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Nutritional Status of Pregnant Women Attending Antenatal Care in a tertiary Health Facility in Abeokuta, South West Nigeria

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ABSTRACT

Poor nutrition affects everyone negatively, mothers and children are particularly at risk due to a combination of physiological and socioeconomic factors. This study was done to assess the nutritional Status of pregnant women attending antenatal care in a tertiary health facility in Abeokuta, Ogun state. Dietary diversity score, food frequency questionnaire, food consumption score analysis, anthropometric assessment and biochemical assessment were used. Data was collected using a semi structured using Statistical package for Social Sciences (SPSS). Blood samples were taken from the respondents for the biochemical test. A total of 398 respondents participated in the study and the majority of the respondents were between 26 and 30 years with 44%. The respondents' monthly income was mainly between ₦31,000 and ₦50,000 as represented by 44.7% of the respondents. The study showed that 94.7% of the respondents consumed cerea lor roots, 96.7% consumed vegetables and 63.6% of the respondents had a high dietary diversity score. The study also showed that 12.8% of the respondents were at risk of malnutrition. In conclusion, carbohydrate foods were the most consumed. There is a significant relationship between the dietary diversity score, the food consumption score and most socio-economic variables.

Keywords: trimester, hemoglobin, pregnancy, malnutrition

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INTRODUCTION

Many sub-Saharan African societies view pregnancy as a joyful state since it heralds the birth of a new human being. However, due to a number of variables, including poor maternal nutritional status, many of these nations have unfavorable maternal and child health indices **(Desyibelew and Dadi, 2019).** Dietary factors are well-established independent variables that are linked to pregnancy outcomes and maternal weight gain during pregnancy. These factors include the

presence or absence of food restrictions, the overall quality of the diet, feeding practices, dietary transgressions, as well as inadequate knowledge of nutrition (**USAID, 2018**; **Gebre et al., 2018).** Globally, poor nutritional status is a complex issue that affects everyone. Severe malnutrition is a problem in low- and middle-income countries, which increases morbidity and mortality globally. Undernutrition, which is the consumption of food lacking in macronutrients (calories and protein), and occasionally micronutrients (multivitamins and minerals), and overnutrition, which is the consumption of too many calories and inadequate nutrients, constitute malnutrition (**Franca et al., 2016; FAO, IFAD, UNICEF, WFP, WHO, 2018).**

Evidence shows that a woman's periconceptional nutritional state and nutritional condition throughout pregnancy are essential and crucial because they influence and permit a good pregnancy outcome. A significant factor in determining the success of a pregnancy and the growth of the fetus is maternal nutrition during pregnancy and preconception **(Woldeamanuel et al., 2019).** This has a serious consequence for pregnant women due to there nutritional needs (**Amodu et al., 2020).** As well as the first two years of a child's existence, preventing negative pregnancy outcomes such as stunting and ensuing obesity and non-communicable diseases in adulthood **(Franca et al., 2016).** Pregnancy weight growth plays a significant role in determining fetal birth weight and delivery outcomes. Restricted weight gain suggests a serious and prolonged dietary shortage. Pregnant women frequently experience malnutrition, which can show up as anemia or undernutrition (**Adinma et al., 2017; Adeogun and Adeoti, 2019).**

Nutritional status is considered an important indicator in estimating the well-being of the population affected by crises and emergencies. This helps with strategy planning through identification and prioritization of needs and the use of resources, to prevent malnutrition among these populations (**Tang et al., 2016; Diddana, 2020).** A widely used method for assessing of weight gain in pregnancy is body mass index (BMI), However, a review of literature between 1995 and 2012 by Médecins sans Frontières confirmed that MUAC is a more acceptable way for diagnosing acute malnutrition in pregnancy because its change is insensitive or has little change with the effect of pregnancy (**Médecins, 2019).** Knowledge about proper nutrition and a balanced diet during pregnancy is considered important for the well-being of both the mother and fetus (**Sirajuddin et al., 2014).** During pregnancy nutritional problems can affect the mother and fetus, so special attention is needed **(Adinma et al., 2017**; Adeogun and Adeoti, 2019) and more researches are required in that area

MATERIALS AND METHODS

Methodology

Study design

The study was a descriptive cross-sectional study to assess the nutritional status of pregnant women attending antenatal care in the federal Medical Centre, Abeokuta, Ogun State

Study area

Abeokuta is the capital city of Ogun State in southwest Nigeria. It is situated on the east bank of the Ogun River, near a group of rocky outcrops in a wooded savanna; 77 kilometers north of Lagos by railway, or 130 kilometres by water. As of 2006, Abeokuta and the surrounding area had a population of 449,088 (Nigeria Population **Commission, 2006).** Abeokuta lies below Olumo Rock, home to several caves and shrines. The town depends on the Oyan River Dam for its water supply, which is not always dependable. **(*Hoiberg,* 2010).**

Study location

Federal Medical centre Abeokuta 250-bedded regional specialist hospital which came into existence on April 21, 1993 with a philosophy of excellence in the provision of medical services to the gateway state of Ogun and other neighboring states and nations. Over the years, the scope of this philosophy has gradually expanded to further encompass excellence in training and research so that today we can rightly say that the hospital stands on a tripod of excellence in research, training and health care service delivery. The hospital has about 13 wards with each specialty having a consultant.

Study Population

The study population comprised consisted of pregnant women receiving ante natal care service at federal medical centre Abeokuta, Ogun state.

Sample size determination

The sample size was determined using the formula for descriptive studies (**Araoye, 2008**)

$$n = \frac{Z^2 p(q)}{d^2}$$

Where; n is the desired sample siz

Z is the standard normal deviate at 95% confidence level (1.96);
p is the proportion of the target population estimated to have characteristic being measured i.e 33.3% prevalence of maalnutrition among pregnant women in Nigeria (**Adeogun and Adeoti, 2019)**
q is 1-p; and
d is the level of statistical significance set = 0.05.
p= 33.3% = 0.333
q= (1-p) = 1-0.333 =0.667
d= 5% = 0.05

$$n = \frac{1.96^2 \times 0.333 \times 0.667}{0.05^2}$$

n = 341

Ultimately, 398 respondents participated in the study.

Sampling technique

Random sampling method was used in the selection of eligible pregnant women for the study.

Inclusion criteria

Pregnant women attending the antenatal clinic of Federal Medical Centre, Abeokuta who willing to participate in the study were recruited.

Exclusion criteria

Pregnant women who are unwilling to be part of the study, those who are severally ill or on wheelchairs at the time of the study were excluded.

Ethical approval

Prior to the study, an approval letter was obtained from the Department of Chemical and Food Sciences, Bell University of Technology, Ota. Ethical clearance was obtained from the ethics

committee of the Federal Medical Centre, Abeokuta. All the interviews were conducted after getting informed consent from the respondents.

Instruments for data collection

Interviewers administered questionnaires to obtain data. Section A contained questions on the socioeconomic and demographic characteristics of the respondents. The socioeconomic and demographic variables include age, level of education, husband's educational status, number of household members, occupation, level of income per month, husband's occupation. Section B focused on dietary practices and dietary diversity,the food frequency questionnaire and the food consumption score of the respondent. Section C comprises the medical history of the respondent. Finally, section D of the questionnaire contained a column for recording of the anthropometric and biochemical data.

Dietary diversity score

FAO (2016) 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-hour period to the assessment. Foods were categorized into 12groups based on FAO recommendations as follows: (i) cereals, (ii)vegetables, iii) fruits, (iv) meat, (v) egg, (vi) fish and other sea foods, (vii) legumes, nuts and seeds, (viii) milk and milk products, (ix) oil and fats, (x) sweets, (xi) spices, condiments and beverage, and(xii) tubers and roots. Commonly consumed foods in the area were incorporated into each food group. The response categories were "yes" if at least two food items in a group were consumed and were scored one point. However, half a point was awarded for food items less than two. In cases 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 were used to classify into low (≤4), medium (5-8) and high (9-12) (FANTA, 2013).

Food consumption pattern using a food frequency questionnaire

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 Consumption Score Analysis

Food items were 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 a weight, reflecting its nutrient density for each participant, the street food consumption score was calculated by multiplying the frequency by each food group weight, and then the summing these scores into one composite score. score between 0 to 21 were regarded as poor food consumption; while scores between 21.5 to 35 were regarded as borderline food consumption and scores greater than > 35 were considered as acceptable food consumption.

Anthropometric assessment

MUAC measurement

The tape measurement was used to measure the MUAC of the pregnant women, this was done to determine their nutritional status during the pregnancy. The measurement of MUAC was made while the woman stood up relaxed with her left arm hanging down with no clothing on the arm and this was done twice for each respondent to ensure accuracy. The left arm was used as it

shows malnutrition while the right arm which is frequently used, shows lean muscle mass as a result of work. The MUAC was measured by first finding the mid-point of the upper arm and then measuring the circumference. The MUAC of the left arm was taken and recorded twice to nearest 0.1cm (**FANTA, 2013**).

Biochemical data

The haemoglobin concentration

The haemoglobin concentration was determined using the haemoglobin paper scale. The fingers of the respondents were pricked for blood samples using a lancet. The blood samples were dropped on the haemoglobin paper and allowed to dry. The blood spot was immediately matched against the given color standards and the corresponding value was recorded on the questionnaire. Hemoglobin concentration less than 11g/dl. It is considered severe when hemoglobin concentration is less than 7.0g/dl, moderate when hemoglobin falls between 7.0 and 9.9g/dl, and mild when hemoglobin is from 10.0 to 10.9g/dl (**WHO, 2015**).

Determination of serum ferritin

Serum ferritin was determined using Abcam's ferritin (FTL) rat ELISA kit according to the manufacturer's protocol. The ferritin present in samples reacts with the anti-ferritin antibodies that have been adsorbed to the surface of polystyrene microtiter wells. After the removal of unbound proteins by washing, anti-ferritin antibodies conjugated with horseradish peroxidase (HRP) will be added. These enzyme-labelled antibodies form complexes with the previously bound ferritin. Iron deficiency was defined as serum ferritin levels below 12g/l.

Statistical analysis

Data collected in the field and those obtained through laboratory work was processed using codes entered into an Excel spreadsheet. Statistical analysis was performed using the statistical package for social science (SPSS version 25). Descriptive statistics such as frequencies, percentages, means, and standard deviation was used to analysed the socio-demographic characteristics and socioeconomic parameters, nutritional status, and health status of the respondent. The chi-square and pearson product moment correlation establish the relationship between nutritional practices, and nutritional status. Level of significance was set at $p<0.05$.

RESULTS AND DISCUSSION

Result

Socio-demographic/ economic characteristics of pregnant of the respondent

The result analysis revealed that slightly below half (44.0%) of the pregnant mothers fall within the age bracket of 26–30years, followed by the age group 31-35years. Yoruba was the dominat ethnicity in the study, about 80.2% of them were yoruba while 17.3% were lgbo. Nearly forty percent (39.7%) said the pregnancy was their first while 59.3% had earlier had a child or given birth to children. As at the time of data collection from the respondents 44.2% of them were already in the second trimester of their pregnancy while 39.7% were in the third trimester.

Education level assessments showed that 6.3% had no formal education, 5.5% had only primary school education, and 30.9% and 50.5% completed secondary and tertiary education respectively. Postgraduate qualification was limited to 6.8% among the respondents. About

12.3% of the subjects earn more than #151,000 monthly, 44.7% earn between #31,000- #50,000 and finally less than 10.0% earn below #30,000.

Socio-demographical characteristic /economic status of the respondent

Variables	Frequency	Percentage (%)
Age of the respondents(years)		
20-25	52	13.1
26 - 30	175	44
31 – 35	87	21.9
36 - 40	65	16.3
Above 41	19	4.8
Total	**398**	**100**
Marital status		
Married	384	96.5
Separated	14	3.5
Total	**398**	**100**
Household number		
1 to 3	179	45
4 to 6	161	40.5
7 and above	58	14.6
Total	**398**	**100**
Ethnicity		
Yoruba	319	80.2
Igbo	69	17.3
Hausa	2	0.5
Others	8	2
Total	**398**	**100**
First pregnancy		
Yes	158	39.7
No	240	60.3
Total	**398**	**100**
What is the trimester		
1st	64	16.1
2nd	176	44.2
3rd	158	39.7
Total	**398**	**100**
Educational status		
None formal education	25	6.3
Primary school	22	5.5
Secondary school	123	30.9
Graduate	201	50.5
post graduate	27	6.8
Total	**398**	**100**
Educational status of husband		
None formal education	41	10.3
PSLC	13	3.3
SSCE/WAEC/NECO	51	12.8
ND/NCE	99	24.9
HND/BSC/MSC	194	48.7
Total	**398**	**100**

Respondent employment status		
Civil servant	109	27.4
Artisan	41	10.3
Traders	134	33.7
Farmer	26	6.5
Unemployed	88	22.1
Total	**398**	**100**
Source of water for use		
Personal Borehole	237	59.5
River/Lake/Stream	11	2.8
Well	122	30.7
Community supply	14	3.5
Other (specify)	14	3.5
Total	**398**	**100**
Monthly income of the mothers		
<#30,000	33	8.3
#31,000- #50,000	178	44.7
#51,000 - #100,000	76	19.1
#101,000- #150,000	62	15.6
Above #151,000	49	12.3
Total	**398**	**100**

Food consumption pattern of respondents

Energy food sources such as cereals, tubers, fat/oil and legumes were well consumed three to four times a week with 20.1%, 38.4%, 53.6% and 44.5% of the respondents consuming them respectively. Protein foods such as meats, fish, milk and eggs were consumed three to four times a week by 34.4%, 31.4%, 42.5% and 28.4% respectively. Fruits and vegetables were consumed by 27.1% and 25.9% respondents five to seven times weekly. Alcoholic beverages were the least consumed, 78.9% had never consumed alcoholic drinks.

Food consumption pattern of the respondent (N=398)

Food group	**<3 times**		**3-4 times**		**5-7 times**		**>7 times**		**None**	
Food group	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Cereal product	124	31.2	80	20.1	112	28.1	46	11.6	36	9.0
Roots &Tubers	169	42.5	153	38.4	51	12.8	12	3.0	13	3.3
Vegetables	88	22.1	182	45.7	103	25.9	25	6.3	0	0.0
Milk & dairy	139	34.9	169	42.5	53	13.3	35	8.8	2	.5
Fruits	53	13.3	177	44.5	108	27.1	53	13.3	7	1.8
Legumes	118	29.6	177	44.5	66	16.6	22	5.5	15	3.8
Meat	115	28.9	137	34.4	94	23.6	46	11.6	6	1.5

Fish	88	22.1	125	31.4	128	32.2	54	13.6	3	.8
Egg	130	32.7	113	28.4	71	17.8	51	12.8	33	8.3
Fat and Oil	73	18.3	213	53.5	67	16.8	45	11.3	45	11.3
Beverages	151	37.9	131	32.9	49	12.3	9	2.3	58	14.6
Alcoholic drinks	46	11.6	5	1.3	15	3.8	18	4.5	314	78.9
Nut and seeds	130	32.7	171	43.0	47	11.8	7	1.8	43	10.8
Condiments/spices	176	44.2	119	29.9	43	10.8	43	10.8	17	4.3

Dietary diversity of the respondents

This shows that 94.5% and 97.2% of the respondents had consumed cereal and root and tuber respectively while 5.0% and 2.1% did not consumed cereals and root & tubers within 24hours prior to the period of the data collection. Majority (96.7%) consumed vegetables, only 3.3% did not consumed vegetables. Also, 92.5% of the respondents did consumed fruits in the past 24hrs, 83.2% consumed meat, while 16.8% did not consume meat. In addition, 83.7% of the respondents consumed egg, 16.3% did not consumed egg product, 10.3 % did not consumed milk, and 93% consumed legumes. Majority (90.7%) consumed oils, fats or butter, and less than hone third (25.9%) of them consumed sugars or honey in their households while 70.1% also consumed nut and seed while fish/sea food were consumed by 90.7% of the respondent with 24hours. On average, majority (63.6%) had good/ high dietary diversity, 27.9% had medium/average while 8.5% had poor dietary diversity.

Dietary diversity of the respondents (N=398)

Food groups	Frequency	Percentage (%)
Cereals		
No	21	5.3
Yes	377	94.7
Roots and tubers		
No	11	2.8
Yes	387	97.2
Vegetables		
No	13	3.3
Yes	385	96.7
Fruits		
No	30	7.5
Yes	368	92.5
Meats		
No	67	16.8
Yes	331	83.2
Eggs		
No	65	16.3
Yes	333	83.7
Fish and sea foods		
No	37	9.3
Yes	361	90.7
Legumes		
No	28	7.0

Yes	370	93.0
Nut & seed		
No	119	29.9
Yes	279	70.1
Milk and milk product		
No	41	10.3
Yes	357	89.7
Oil, fats and butter		
No	37	9.3
Yes	361	90.7
Sugar or honey		
No	103	25.9
Yes	295	74.1
Diversity score		
High dietary diversity score	253	63.6
Average dietary diversity score	111	27.9
Poor dietary diversity score	34	8.5
Total	**398**	**100.0**

Anthropometric status of the respondents

The mid-upper arm circumference (MUAC) measurement revealed that 12.8% of the pregnant women were at risk of malnutrition at the time of data collection while 87.2 percent of the subjects had normal and healthy nutritional status.

Anthropometric status of the respondents (N=398)

Mid upper arm circumference	Frequency	Percentage (%)
At risk of malnutrition	51	12.8
Normal	347	87.2
Total	398	100.0

Biochemical characteristics of the respondents

The result shows that the hemoglobin level was abnormal in 5.0% of the pregnant mothers while the ferritin level was low in among 30% of the pregnant mothers.

Biochemical status of the respondent

Biochemical parameters	Frequency (N=40)	Percentage
Hemoglobin Level		
Mild	38	95.0
Moderate	2	5.0
Total	40	100.0
C-Reactive protein		
Normal	31	77.5
At high Level	9	22.5
Total	40	100.0
Ferritin level		

Low	12	30.0
Normal	28	70.0
Total	40	100.0

Relationship between socio-demographical/economic characteristic and dietary diversity score of the respondent

Investigating the relationship between dietary diversity score and sociodemograpic/economic shows that there's a significant relationship between dietary diversity and the following variables; age (p=0.000), ethnicity (p=0.000), household number (p=0.000), trimesters (p=0.001), first pregnancy (p=0.012), education status (p=0.003) household monthly income (p=0.013) while no significant relationship was found with other sociodemographic/economic variables.

Relationship between socio-demographical/economic characteristic and dietary diversity score of the respondent

Variable	**High DDS**	**Average DDS**	**Poor DDS**	**Total (%)**	**X^2**	**P-value**
Age (years)	**F (%)**	**F (%)**	**F (%)**	**F (%)**	**31.636**	**0.000***
20-25	29(11.5)	12(10.8)	11(32.4)	52(13.0)		
26-30	113(44.7)	41(36.9)	21(61.8)	175(44.0)		
31–35	53(20.9)	32(28.8)	2(14.3)	87(21.9)		
36-40	42(16.6)	23(20.7)	0(0.0)	65(16.3)		
Above 41	16(6.3)	3(2.7)	0(0.0)	19(4.8)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
Marital status					**1.559**	**0.459**
Married	244 (96.4)	106 (95.5)	34 (100.0)	384(96.5)		
Separated	9(3.6)	5 (4.5)	0(0.0)	14(3.5)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
Religion					**7.954**	**0.093**
Christianity	165(65.2)	72 (64.9)	27 (79.4)	**264 (66.3)**		
Islam	88 (34.8)	37 (33.3)	7 (20.6)	**132(33.2)**		
Others	0 (0.0)	2(1.8)	0 (0.0)	2(0.5)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
Ethnicity					**30.625**	**0.000***
Yoruba	199 (78.7)	97(87.4)	23(67.6)	319 (80.2)		
Igbo	46 (18.2)	14 (12.6)	9(26.5)	69 (17.3)		
Hausa	0(0.0)	0(0.0)	2 (5.9)	2 (0.5)		
Others	8(3.2)	0(0.0)	0(0.0)	8(2.0)		
Household number					**27.398**	**0.000***
1-3	102 (40.3)	53 (47.7)	24 (70.6)	179 (45.0)		
4-6	121(47.8)	31(27.9)	9(26.5)	161 (40.5)		
7 and above	30 (11.9)	27 (24.3)	1 (2.9)	58 (14.6)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
What trimester					**17.929**	**0.001***
1st	54 (21.3)	8(6.2)	2 (5.9)	64 (16.1)		
2nd	108 (42.7)	56 (50.5)	12 (35.3)	176(44.2)		
3rd	91(36.0)	47(36.0)	20(36.0)	158(39.7)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
First pregnancy					**8.909**	**0.012***
Yes	112 (44.3)	31(27.9)	15(44.1)	158(39.7)		
No	141 (55.7)	80 (72.1)	19 (55.9)	240(60.3)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		

Relationship between socio-demographical/economic characteristic and dietary diversity score of the respondent continued

Variable	High DDS	Average DDS	Poor DDS	Total (%)	X^2	P-value
Employment status	**F (%)**	**F (%)**	**F (%)**	**F (%)**	**14.902**	**0.061**
civil servant	62 (34.2)	38(26.5)	9(27.4)	109(27.4)		
Artisan	25(9.9)	11(9.9)	5(14.7)	41(10.3)		
Traders	92 (36.4)	33(29.7)	9(26.5)	134(33.7)		
Farmer	14 (3.5)	12(3.0)	0(0.0)	26(6.5)		
Unemployed	60(23.7)	17(15.3)	11(32.4)	88(22.1)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
Educational status					**23.038**	**0.003***
None education	13(5.1)	9(8.1)	3 (8.8)	25(6.3)		
Primary school	14(5.5)	5(4.5)	3(8.8)	22(5.5)		
Secondary school	81(32.0)	35(31.5)	7(20.6)	123(30.9)		
Graduate	128(50.6)	60(54.1)	13(38.2)	201(50.5)		
post graduate	17(6.7)	2(1.8)	8(23.5)	27(6.8)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
Husband Education level					**21.539**	**0.006**
None education	26 (10.3)	9(8.1)	6(17.6)	41 (10.3)		
PSLC	6(2.4)	7(6.3)	0(0.0)	13 (3.3)		
WAEC/NECO	25(9.9)	16 (14.4)	10 (29.4)	51 (12.8)		
ND/NCE	63 (15.8)	32(8.0)	4 (11.8)	99 (24.9)		
HND/BSC/MSC	133 (52.6)	47(42.3)	14 (41.2)	194(48.7)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		
Household monthly income					**16.959**	**0.013***
<30,000	17(6.7)	9(8.1)	7(20.3)	33 (8.3)		
#31,000- #50,000	115 (45.5)	55 (49.5)	8 (23.5)	178 (44.7)		
#51,000 - #100,000	55(21.7)	13(21.7)	8 (23.5)	76(19.1)		
#101,000- #150,000	37(14.6)	20 (18.0)	5(14.7)	62(15.6)		
Above #151,000	29 (11.5)	14(12.6)	6(17.6)	49(12.3)		
Total	**253 (100.0)**	**111(100.0)**	**34 (100.0)**	**398 (100.0)**		

*Significant at $p < 0.05$

Relationship between socio-demographic/economic characteristic and food consumption score of the respondent

Ethnicity (X2 = 57.595 P-value = 0.000), stages of pregnancy (trimester) (X2= 17.624 P-value= 0.000), education level (X2 = 19.558, P-value 0.001), husband education level (X2 = 16.649, P-value = 0.002), and household monthly income (X2 = 16.959, P-value = 0.013) had a significant ($p < 0.05$) relationship with the food consumption score of the respondent. Other socio-demographic/economic variables however, showed no significant relationship with the food consumption score.

Relationship between socio-demographical/ economic characteristic and food consumption score of the respondent

Variable	Borderline	Acceptable	Total (%)	X^2	P-value
Age (years)	**F (%)**	**F (%)**	**F (%)**	**4.885**	**0.299**
20-25	3 (17.6)	49(12.9)	52(13.1)		
26-30	11 (64.7)	164 (43.0)	175 (44.0)		
31–35	2 (11.8)	85(22.3)	87 (21.9)		
36-40	1 (5.9)	64(16.8)	65 (16.3)		
Above 41	0(0.0)	19 (5.0)	19 (4.8)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
Marital status				**3.559**	**0.059**
Married	15(88.2)	369 (96.9)	384 (96.5)		
Separated	2 (11.8)	12 (3.1)	14 (3.5)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
Religion				**0.213**	**0.899**
Christianity	12(70.6)	252 (66.1)	264 (66.3)		
Islam	5 (29.4)	127 (33.3)	132(33.2)		
Others	0(0.0)	2(1.8)	2(0.5)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
Ethnicity				**57.595**	**0.000***
Yoruba	7(41.2)	312 (81.9)	319 (80.2)		
Igbo	8 (47.1)	61 (16.0)	69 (17.3)		
Hausa	2 (11.8)	0(0.0)	2 (0.5)		
Others	0(0.0)	8 (2.1)	8(2.0)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
Household number				**1.388**	**0.499**
1-3	10 (58.8)	169(44.4)	179 (45.0)		
4-6	5 (29.4)	156(40.9)	161 (40.5)		
7 and above	2 (11.8)	56(14.7)	58 (14.6)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
What trimester				**17.624**	**0.000***
1st	0 (0.0)	64(16.8)	64 (16.1)		
2nd	2 (11.8)	174 (45.7)	176(44.2)		
3rd	15(88.2)	143 (37.5)	158(39.7)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
First pregnancy				**3.607**	**0.058**
Yes	3(17.6)	155 (40.7)	158(39.7)		
No	14(82.4)	226(59.3)	240(60.3)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		

Relationship between socio-demographical/ economic characteristic and food consumption score of the respondent continued

Variable	Borderline	Acceptable	Total (%)	X^2	P-value
Employment status	**F (%)**	**F (%)**	**F (%)**	**8.846**	**0.065**
civil servant	3 (17.6)	106(27.8)	109(27.4)		
Artisan	0 (0.0)	41(10.8)	41(10.3)		
Traders	11 (64.7)	123(32.3)	134(33.7)		
Farmer	0 (0.0)	26(6.8)	26(6.5)		
Unemployed	3 (17.6)	85(22.3)	88(22.1)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
Educational status				**19.558**	**0.001***
None education	0 (0.0)	25(6.6)	25(6.3)		
Primary school	0 (0.0)	22(5.8)	22(5.5)		
Secondary school	8 (47.1)	115(30.2)	123(30.9)		
Graduate	4 (23.5)	197 (51.7)	201(50.5)		

post graduate	5 (29.4)	22(5.8)	27(6.8)		
Total	**17(100.0)**	**381(100.0)**	**398 (100.0)**		
Husband Education level				**16.649**	**0.002***
None education	0 (0.0)	41(11.5)	41 (10.3)		
PSLC	0 (0.0)	13 (3.4)	13 (3.3)		
WAEC/NECO	7(41.2)	44 (11.5)	51 (12.8)		
ND/NCE	6 (35.3)	93 (24.4)	99 (24.9)		
HND/BSC/MSC	4 (23.5)	190 (49.9)	194(48.7)		
Total	**253 (100.0)**	**111(100.0)**	**398 (100.0)**		
Household monthly income				**16.959**	**0.013***
<30,000	6 (35.3)	27 (7.1)	33 (8.3)		
#31,000- #50,000	5 (29.4)	173 (45.4)	178 (44.7)		
#51,000 - #100,000	1 (5.9)	75 (19.7)	76(19.1)		
#101,000- #150,000	22 (11.8)	60(15.7)	62(15.6)		
Above #151,000	3 (17.6)	46(12.1)	49(12.3)		
Total	**253 (100.0)**	**111(100.0)**	**398 (100.0)**		

*Significant at $p < 0.05$

DISCUSSION

In this study, the majority of the mothers were in their of reproductive age and just a few of them were under age mothers. This result is in agreement with the reports of Olagunju et al., (2020) and Awodele et al., (2020) in their study on food security. The profile of the respondents by marital status showed that a high percentage of the respondents were married and just a few were separated. This could be attributed to strong societal regard for marriage institutions. Yoruba speaking participants dominated the study population, reason could be that the study area is a Yoruba speaking city in the south west part of Nigeria regarded as the Yoruba nation, similar result had been reported in Ibadan, another city in the south west part of Nigeria by (Afolabi *et al*., 2013). The majority of the participants were graduate and civil servants and this could be explain the high level of literacy observed in this study. Furthermore, education is prioritized in South Western States, especially Ogun state in which the study was carried out. Education to a large extent determines type of occupation one engages in; people with post graduate/secondary qualification often have entry into formal employment compared to those with the secondary education or less. This finding is similar to that of Awodele et al., (2020) in their study. The respondents and their spouses were involved in different income generating activities ranging from business owners or traders, farming, artisan and some were civil servants which can help their household food secured (Olagunju et al., 2020). The household size report is similar to that of Awodele et al., (2020). Meanwhile, several studies (Powell et al., 2017, Farzan et al., 2017) had linked food security status to large house sizes.

Assessing the food consumption pattern is also important to ascertain energy and nutrient intake in this study area. Cereals and tubers were the most consumed while egg, milk and milk products were less consumed. These findings could be explained in that the primary source of energy food in Nigeria are from cereals and, roots and tubers which are often available within rural and urban communities throughout the nation whereby households can have access to them. Many households were less diversified in fruits, eggs, milk and milk products. This finding is similar to the result reported by Mekonnen et al. (2021).

The consumption of variety of foods from different food group (vegetables, fruits, grains, and animal foods) provides a balance of nutrients that promote healthy growth and development. Dietary diversity has been said to give an indication of the quality of the total diet in addition to having positive association with nutritional adequacy (Onyeji 2020). The dietary diversity score in this study was high. This implies that the people in the study area had good dietary diversity. This finding is in contrast to the findings of Onyeji (2020) who reported a lower score for good dietary diversity and higher score for both moderate and poor dietary diversity.

In this study, majority of the respondents had acceptable food consumption score. The food consumption score is a proxy indicator of household caloric availability. This could be because most of the respondents have good socioeconomic status. Good socioeconomic factor is a predictor of household food security (Marangoni et al. 2016).

The prevalence of underweight amongst mothers in the study area was slightly lower than the 12% of women in the reproductive group in Nigeria that were too thin for their height at national level (NDHS, 2018). Although, the prevalence of women undernutrition has been on a decline in the recent times, nonetheless, high prevalence is still noticeable in sub-Saharan Africa (Awodele, 2020). The prevalence of women undernutrition ranged between 10 and 40% in the most countries in sub-Saharan African (Awodele, 2020). Findings from this study are still within that range among pregnant mothers in the study area.

CONCLUSION

Findings from this study show that there was prevalence of risk of malnutrition among the women in the study area. Carbohydrate foods were the most consumed followed by protein foods. The study found a significant relationship between dietary diversity score, food consumption score and most socio-economic variables. This implies that households with high income and steady income are likely to be food secured and have access to variety of food groups which in turn have a positive effect on their health status.

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