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Assessment of Nutritional Status of Pregnant Women Attending Antenatal Care Centers in Odo-Otin Local Government Area of Osun State, Nigeria

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Background: Good nutrition is a prerequisite for the national development of countries and for the well-being of every individual. Although problems related to poor nutrition affect the entire population, women and children are especially vulnerable because of their physiological and socio-economic characteristic. Pregnancy places extra nutritional demands on women and this may affect the development of the foetus and its health later in life. The nutritional demands however does not necessarily translate to increase in the amount of food to be consumed but certain nutrients such as protein, iron, folate, zinc and iodine are required in higher proportions to prevent anaemia and abortion. The general objective of this study was to assess the nutritional status of pregnant women aged 15-49 years that were attending antenatal care (ANC) at Primary Healthcare Centres, Odo-Otin Local Government Area, Osun State, Nigeria.

Methods: This was a cross-sectional descriptive study of 400 pregnant women attending ANC at Primary Health Care Centres in Odo-Otin Local Government Area of Osun State over a period of four weeks. Their anthropometric and bio-chemical data were determined. Their bio-data and dietary investigation were obtained using a questionnaire. Analysis was done using Statistical Package for Social Sciences (SPSS) version 20 and P was drawn at 0.05.

Results: One hundred and thirty two (33.3%) of the participants were malnourished with their mid-upper arm circumference (MUAC) less than 23cm. Anaemia was found in 127(31.8%) of participants and of this proportion, civil servants were more commonly affected 54 (42.5%). Of the 90 participants that were civil servants, 46.5% were under-weight and they were the most malnourished while farmers had the least proportion (15.8%) of underweight participants ($P=0.001$). More than half (51.8%) of those who earned less than N10,000.00 were under-weight compared with 8.3% of those who earned more than N50,000.00 ($P=0.001$). One hundred and eight (94.7%) of those who skipped meals were under-weight compared to 6.3% of those who do not ($P=0.001$). Hence, 82.7% of those who skipped meals were anaemic as compared to 17.3% of those who do not ($P=0.001$).

Conclusion: The prevalence of malnutrition among pregnant women in Odo-Otin Local Government Area of Osun State, Nigeria was moderately low. However, it is worth noting that pregnant women who were Civil Servants were more malnourished.

Keywords: Nutritional status, pregnant women, antenatal care, Local Government Area

1.0 INTRODUCTION

The development of any country depend on the availability of good food and nutrients among other things for the well-being of every individual. The Council on Food and Nutrition of the American Medical Association defines nutrition as the science of food, the nutrients and the substance therein, their action, interaction and balance in reaction to health and disease: and the process by which the organization (i.e. body) ingests, digests, absorbs, transports and utilizes food substances [1]. Nutrition could also be described as the study of food values and its effect on the body as food is essential for optimum healthy living [2].

Pregnancy places extra nutritional demands on women which may affect the development of the foetus and its health later in life [3]. The nutritional demands however does not necessarily translate to increase in the amount of food to be consumed but certain nutrients such as protein, iron, folate, zinc and iodine are required in higher proportions to prevent anaemia. Anaemia during pregnancy is associated with higher rates of pre-natal morbidity, higher risk for miscarriage, prematurity, low birth weight, infants with low iron stores and babies higher risk of developing anaemia in the first month of life [3]. Studies have shown that most of the women in of sub-Sahara Africa, including Kenya, get pregnant under poor nutritional status which adversely affect their health and that of foetus [4].

One of the Sustainable Development Goals (SDGs) is to eradicate extreme poverty and hunger and to reduce child mortality and improve maternal health. It is less than a decade into SDGs and the maternal nutritional indices are not encouraging. Maternal prenatal morbidity and mortality has remained unacceptably high with not much impact by the government or the non-government agencies in Nigeria [5]. Maternal Mortality Rate (MMR) is unacceptability high in sub-Sahara Africa [6]. In Nigeria for example, MMR have been reported to be 630 deaths per 100,000 live births, thus ranking Nigeria 11th country in the world with highest MMR, among 184 countries [7].

A balanced, nourishing diet throughout pregnancy provides the nutrients needed to support fetal growth and development without depriving the mother the nutrients needed to maintain her own health. It also minimizes the risks of excess energy loss [7]. Usually, a woman whose diet is adequate before pregnancy is able to bear a full term viable infant [8]. Multiple micronutrient supplements taken with iron and folic acid can improve birth outcomes for women in low income countries [9]. These supplements reduce numbers of low

birth weight of babies, premature and stillbirths in women [9]. Undernourished women can benefit from dietary education sessions, balanced energy and protein supplements [11]. This study therefore assess the nutritional status of pregnant women attending antenatal care centers in Odo-Otin Local Government Area of Osun State in order to make recommendations that will lead to improvement in nutritional habits of pregnant women and thereby prevent maternal and child mortality

2.0 METHODOLOGY

The study was conducted in Odo-Otin Local Government area of Osun State, Nigeria. Osun State is one of the 36 States of the Federal Republic of Nigeria. It is an inland State in South-Western Nigeria with its capital in Osogbo [11,12]. A cross-sectional descriptive study was conducted to assess the anthropometric and bio-chemical measures of pregnant women aged 15-49 years attending antenatal clinics at the Local Government Area. The sample size was calculated using the prevalence of malnutrition in pregnant mothers in Nigeria found to be about 36% [14]. The Cochran formula [15] for calculating a representative sample for proportions was used as follows:

$n = Z^2pq/e^2$, Where; n is the desired sample size; 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 = 36%; q is $1-p$; and e is the level of statistical significance set = 0.05. Therefore; sample size of pregnant women $n = 1.962 \times 0.36 (1-0.36)/0.052$. Thus $n = 354$. Due to the possibility of non – response, 10% was added to make a sample of 389. A sample of 400 pregnant women was therefore used. Included in the study were pregnant women aged 15-49 years willing to participate in the study and who had been residents of Osun State for not less than six months prior to the study. Excluded pregnant women in the study included those less than 15 years and above 49 years, those not willing to participate, those with chronic diseases such as hypertension, diabetes, tuberculosis and HIV/AIDS and those enrolled in intervention feeding or general food distribution. These intervention would have impact on nutritional status and dietary diversity and thus bias the result of the study.

The multi-stage sampling technique was used to select the participants as follows: Stage One: 8 out of the 15 wards in Odo-otin Local Government Area was randomly selected using simple random sampling technique (lottery method). Stage Two: Simple random sampling technique (lottery method) was used to select two Primary Health Care Centers from each of the 8 wards selected in stage 1, making a total of 16 Primary Health Care Centers. Stage three: 25 pregnant women who were within

the inclusion criteria were then selected from each Ward, using a simple random sampling technique (lottery method). This number was obtained by dividing the sample size by total number of Primary Health Care Centers that were randomly selected ($400 \div 16 = 25$). The dependent variables measured were the Mid Upper Arm Circumference (MUAC), Body Mass Index and Haemoglobin level. These were assessed in second or third trimester at the same time of administering the questionnaire.

The tape measurement was used to measure the MUAC of the pregnant women, this was done to determine the nutritional status during the pregnancy. Measurement of MUAC was made while the woman stands 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 show lean muscle mass as a result of work. The MUAC was measured by first finding the mid-point of upper arm and then measuring the circumference. MUAC of the left arm was taken to nearest 0.1cm [16].

The adult weighing scale (Bathroom scale) was used to record the weight. The participants were asked to step on scale with light dress, and foot wear removed. The reading on the scale was noted and recorded on the questionnaire. It was ensured that the scale was adjusted to the zero level to avoid error, and the weight was recorded to the nearest 0.1Kg. The stadiometer was used to measure the height of the pregnant woman. The respondent was asked to stand straight and tall with her head, shoulders and heels touching the wall. The number just below the measuring device was recorded to the nearest 0.1m.

The haemoglobin concentration was determined using the haemoglobin paper scale. One of the research assistants took the finger pricked blood samples of the respondents through using a lancet. The blood sample was 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. The Socio-demographic and economic variables determined includes age group, level of education, husband's educational status, number of household members, occupation, level of income per month, husband's occupation and number of wives. Dietary history was determined using the last 24 hours dietary recall. The participants were asked the type of food they have been eating for the past 24 hours.

Data was entered and analyzed using Statistical Package for Social Sciences (SPSS) version 20 and cleaned for abnormal values at regular intervals. A backup was done on

an external hard drive. Univariate analysis was done by tabulating and reporting frequencies with their respective percentages. Bivariate analysis was done using the chi-square test with p-values less than 0.05 considered statistically significant for qualitative variables, while multivariate analysis was analyzed using binary logistic regression to control potential confounders.

3.0 RESULTS

A total of 400 pregnant women participated in this study (Table 1). Majority of the participants were within age group 25 to 34 years 52.0%, while 19.3% were within 15 to 24 years. The mean age of the participants was 30.88 ± 7.14 years. Most (94.5%) of them were married and had secondary school education (50.2%), with 6.0% having no formal education. More than half of the participants' husbands (50.5%) had secondary school education with 5.8% having no formal education. Majority (88.5%) were Yoruba and were mostly Muslims (49.7%) by religion and by occupation were mostly artisans (56.3%). Almost half of the participants' husbands were artisans (48.5%), while less than one fifth were civil servants (16.8%). More than one third of the participants (36.0%) earned less than N10,000 per month while majority (55.5%) earned an average monthly income of N10,000 to N50,000. The mean average monthly income was $N20,727.50 \pm 16773.24$. More than three quarter (77.5%) were in monogamous family setting while 90 (22.5%) were in polygamous setting. All of the participants had height greater than 1.45 m 400 (100%), the mean height was 1.70 ± 0.05 m and majority of them had weight greater than 50 kg were 368 (92%) with mean weight of 61.30 ± 7.83 kg. Less than one third 114 (28.5%) were underweight with the mean BMI of 20.99 ± 2.35 kg/m². The breakdown of the demographic characteristics and socio-economic factors of the study participants are shown in table 1.

Table 2 shows the twenty four hour recall of dietary practice of the participating pregnant women in the study. More than one third of the participants (36.3%) skipped meal. Of different reasons given for skipping meals, unavailability of food (44.8%) was the most common. The type of food consumed by majority of the participants were starchy staples (17.4%), consisting of cereals, white root and tuber while the least consumed was eggs 70 (3.8%). The frequency of malnutrition and anemia in the study population is presented in table 3. One third of the pregnant women 132 (33.3%) were malnourished (MUAC less than 23 cm), while 268 (67.0%) were normal (MUAC greater than or equal to 23 cm, with the mean of in the study population 23.77 ± 3.29 cm). Also, less than

Table 1. Socio-demographic factors, economic characteristics of respondents

Variable	Level	Frequency (N=400)	Percentage (%)
Age group (years)	15-24	77	19.3
	25-34	208	52.0
	35-44	115	28.7
Height	Less than or equal to 1.45m	0	0
	Greater than 1.45m	400	100
	1.45m		
Weight	Less than or equal to 50kg	32	8
	Greater than 50kg	368	92
	114	28.5	
BMI	Under weight		
	Normal	286	71.5
Marital status	Single	22	5.5
	Married	378	94.5
	None	24	6.0
	Primary	137	34.3
Level of education	Secondary	201	50.2
	Tertiary	38	9.5
	Christianity	184	46.0
Religion	Islam	199	49.7
	Traditional	17	4.3
	Yoruba	354	88.5
Ethnicity	Igbo	29	7.3
	Hausa	17	4.2
	None	23	5.8
Husband's educational status	Primary	86	21.5
	Secondary	202	50.5
	Tertiary	89	22.2
Occupation	Civil servant	90	22.5
	Artisan	225	56.3
	Farming	53	13.2
	Unemployed	29	7.2
Occupation of the husband	Civil servant	67	16.8
	Artisan	194	48.5
	Farming	139	34.7
Average monthly income	Less than N10,000	144	36.0
	N10,000-50,000	222	55.5
	More than N50,000	34	8.5
Family type	Monogamy	310	77.5
	Polygamy	90	22.5

Note * represents multiple response question

one third of the pregnant women 127 (31.8%) were anaemic (62 (48.8%) had mild anaemia and 15 (11.8%) were severely anaemic). The mean haemoglobin level was 10.41 ± 2.13 g/dl.

Table 2. Twenty four hour recall of dietary practice in 400 respondents

Variable	Level	Frequency	Percentage (%)
Do you skip meal	Yes	145	36.3
	No	255	63.7
Reason for skipping meal	Unavailability of food	65	44.8
	Loss of appetite	30	20.7
	Inconvenience	50	34.5
Food groups consumed	Legumes, nuts and seeds	244	13.2
	Starchy staples (cereals and white root and tuber)	321	17.4
	Dark green leafy vegetables	205	11.1
	Meat and fish	203	11.0
	Other vitamin A rich fruits and vegetables	193	10.4
	Other fruits and vegetables	125	6.8
	Organ meat	108	5.8
	Milk and milk products	80	4.3
	Eggs	70	3.8
	Fat and oil	300	16.2

Table 3. Frequency of malnutrition and anemia

	Level	Frequency (N= 400)	Percent (%)
Mid upper arm circumference of respondents	Normal (≥ 23 cm)	268	67.0
	Malnourished (< 23 cm)	132	33.0
Anaemic status of the respondents	Not anaemic	273	68.2
	Anaemic	127	31.8
Severity of anaemia among respondents	Mild	62	48.8
	Moderate	50	39.4
	Severe	15	11.8

The relationship between socio-demographic factors of respondents, and their BMI are shown in table 4. Statistical significant relationship was not observed when BMI was compared to age, marital status, level of education, religion, ethnicity and husband's educational status. On the other hand occupation had significant

effect on BMI with the proportion of underweight participants (46.5%) been highest among civil servants and least (15.8%) among farmers ($X^2= 119.930$, $P= 0.001$). Also participant's husband occupation contributed significantly to BMI with civil servants recording the highest (46.5%) proportion of underweight pregnant women, while farmers had the least (21.1%) ($X^2= 101.268$, $P= 0.003$).

Similarly, average monthly income also had a significant effect on the participants BMI with those earning less than N10,000 per month being more underweight (51.8%) compared with those earning more than N50,000 (9.6%) ($X^2=19.449$, $P= 0.001$). Family type also produce a significant effect on BMI with pregnant women from polygamous family settings (66.7%) being more underweight compared to those in monogamous settings (33.3%) ($X^2=13.036$, $P = 0.001$). Pregnant women who skipped meals were more underweight (94.7%) compared with those who did not 5.3% ($\chi^2= 66.247$, $p= 0.001$).

Table 5 shows the relationship between socio demographic factors, economic characteristics and MUAC of the respondents. A significant association ($p=0.0001$) was observed when MUAC was compared to occupation with civil servants (47.7%) being the most malnourished. Also occupation of husband, Average monthly income, family type and skipping of meals produced a significant association ($p= 0.001$) on MUAC with civil servant (37.2%), average monthly income less than N10,000 (50.8%), polygamy family type (60.6%) and participants who skipped meal (79.5%) respectively, being the most malnourished. On the other hand Age group, marital status, level of education, religion, ethnicity and husband's educational status did not produce any significant effect on MUAC.

The relationship between socio demographic factors, economic characteristics, and anaemic status is shown in table 6. The highest proportion of participants with anaemia were found in the age group 25 to 34 years (48.0%, $p= 0.033$), civil servants (42.5%, $p= 0.0001$), women whose husbands are artisan (37.8%; $p=0.000$), participants whose earnings are less than N10,000 (48.0%; $p= 0.0001$), those with polygamy family type (52.8%; $p= 0.001$) and those who skipped meals (82.7%; $X^2= 28.846$, $P= 0.001$).

Table 4. Relationship between socio-demographic factors of respondents, and body mass index

Variable	Level	BMI		Statistics
		Under weight	Normal	
Age group (years)	15-24	22 (19.3%)	55 (19.2%)	$X^2= 1.499$ df= 2 $P= 0.473$
	25-34	64 (56.1%)	144 (50.3%)	
	35-44	28 (24.6%)	87 (30.5%)	
Marital status	Single	5 (4.4%)	17 (5.9%)	$X^2= 0.381$ df= 1 $P= 0.634$
	Married	109 (95.6%)	269 (94.1%)	
Level of education	None	10 (8.8%)	14 (4.9%)	$X^2= 1.762$ df= 3 $P= 0.627$
	Primary	38 (33.3%)	99 (34.6%)	
	Secondary	57 (50.0%)	144 (50.3%)	
	Tertiary	9 (7.9%)	29 (10.1%)	
Religion	Christianity	48 (42.1%)	136 (47.6%)	L.R= 0.988 df= 2 $P= 0.610$
	Islam	61 (53.5%)	138 (48.2%)	
	Traditional	5 (4.4%)	12 (4.2%)	
Ethnicity	Yoruba	106 (93.0%)	248 (86.7%)	L.R= 3.432 df= 2 $P= 0.189$
	Igbo	5 (4.4%)	24 (8.4%)	
	Hausa	3 (2.6%)	14 (4.9%)	
Occupation	Civil servant	53 (46.5%)	37 (12.9%)	$X^2= 119.930$ df= 3 $P= 0.001$
	Artisan	19 (16.7%)	206 (72.0%)	
	Farming	18 (15.8%)	35 (12.3%)	
	Unemployed	24 (21.0%)	8 (2.8%)	
Husband's educational status	None	8 (7.0%)	15 (5.2%)	$X^2= 2.381$ df= 3 $P= 0.500$
	Primary	29 (25.5%)	57 (19.9%)	
	Secondary	55 (48.2%)	147 (51.5%)	
	Tertiary	22 (19.3%)	67 (23.4%)	
Occupation of the husband	Civil servant	53 (46.5%)	14 (4.9%)	$X^2= 101.268$ df= 2 $P= 0.003$
	Artisan	37 (32.5%)	157 (54.9%)	
	Farming	24 (21.0%)	115 (40.2%)	
Average monthly income	Less than N10,000	59 (51.8%)	85 (29.7%)	$X^2= 19.449$ df= 2 $P= 0.001$
	N10,000 -50,000	44 (38.6%)	178 (62.3%)	
	More than N50,000	11 (9.6%)	23 (8.0%)	
Family type	Monogamy	38 (33.3%)	272 (95.1%)	$X^2= 13.036$ df= 1 $P= 0.001$
	Polygamy	76 (66.7%)	14 (4.9%)	
	Yes	108 (94.7%)	147 (51.4%)	
Do you skip meal	No	6 (5.3%)	139 (48.6%)	$X^2= 66.247$ df= 1 $P= 0.000$

Table 5. Relationship between socio-demographic factors, economic characteristics and MUAC of the respondents.

MUAC				
Variable	Level	Normal	Malnour-ished	Statistics
Do you skip meal	Yes	150 (56.0%)	105 (79.5%)	X ² = 21.270 df= 1 P= 0.000
	No	118 (44.0%)	27 (20.5%)	
Age group (years)	15-24	55 (20.5%)	22 (16.7%)	X ² = 4.917 df= 2 P= 0.086
	25-34	129 (48.2%)	79 (59.8%)	
	35-44	84 (31.3%)	31 (23.5%)	
Marital status	Single	16 (6.0%)	6 (4.5%)	X ² = 0.345 df= 1 P= 0.557
	Married	252 (94.0%)	126 (95.5%)	
	None	12 (4.5%)	12 (9.1%)	
Level of education	Primary	98 (36.5%)	39 (29.6%)	X ² = 4.996 df= 3 P= 0.172
	Secondary	131 (48.9%)	70 (53.0%)	
	Tertiary	27 (10.1%)	11 (8.3%)	
Religion	Christianity	122 (45.5%)	62 (47.0%)	X ² = 0.732 df= 2 P= 0.693
	Islam	133 (49.6%)	66 (50.0%)	
	Traditional	13 (4.9%)	4 (3.0%)	
Ethnicity	Yoruba	236 (88.1%)	118 (89.4%)	X ² = 0.443 df= 2 P= 0.801
	Igbo	21 (7.8%)	8 (6.1%)	
	Hausa	11 (4.1%)	6 (4.5%)	
Hus-band's educa-tional status	None	16 (6.0%)	7 (5.3%)	X ² = 2.043 df= 3 P= 0.563
	Primary	53 (19.8%)	33 (25.0%)	
	Secondary	141 (52.6%)	61 (46.2%)	
Occupation	Tertiary	58 (21.6%)	31 (23.5%)	X ² = 138.200 df= 3 P= 0.0001
	Civil serv-ant	27 (10.1%)	63 (47.7%)	
	Artisan	200 (74.6%)	25 (18.9%)	
Occupation of the hus-band	Farming	35 (13.1%)	18 (13.6%)	X ² = 58.941 df= 2 P= 0.0001
	Unem-ployed	6 (2.2%)	26 (19.8%)	
	Civil serv-ant	18 (6.7%)	49 (37.2%)	
Average monthly income	Artisan	148 (55.2%)	46 (34.8%)	X ² = 19.482 df= 2 P= 0.0001
	Farming	102 (38.1%)	37 (28.0%)	
	Less than N10,000	77 (28.7%)	67 (50.8%)	
Family type	N10,000-50,000	168 (62.7%)	54 (40.9%)	X ² = 164.060 df= 1 P= 0.0001
	More than N50,000	23 (8.6%)	11 (8.3%)	
	Monogamy	258 (96.3%)	52 (39.4%)	
	Polygamy	10 (3.7%)	80 (60.6%)	

Table 6. Relationship between socio demographic factors, economic characteristics, and anemic status

ANAEMIC STATUS				
Variable	Level	Not anae-mic	Anaemic	Statis-tics
Age group (years)	15-24	43(15.8)	34 (26.8%)	X ² = 6.850 df= 2 p= 0.033
	25-34	147 (53.8)	61 (48.0%)	
	35-44	83 (30.4)	32 (25.2%)	
Marital status	Single	15 (5.5%)	7 (5.5%)	X ² = 0.001 df= 1 p= 0.994
	Married	258 (94.5)	120 (94.5%)	
	None	17 (6.2%)	7 (5.5%)	
Level of educa-tion	Primary	96 (35.2)	41 (32.3%)	X ² = 1.331 df= 3 P= 0.722
	Secondary	137 (50.2)	64 (50.4%)	
	Tertiary	23 (8.4%)	15 (11.8%)	
Religion	Christianity	127 (46.6)	57(44.9%)	X ² = 3.684 df= 2 P= 0.158
	Islam	138 (50.5%)	61 (48.0%)	
	Traditional	8 (2.9%)	9 (7.1%)	
Ethnicity	Yoruba	245 (89.7)	109 (85.8%)	X ² = 2.482 df= 2 P= 0.289
	Igbo	16 (5.9%)	13 (10.3%)	
	Hausa	12 (4.4%)	5 (3.9%)	
Hus-band's educa-tional status	None	16 (5.9%)	7 (5.5%)	X ² = 2.752 df= 3 P= 0.431
	Primary	63 (23.1)	23 (18.1%)	
	Secondary	139 (50.9)	63 (49.6%)	
Occupation	Tertiary	55 (20.1)	34 (26.8%)	X ² = 133.971 df= 3 P= 0.0001
	Civil servant	36 (13.2)	54 (42.5%)	
	Artisan	202 (74.0)	23 (18.2%)	
Occupation of the hus-band	Farming	32 (11.7)	21 (16.5%)	X ² = 21.585 df= 2 P= 0.000
	Unemployed	3 (1.1%)	29 (22.8%)	
	Civil servant	30 (11.0%)	37 (29.1%)	
Average monthly income	Artisan	146 (53.5%)	48 (37.8%)	X ² = 28.085 df= 2 P= 0.0001
	Farming	97 (35.5%)	42 (33.1%)	
	Less than N10,000	83 (30.4)	61 (48.0%)	
Family type	N10,000-50,000	175 (64.1)	47 (37.0%)	X ² = 97.687 df= 1 P= 0.001
	More than N50,000	15 (5.5%)	19 (15.0%)	
	Monogamy	250 (91.6)	60 (47.2%)	
Do you skip meal	Polygamy	23 (8.4%)	67 (52.8%)	X ² = 28.846 df= 1 P= 0.000
	Yes	150 (54.9)	105 (82.7%)	
	No	123 (45.1)	22 (17.3%)	

4.0 DISCUSSION

This study shows that pregnant women who are civil servants in Osun State are more likely to be underweight and malnourished compared to those who are farmers as observed in their significantly different BMI. This is contrary to findings in other studies by NDHS [14], and Ikechukwu *et al* [17] that reported higher mean BMI among civil servants in their study which was attributed to the higher purchasing power that possibly led to excessive calorie intake in comparison to farmers and artisans. On the contrary, the findings of this study showed lower mean BMI in women who are civil servants in comparison to those who were farmers and artisans. This may be explained by the prevailing economic situation in Osun State in which civil servants have been previously on modulated salaries for more than a year.

The prevalence of malnutrition observed in this study was found to decrease with increase in age. Pregnant women who were between the ages of 15-24 were more malnourished than those in the age categories of 35-44 years. This is contrary to studies in Tanzania that showed that women within the age brackets 20-29 years and 30-39 years were less likely to suffer from under nutrition compared to women in the age brackets 15-19 years and 40-49 years [18]. It is difficult to explain the reason for this observation. This study also shows that women who were in the age category 25-34 years were more anemic compared to those who were in the age category 35-44 years. This is comparable to a study conducted in Osogbo by Wasiu and Olufemi [19] those with non-education and tertiary education. However, result of a similar study conducted in Tanzania [18] showed that those with primary education were less likely to be affected by chronic under nutrition than women with secondary or higher education. According to NDHS 2013 data on nutritional status of women, women with low education were more malnourished than those with primary or higher education [14]. Also the result of DHS conducted in Ethiopia in 2000 showed that malnutrition among pregnant women decreased with increase in level of education. Another study conducted by Olujimi *et al* [20] showed that the proportion of anaemic women increased with decrease in the level of education.

The findings in this study revealed that among pregnant women in Odo-Otin Local government Area, civil servants were more malnourished than farmers. This is unlike the result of findings in the study conducted by Olujimi *et al* [20] which showed that women of high socio-economic status had low prevalence of malnutrition. The study shows that those who earn less than N10, 000.00 were more malnourished than those who earn more than N50,000.00. This is in accordance with studies that showed that women of high social class had good nutri-

tional status than those who were less economically empowered [20].

This study has revealed that the prevalence of malnutrition among pregnant women in Odo-Otin Local Government area was low. The study also revealed that there were significant associations between the socio-demographic factors, economic status and nutritional status. The result of the analysis confirmed that there was association between the dietary practice and nutritional status of the pregnant women. This is obvious as majority of the participants who skipped meal were malnourished, under-weight, had MUAC less than 23cm and were anemic. Also, pregnant women who were civil servants in Odo-Otin local government area, Osun state were more malnourished and anemic than farmers and artisans. It is therefore recommended that the state government should consider improvement in the salaries of civil servants and restore their full salaries. Government should also sponsor special dietary education sessions and, make available subsidized balanced energy and protein supplements especially for the pregnant women.

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Conflict of interest

The authors declare that there is no conflict of interest

Authors' Contributions

AA performed data collection. All authors conceptualized the study, performed data analysis, drafted, revised and approved the final manuscript.

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