks with the tape parallel to the floor as described by WHO [23]. Waist-hip ratio (WHR) was calculated as the ratio of the waist to that of the hip. A waist hip ratio (WHR) of >0.85 in females was used to determine those at risk of abdominal obesity [23]. Body mass index (BMI) was calculated as weight (kg)/Height (m^2). The women were grouped into various BMI classifications. Women with a BMI less than 18.49 kg/m^2 were regarded as underweight, those between 18.5-24.99 kg/m^2 were regarded as normal, 25.0-29.99 kg/m^2 as overweight, while those that have BMI greater than 30.0 kg/m^2 were regarded as obese [23].

Assessment of dietary diversity

Dietary assessment was investigated using the 24hour dietary intake interview. The women were asked to recall the foods consumed both within and outside the home in the last 24hours. The ingredients used in preparation of mixed dishes were also noted [3]. Dietary diversity was assessed using a standardized Food and Nutrition Technical Assistance Project (FANTA) questionnaire for calculating women dietary diversity score based on 9 food groups [3]. The WDD questionnaire nine food groups are: (i) starchy staples (ii) Vitamin A-rich dark green leafy vegetables (iii) vitamin A rich fruits and vegetables and palm oil (iv) organ meat (v) meat and fish (vi) eggs (vii) legumes (viii) nuts and seeds (ix) milk and milk product. Locally available foods consumed by women in the locality were identified and incorporated into the respective food groups. Dietary diversity score was calculated based on the nine food groups. Each food group was assigned a score of one if any food item within the food group was consumed more than twice daily. In the case where an individual consumed only one or two items from a food group over 24 hours, a score of half was given to that food group. The sum of the different food groups summed up to 9 points and this indicated the dietary diversity score for an individual. Women with a dietary diversity score of more than six (>6) were classified as having high dietary diversity, 4-6 was medium, while <4 was classified as low dietary diversity based on FAO [3].

Statistical analysis

Data were coded and the means and standard deviations were calculated for the dietary diversity and anthropometric measurements. Frequencies and percentages were used to compute data on socio-demographic characteristics. The scores obtained from the dietary diversity questionnaire were compared with standard from the Food and Agricultural Organization [3]. Relationship between nutritional status (BMI) and dietary diversity was assessed using Chi square. A p-value of less than 0.05 was accepted as statistically significant.

Results

Table 1 represents the socio-demographic characteristics of the rural women. Some of the rural women were within the age range of 22-28 years (27.9%), 29-35 years (24.2%) and 36-42 years (24.6%). Majority (60%) were married, 55% had up to secondary school education and were mostly artisans (43.7%) and traders (39.6%). More than one third (40.4%) had income less than #5,000, had 1-3 children (36.7%), household size of 4-6 (45.5%) and were from monogamous family (72.9%).

Parameters	Frequency	%
Age group (years)		
15-21	24	10.0
22-28	67	27.9

29-35	58	24.2
36-42	59	24.6
43-49	32	13.3
Total	**240**	**100**
Marital status		
Single	84	35
Married	144	60
Divorced	2	0.8
Widowed	10	4.2
Total	**240**	**100**
Educational status		
No formal education	44	18.3
Primary education	42	17.5
Secondary education	132	55
Tertiary	22	9.2
Total	**240**	**100**
Occupation		
Full time house wife	18	7.5
Trader	95	39.6
Farmer	18	7.5
Artisan	105	43.7
Civil servant	4	1.7
Total	**240**	**100**
Income earned		
Less than N10,000	97	40.4
N10,000-20,999	95	39.6
N21,000-30,999	18	7.5
N31,000-40,999	18	7.5
N41,000-50,999	12	8
> N60,000	0	0
Total	**240**	**100**
Number of children		
1-3	88	36.7
4-6	63	26.2
7-9	57	23.8
> 9	19	7.9
None	13	5.4
Total	**240**	**100**
Household size		
1-3	35	14.6
4-6	109	45.4
7-9	65	27.1
> 9	31	12.9
Total	**240**	**100**
Family type		
Polygamous	65	27.1
Monogamous	165	72.9
Total	**240**	**100**

Table 1: Socio-demographic characteristics of the rural women (n=240).

Table 2 shows that most of the women sometimes produce and purchase their foods (37.5%), while 27.6% and 24.6% purchase and produce their foods, respectively. About one third of the respondents (32.3%) noted that the main factor that determines their choice of food was the cost.

Parameters	Freq	%
Source of food		
Own produce	59	24.6
Purchased	66	27.5
Borrowed/ gifts from friends and relatives	1	0.4
Food aid	24	10
Produce and purchase sometimes	90	37.5
Total	**240**	**100**
Factors that determine choice of food		
Religion	10	4.2
Culture	35	14.6
Time	58	24.6
Cost of food	78	32.5
Food in season	59	24.6
Total	**240**	**100**

Table 2: Distribution of women according to source of food and factors that determine choice of Foods (n=240).

Table 3 presents the dietary habits of the respondents. Majority (60.4%) of the respondents ate three meals per day and more than half (50.8%) skipped meals. Some (23.8%) missed lunch, 21.7% missed breakfast, and 5.4% miss dinner while 49.2% missed none. The main reason for missing meals was due to busy schedule (33.3%). Majority of them (72.9%) ate in-between meals, more than one third (38.3%) consumed snacks in-between meals, while 28.8% ate fruits in-between their meals. The favorite food for 47.1% of the women was *garri* and soup, while 36% and 10.8% indicated rice and beans, respectively. More than one third of the respondents (44.6%) choose these foods as their favorite because it is readily available, while 21.2% indicated it was easy to cook. Most of the respondents (43.3%) consumed fruits daily and 24.6% consumed fruits once a week. Less than half of the respondents (48.8%) consumed fruits because it is nourishing, while 21.2% and 25.5% noted it was due to its sweetness and taste, respectively. About 39.2% and 37.1% consumed vegetables weekly and daily, respectively.

Parameters	Freq	%
Number of meals eaten per day		
One	4	1.6
Two	88	36.7
Three	143	60.4
Four	3	1.2
Total	**240**	**100**
Meal skipping		
Yes	122	50.8
No	118	49.2
Meal normally skipped		
Breakfast	52	21.7
Lunch	57	23.8
Dinner	13	5.4
Do not skip meals	118	49.2
Total	**240**	**100**

Reasons for skipping meal		
No money to buy food	31	12.9
Health reason	12	5.0
Very busy	79	32.9
Don't skip meals	118	49.2
Total	**240**	**100**
In –between meals eaten		
Yes	175	72.9
No	65	27.1
Total	**240**	**100**
Types of in between meals eaten		
Snacks	140	58.3
Fruits	89	37.1
Carbonated drinks	11	4.6
Total	**240**	**100**
Favorite foods		
Garri and soup	113	47.1
Rice	83	34.6
Beans	26	10.8
Yam	18	7.5
Total	**240**	**100**
Reasons for favorite foods		
Always available	107	44.6
Easy to cook	51	21.2
Health reasons	49	20.4
It is affordable	28	11.7
Taste	5	2.1
Total Frequency of consuming fruits	**240**	**100**
Daily	104	43.3
Once a week	59	24.6
Twice a week	35	14.6
Rarely	42	17.5
Total Reason for consuming fruits	**240**	**100**
They are nourishing	117	48.8
Taste	60	25.0
They are sweet	51	21.2
They are affordable	12	5.0
Frequency of consuming vegetables		
Daily	89	37.1
Weekly	94	39.2
Twice a week	29	12.1
Not sure	28	11.7
Total	**240**	**100**

Table 3: Dietary habits of the rural women (n=240).

Mean anthropometry of the women showed that the mean weight, height, BMI and MUAC were 64.24kg, 160.7cm, 25.23kg/m^2 and 28.27cm, respectively (Table 4). The prevalence of overweight and obesity were 30.8 and 10%, respectively, while 79.6% had abnormal waist hip circumference ratio (Table 5).

Parameter	Mean	Std. deviation
Weight (Kg)	64.24	± 11.52
Height (cm)	160.7	± 7. 87
B MI (Kg/ m^2)	25.33	± 10.27
MUAC (cm)	28.27	± 3.59
Waist circumference (cm)	86.87	± 10.01
Hip circumference (CM)	97.27	± 11.54
Waist-hip circumference ratio	0.88	± 0.05

Table 4: Mean anthropometric characteristics of the rural women.

Parameters	Frequency	Percentage
BMI classification (kg/m^2)		
Underweight (16.00-18.49)	10	4.2
Normal (18.50-24.99)	132	55.0
Overweight (25.00-29.99)	74	30.8
Obese (>30)	24	10
Total	**240**	**100**
Waist-hip ratio		
Normal (< 0.85)	49	20.4
At risk (>0.85)	191	79.6
Total	240	100

Table 5: Nutritional status indicators of the rural women.

Table 6 represents the contributions of foods from different food groups. Some of the respondents (26.28%) consumed foods from starchy staples, followed by vitamin A rich fruits and vegetable (19.72%) and meat/fish products (17.22%). The least consumed food group was from egg (0.85%) and organ meat (1.92%) groups.

Food groups	Percentage (%)
Starchy staples	26.28
Vitamin A rich fruits and vegetables	19.78
Meat and fish	17.22
Dark leaf vegetable	11.88
Other fruits and vegetable	9.04
Legumes, nut and seed	8.90
Milk and milk product	4.13
Organ meat	1.92
Eggs	0.85
Total	**100**

Table 6: Contribution of different food groups.

Table 7 shows the mean dietary diversity score of the rural women. Starchy staples had the highest mean dietary diversity score of 0.77 ± 0.27, followed by vitamin A rich fruits and vegetables 0.58 ± 0.27, while, the egg group had the least dietary diversity score of 0.03 ± 0.10. The total dietary diversity score was 2.94 ± 0.74. The table also revealed that majority of the rural women (84.6%) fell in the low dietary diversity category, while 15.4% were at the medium dietary diversity score. None of the women was in the high dietary diversity category.

Food groups	Mean (SD)
Starch staples	0.77 ± 0.27
Dark leafy vegetables	0.58 ± 0. 27
Meat and fish	0.50 ± 0.28
Dark leafy vegetables	0.35 ± 0.25
Other fruits and vegetables	0.26 ± 0.26
Legumes, nuts and seeds	0.26 ± 0.27
Milk and milk products	0.12 ± 0.21
Organ meat	0.06 ± 0.17
Egg	0. 03 ± 0.11
Total food group mean score Dietary diversity score	**2.94 ± 0.74 Frequency (%)**
Low dietary diversity score (<4)	203 (84.6)
Medium dietary diversity score (4-6)	37 (15.4)
High dietary diversity score (> 6)	0 (0)

Table 7: Mean dietary diversity and dietary diversity score of the rural women (n=240).

The association between dietary diversity and nutritional status showed no significant relationship (r=5.84; p=0.119) (p>0.05) (Table 8).

Parameter	Dietary Diversity Score (%)						X^2	P-Value
	Less than 4		Medium(4-6)		Total			
	Freq	%	Freq	%	freq	%		
Underweight	10	4.9	0	0	10	4.2		
Normal	108	53.2	24	64.9	132	55	5.846	0.119^{ns}
Overweight	66	32.5	8	21.6	74	30.8		
Obesity	19	9.4	5	13.5	24	10		
Total	**203**	**100**	**37**	**100**	**240**	**100**		

Ns= not significant

Table 8: Association between dietary diversity and nutritional status.

Discussion

Dietary diversity was measured in this study by using a simple score over a 24 hour period and this reflects current intake. The low educational level of the rural women could have accounted for their low income. This is because education is an important determinant of work or occupation that is available to mothers and fathers as well as possible income level [24]. A mother requires knowledge; understanding and self confidence to make informed choices that will be beneficial to her wellbeing and those of her children [25]. Meal skipping was common especially breakfast and lunch and this was mainly due to time constraint. The fact that most of the women were traders means that they would likely leave home early in the morning to meet up early with market activities. A study [26] reported that the usual practice of skipping breakfast is a function of most women leaving home early in the morning and this may predispose them to nutrient deficiencies. Snacking habit may also affect the nutritional status of the women since most of them consumed fatty and high energy dense foods. The fact that some of them consumed fruits is encouraging. The reason for this may be because these fruits are usually available in rural areas. Even if these fruits are sold, the price may still be affordable in such areas.

Diversification of diets has been shown to increase the intake of energy as well as micronutrients in developing countries [27]. Total mean dietary diversity score was

observed to be very low (2.94 ± 0.74). The food group with the highest mean score was the starchy staples (e.g. rice, yam, cassava etc), followed by vitamin A rich foods (such as pawpaw, tomatoes, palm oil, green leafy vegetables). The higher mean DDS for starchy staples indicates that it is what is predominantly grown in the area and majority of them choose their food based on availability and seasonality. Despite the high consumption of vitamin A rich food group, the main sources were from plant foods which are not usually bio-available due to losses that occur during cooking and processing. Palm oil contributed to a higher percentage of vitamin A consumption, since it is generally used in the preparation of pottages, soups and sauces by the women. Consumption of dark leafy vegetables was high and this could be due to the fact that vegetables such as *ugu* (*Telfeira occidentalis*) form part of the diets of people in the South eastern part of Nigeria where they are commonly used in the preparation of soups/sauces which is a major relish locally consumed with cassava flour. These vegetables are also easily accessed from backyard gardens and farms in such rural setting. Kennedy and Powell [28] noted that increased food variety with consumption of more fruits and vegetables is associated with lower energy consumption, a lower BMI and perhaps also reduces the risk of obesity in adults. Low consumption of animal sources of vitamin A could be attributed to economic constraint. The low occurrence of milk and milk products (0.12 ± 0.21) could be due to the fact that milk is not common in diets of people in developing countries. Little quantity may be added to beverages or corn gruel (*pap*) and this could probably explain the low consumption level observed in this study. Similarly, consumption of eggs was low indicating that diets of the rural women constitutes very little animal protein sources and this in turn can predispose the women to protein, vitamin A, iron and calcium deficiencies. It is thus necessary to improve dietary diversity of households in the study area.

Majority of the women had low dietary diversity with none being in the high category. The low DDS could be a function of the socioeconomic status of the rural women as most of them earned low income. The low income could lead to their inability to afford or access a large variety of foods. The low dietary diversity score of the rural women in terms of food groups indicates that the women may not meet their micronutrient requirements. A South African study noted that lower socioeconomic groups cannot afford a healthy diet due to cost and as such they drift to poor quality, energy dense and cheap foods [29]. Similarly, some studies [30-31] reported that less processed foods like fruits and vegetables generally do cost more and that the cost is a barrier to urban poor in South Africa consuming less healthy foods.

The low DDS of the rural women in this study is similar to that carried out on rural women in south western Nigeria which reported low dietary diversity *Nupo et* al. [32]. The result is slightly lower than previous findings [33,34], that reported DDS of 4.2 and 3.5 in urban settings of Mexico and Botswana, respectively. Other studies [35,36] reported that people who reside in rural areas were more likely to adopt their traditional food culture and this has been found to be associated with a more diversified diet. However, the reverse was the case in the study area as the diets of the women was not varied. Rather, their diet was monotonous in nature with starchy staples dominating and this can indeed pose a risk for a range of micronutrient deficiencies.

The high prevalence of overweight (30.8%) and obesity (10%) coupled with abdominal fat accumulation could be attributed to their high consumption of starchy staples which are usually energy dense. No significant relationship was found between dietary diversity and the nutritional status of the rural women in this study (X^2=5.846; p=0.119). This may support the findings of Kennedy *et al*. [37] and Styen *et al*. [38] that BMI is regarded as an outcome of energy balance, with particular reference to weight while DDS is associated with adequate macro and micronutrients intakes [37,38].

Conclusion

The result showed that dietary diversity score was low over the reference period. Considering the importance of dietary diversity to nutrition and health, these results show the need to mobilize efforts to ensure that people have better access to and knowledge about adequate nutrition and dietary diversification.

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