Nutrient Intake, Activity Level and Post Pregnancy Anthropometric Changes Among Women in Lagos State

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Abstract

Pregnancy and post-partum are critical periods in which nutritional intake is essential to maternal health. Maintaining an adequate health status and appropriate lifestyle after pregnancy are of great importance in order to prevent adverse outcomes for the mother. A longitudinal study was conducted on 300 women in Lagos State. The study determined nutrient intake and physical activity as they affect anthropometric changes among women of different parities in Lagos State. Multistage cluster sampling was used for the study to select 300 women of which 50 women were nulliparous, 70 had one child, 86 had 2-3 children while 94 had 4 children and above. Activity level was estimated from the calculation of energy expended (EE) per day. Nutrient intake (Protein, Energy, Vitamin A, Iron and Calcium) was calculated using 24hour dietary recall while the anthropometric status was estimated with the measurement of body mass index (BMI) and Waist-Hip Ratio (WHR). The results of the study showed a significant variation (p<0.05) in intake of protein, energy, vitamin A, iron and calcium among women with varying parities. Highest mean protein intake (94.37g) was observed among women with 4 children and above, followed by women with no child (Mean = 86.33g). The lowest mean protein intake (37.85g) was observed among women with 2-3 children. Women with 4 children and above had the highest mean intake of iron and calcium while women with 2-3 children had the highest mean intake of vitamin A. Lowest nutrient intake was observed among nulliparous women for Vitamin A (422.75μ), Iron (16.64mg) and calcium (928.60mg) respectively. The study concludes that the anthropometric changes among post pregnant women in Lagos State when compared to nulliparous women is a function of individual nutrient intake. Based on the findings of the research, it was recommended among others that physical activity should be encouraged to commensurate nutrient intake. Mothers, especially pregnant and lactating women should be counseled to understand the need for exercise during these physiological states.

Key Words: Nutrient intake, activity level, post – pregnancy, anthropometric

Introduction

Women of childbearing age who actively performed the reproductive roles of

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pregnancy, lactating or weaning are considered as nutritionally vulnerable especially in developing countries of the World (Kawatra & Sahgal, 2004) Pregnancy can be described as one of the major causes of maternal changes in physical structure. T h e changes are visibly observed in the breast, waist, and hip and general body structure (Ohlin & Rossner, 1996)

Due to post nursing processes, child bearing age women are subjected to nutritional inadequacies that evidently result to observed changes in their physical structure Worthington- Roberts & Williams (1996), (Kawatra & Sahgal, 2004). Also, Women's bodies react differently before and after childbirth and motherhood present a great challenge. Post pregnancy anthropometric changes among women are evidenced in their physical appearance especially in weight, waist, hip and body mass index (BMI) (Ohlin & Rossner, 1996).

There is an assumption, which is traditionally accepted in Africa and Nigeria in particular that once a woman is married and consequently starts the reproductive functions, there ought to be an evidence to prove this maternal role, and this can be evidenced in the increase of hip and waist, mid-arm circumference, and body mass index (Akpochafor, 1999).. The influence of childbearing on weight gain among African women is not well documented. Most studies of weight change after childbearing have lacked a comparison group and could not account for the gain that often occurs with increasing parity (Rosenbergs & Keteyian, 2003)..

Statement of the Problem

Postpartum women are traditionally advised to adhere to a special pattern of lifestyle. The common postpartum practices in Nigeria and other developing countries of the world include drinking special soups and fluids, bathing with medical herbal preparations, injection of gruel flavoured with local salt, nursing in heated rooms, physical confinement and sexual abstinence. In Nigeria, it is traditionally believed that postpartum women are associated with an increase in hip and waist, mid-arm circumference and body mass index. This research is aimed at determining the association between nutrient intake and physical activity as they affect anthropometric changes among women of different parities in Lagos State.

Major purpose of the Study

The major purpose of the study was to d e t e r m i n e nutrient intake and physical activity as they affect anthropometric changes among women of different parities in Lagos State.

Specific Purpose of the Study

Specifically, the study

1. Determined the energy, protein, vitamin A, iron and calcium intake by women in Lagos state.

2. Assessed the effect of parity on mean energy, protein, vitamin A, iron and iron intake of women in Lagos state.

3. Determined relationship between parity and BMI status of women in Lagos state.

4. Analyzed the relationship between parity and WHR status of women in Lagos state.

5. Assessed the effect of parity on energy expenditure (Activity level) of nulliparous women and women with varying parities in Lagos state.

IJDRE vol. 2 (1) 2022

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6.   Evaluated the correlation coefficient of energy, parity, physical activity level, BMI and nutrient intake of respondent.

Research Questions

1.   What are the energy, protein, vitamin A, iron and calcium intake by women in Lagos state?

2.   What are the effect of parity on mean energy, protein, vitamin A, Iron and iron intake of women in Lagos state?

3.   What are relationship between parity and BMI status of women in Lagos state?

4.   What are the relationship between parity and WHR status of women in Lagos state?

5.   What are the effect of parity on energy expenditure (activity level) of nulliparous women and women with varying parities in Lagos state?

6.   What are the correlation coefficient of energy, parity, physical activity level, BMI and nutrient intake of respondent?

Methodology

Longitudinal research design was utilized for the study. According to Gall Gall & Borg (2007), A longitudinal study involves collecting data from a sample at different points in time in order to study changes or continuity in the sample's characteristics. This study was carried out in Lagos Mainland Local Government Area of Lagos State. 300 women were selected through multi-stage cluster sampling, comprising 50 women without children (Nulliparous), 70 with one child, 86 with 2-3 children and 94 with four children and above. Data were collected through the use of a structured interview technique developed to obtain information on the respondents' demographic data, behavioural data, nutrient intake, anthropometric data and activity level as they relate to parity.

The major variables under study were:

Nutrient intake 24-hour dietary recall protocol. A 24-hour dietary recall was collected from all the subjects included in the study. Anthropometry status as measured in Body Mass Index (BMI) Waist/Hip ratio was calculated by waist circumference in cm divided by hip circumference in cm and the value was indicated against the subject identity. Activity level- (6) formula: energy used = BMR+PAL+TEF where BMR for light activity= 0.554 and 0.404 for very light activity. Where BMR = basal metabolic rate; PAL= physical activity level; thermal effect of food.

Statistical Analysis

Descriptive and inferential statistics were used on Statistical Package for Social Sciences (SPSS Version 17). Descriptive statistics such as percentage, frequency, graph, mean and standard deviation were used. Activity level was estimated from the calculation of energy expended (EE) per day. Nutrient intake (Protein, Energy, Vitamin A, Iron and Calcium) was calculated using 24hour dietary recall was analyzed using adopted total diet assessment software. The anthropometric status was estimated with the measurement

IJDRE vol. 2 (1) 2022

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of body mass index (BMI) and Waist-Hip Ratio (WHR). The relationship between Parity and Waist-Hip Ratio (WHR) as well as body mass index (BMI) status of women in Lagos state were computed using Chi square statistics. Pearson Correlation Coefficient was used in determining the relationship among energy, parity, physical activity level, BMI and nutrient intake of respondents.

Results

Findings from the study revealed bio data, parity level, energy and nutrient intake and physical activity level of women in Lagos State.

Bio-data

Majority (55.5%) of the respondents were between age 25-34, while most (55%) of them were self-employed traders.66% of them were married while only 5.0 % were divorced.

Parity level

Research results revealed that fifty (50) women were nulliparous, seventy (70) had one child, eighty six (86) had 2-3 children while ninety four (94) had four children and above.

Energy and Nutrient intake

The results of the study also showed a significant variation ($p<0.05$) in energy and nutrient intake among women with varying parities.
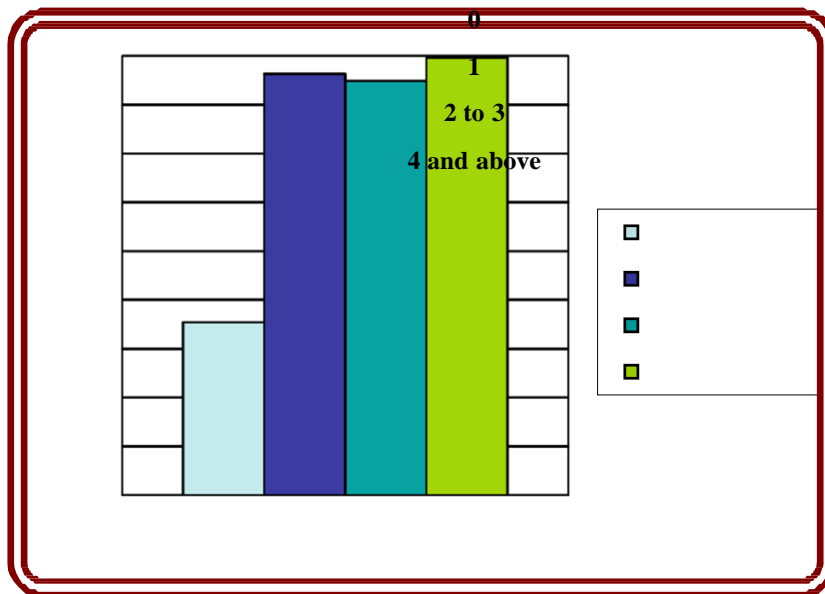
Physical Activity level

Majority (53.5%) of the respondents engaged in light physical activity while only 20.5% of them engaged in intensive physical activities.

Table 1: Descriptive analysis of energy, protein, vitamin A, iron and calcium intake by women in Lagos state.

Nutrient	N	Minimum	Maximum	Mean	Std. Deviation
Energy(kcal)	300	1984.21	3841.30	2614.78	176.42
Protein(g)	300	21.63	455.72	117.73	13.64
Vitamin A (µ)	300	220.41	3721	715.24	36.92
Iron (mg)	300	16.14	169.52	46.36	15.81
Calcium (mg)	300	445.63	2892.56	1497.91	69.04

Results on the mean intake, standard deviation, minimum and maximum of energy, protein, vitamin A, iron and calcium are contained in Table 1 above. The mean energy intake for the women was 2614.78kcal and the mean protein intake of the women was 117.73. On the average, the intake of vitamin A, iron and calcium were 715.24, 46.36mg and 1497.91mg respectively.

IJDRE vol. 2 (1) 2022

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Fig. 1: Parity and mean Energy intake of women in Lagos state.

The result shows that parity had no significant effect on energy intake of women (P> 0.05). However, women with 4 and above children had the highest mean intake of energy as illustrated in the Figure 1.

Table 2: Effect of Parity on mean energy, protein, vitamin A, Iron and iron intake of women in Lagos state.

Parity	Energy(kcal)	Protein(g)	Vitamin A(μ)	Iron(mg)	Calcium(mg)
0	3154.45a	86.33a	422.75b	16.64c	928.60c
1	3633.30a	38.38b	459.07b	17.82bc	1265.30bc
2-3	3648.91a	37.85b	641.72a	26.43b	1612.13ab
4	3696.33a	94.37a	620.12a	42.30a	1862.65a

Means with the same letter(s) do not differ significantly based on Duncan multiple range test at P < 0.05.

Parity had effect on intake of protein, vitamin A, iron and calcium at P< 0.05. However, parity had no significant effect on energy intake of women (P>0.05). Table 2 above shows that highest protein intake was observed with women with four and above children (mean protein intake women= 94.37), followed by women with no child. Women with two-three children had the lowest protein intake (mean = 37.85). Women with 4 and above children had the highest mean intake of iron and calcium while women with 2-3 children had the highest mean intake of vitamin A. Lowest nutrient intake was observed for nulliparous women compared to women with children except in in protein intake where their mean intake was significantly higher than that of women with 1 and 2-3 level of parity.

IJDRE vol. 2 (1) 2022

[INTERNATIONAL JOURNAL OF DEVELOPMENTAL RESEARCH IN EDUCATION (IJDRE) UNIVERSITY OF UYO ISSN Online 2971-5482, Print 2971-5474, July-Sept, 2022]]

Table 3: Relationship between Parity and BMI status of women in Lagos state.

Parity		Frequency	Chi-square
Nulliparous	Normal	50	0
Women with one child	Normal	25	18.2**
	Overweight	37	
	Obese	8	
Women with 2-3 children	Normal	2	51.55**
	Overweight	56	
	Obese	27	
Women with 4 and above children	Overweight	23	24.21**
	Obese	71	

Table 3 showed the relationship between parity and BMI status of women in Lagos state. 50 nulliparous women involved in this study had normal BMI. The number of women with normal BMI decreased as the parity increased.

Table 4: Relationship between Parity and WHR status of women in Lagos state.

Parity	Frequency		Chi-square
Women with no child	Ideal		35.20**
	Overweight		
Women with one child	Ideal		6.91**
	Overweight		
Women with 2-3 children	Ideal		0.294ns
	Overweight		
Women with 4 and above	Ideal		0.043ns
	Overweight		

The status of the women with respect to waist-hip ratio was analyzed and the results are contained in table 4 above. Most of the nulliparous women (46) had ideal WHR compared to women with at least one child. The number of women with overweight WHR status significantly increased with parity, while within the category of women with 2-3 and women with 4 and above children, there was no significant (P>0.05) difference in the number of women with ideal and overweight WHR status (Table 4).

Table 5: Effect of parity on Energy expenditure (Activity level) of nulliparous women and women with varying parities in Lagos State.

Parity	Mean Energy Expenditure
Nulliparous	2192.44d
Women with a child	2704.68c
Women with 2-3 children	3009.28b
Women with 4 and above children	3404.80a

Means with the same letter are not significantly different based on Duncan Multiple Range Test at P<0.05.

Table 5 shows that parity effect on energy expenditure was significant at P<0.01. Women with 4 expended the highest energy (mean = 3404.80 kcal) followed by women with 2-3 children (mean = 3009.28) and the lowest energy expenditure was expressed by the nulliparous women (mean = 2192.44). Also, energy expenditure was significantly lower among nulliparous women compared to women with at least one child as shown in Table 5.

IJDRE vol. 2 (1) 2022

[INTERNATIONAL JOURNAL OF DEVELOPMENTAL RESEARCH IN EDUCATION (IJDRE) UNIVERSITY OF UYO ISSN Online 2971-5482, Print 2971-5474, July-Sept, 2022]]

Table 6: Correlation Coefficient of Energy, Parity, Physical activity level, BMI and Nutrient intake of respondent.

Variable		Energy Intake	Parity	Activity Level	BMI	PROTEIN	VITA	IRON	CALCIUM
Energy intake	Pearson Correlation	1	.037	.053	.004	.015	-.007	-.050	.046
	Sig. (2-tailed)	.	.520	.361	.948	.793	.907	.385	.431
	N	300	299	299	299	300	300	300	300
Parity	Pearson Correlation	.037	1	.902**	.740**	.069	.175**	.275**	.230**
	Sig. (2-tailed)	.520	.	.000	.000	.235	.002	.000	.000
	N	299	299	299	299	299	299	299	299
Activity Level	Pearson Correlation	.053	.902**	1	.736**	.043	.131*	.247**	.198**
	Sig. (2-tailed)	.361	.000	.	.000	.456	.023	.000	.001
	N	299	299	299	299	299	299	299	299
BMI	Pearson Correlation	.004	.740**	.736**	1	-.007	.132*	.148*	.170**
	Sig. (2-tailed)	.948	.000	.000	.	.898	.022	.011	.003
	N	299	299	299	299	299	299	299	299
PROTEIN	Pearson Correlation	.015	.069	.043	-.007	1	-.026	.554**	.579**
	Sig. (2-tailed)	.793	.235	.456	.898	.	.653	.000	.000
	N	300	299	299	299	300	300	300	300
VITA	Pearson Correlation	-.007	.175**	.131*	.132*	-.026	1	.043	-.004
	Sig. (2-tailed)	.907	.002	.023	.022	.653	.	.461	.949
	N	300	299	299	299	300	300	300	300
IRON	Pearson Correlation	-.050	.275**	.247**	.148*	.554**	.043	1	.380**
	Sig. (2-tailed)	.385	.000	.000	.011	.000	.461	.	.000
	N	300	299	299	299	300	300	300	300
CALCIUM	Pearson Correlation	.046	.230**	.198**	.170**	.579**	-.004	.380**	1
	Sig. (2-tailed)	.431	.000	.001	.003	.000	.949	.000	.
	N	300	299	299	299	300	300	300	300

IJDRE vol. 2 (1) 2022

[INTERNATIONAL JOURNAL OF DEVELOPMENTAL RESEARCH IN EDUCATION (IJDRE) UNIVERSITY OF UYO ISSN Online 2971-5482, Print 2971-5474, July-Sept, 2022]]

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

The results of the correlation matrix among nutrient intake, BMI, parity and activity level of women involved in this study are contained in Table 6 above. Parity correlated positively and significantly (P<0.01) with vitamin A, calcium, and iron intake of women investigated with R-value of 0.175, 0.230 and 0.275 respectively. Parity also correlated positively with protein and energy intake but not significantly (P>0.05) with R-value of 0.69 and 0.037 respectively. The relationship between parity and BMI was positive and significant (P<0.01) with R-value of 0.74. Similarly, parity correlated positively and significantly with activity level of women with R-value of 0.902. Nutrient intake of the women in terms of vitamin A, iron, calcium and energy intake correlated positively and significantly at P<0.01 with BMI (R-value= 0.132, 0.148, 0.170 and 0.004 respectively). On the contrary, BMI correlated negatively with protein intake of women in this study with R-value of -0.007 (Table 6). Activity level correlated positively with energy intake and protein but significantly (P>0.05) with vitamin A, iron and calcium having R-values of 0.053, 0.43, 0.131, 0.247 and 0.198 respectively.

Discussion of Findings

The analysis of the result indicates a significant variation in protein, vitamin A, iron and calcium intakes among mothers with varying parities. Women with 4 children and above consumed higher nutrient intakes except for energy intake where there was no significant (P>0.05) variation in consumption pattern among women with different parities. This finding corroborates the study of Ayatollah (2004) who equally observed from that nutrient intake among childbearing women are similar, especially when based on dietary recommendation. Consumption of food containing vitamin A was quite low for all the subjects. The reason might not be unconnected with low vitamin A value of the cultural foods available in the market, despite its health implications for healthy vision (8). This could explain the fortification of most foods with vitamin A by Nigerian food industries as mandated by the Federal Government. Therefore, due to the importance of maternal nutrition, determining habitual nutrient intake throughout pregnancy and even after delivery is crucial.

Table 2 showed that highest protein intake was observed with women with four and above children (mean protein intake women= 94.37), followed by women with no child. Women with two-three children had the lowest protein intake (mean = 37.85). Women with 4 and above children had the highest mean intake of iron and calcium while women with 2-3 children had the highest mean intake of vitamin A. Lowest nutrient intake was observed for nulliparous women compared to women with children except in in protein intake where their mean intake was significantly higher than that of women with 1 and 2-3 level of parity.

Similarly, a study on the nutrient intake during pregnancy and post- partum conducted on 793 pregnant women in Tarragona in Spain, an European Mediterranean country, reported that although nutritional requirement increase during gestation, pregnant women did not increase their energy and nutritional intake during pregnancy and post- partum and they had a high risk of

IJDRE vol. 2 (1) 2022

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deficient intake of vitamin D, iron and foliates during pregnancy and therefore, of developing an unfavourable nutritional status, contrary to health recommendations. (Estefania, Cristina, Cristina, Meritxell, Basora, Arija & the ECLIPSES Group Study, 2022)

The results of the correlation matrix among nutrient intake, BMI, parity and activity level of women involved in this study are contained in Table 6 above. Parity correlated positively and significantly ($P<0.01$) with vitamin A, calcium, and iron intake of women investigated with R-value of 0.175, 0.230 and 0.275 respectively. Parity also correlated positively with protein and energy intake but not significantly ($P>0.05$) with R-value of 0.69 and 0.037 respectively. The relationship between parity and BMI was positive and significant ($P<0.01$) with R-value of 0.74. Similarly, parity correlated positively and significantly with activity level of women with R-value of 0.902.

Nutrient intake of the women in terms of vitamin A, iron, calcium and energy intake correlated positively and significantly at $P<0.01$ with BMI (R-value= 0.132, 0.148, 0.170 and 0.004 respectively). On the contrary, BMI correlated negatively with protein intake of women in this study with R-value of -0.007 (Table 6).

The findings of the present study is in agreement with the findings in an earlier study on the association of the maternal experience and changes in adiposity measured by BMI, waist : hip ratio and percentage body fat in urban Brazilian women. In a cross- sectional study, 203 women were recruited at health care and educational facilities in Brasilia, Brazil. These groups were divided into three groups fifty- three nulliparous (no full term pregnancy); 63 primiparous (one full term pregnancy); 87 multiparous (2 or more full term pregnancies. Socio-economic, behavoural, reproductive and dietary data were collected. Report from the study also indicated that all the women were measured for weight, height, skin fold thickness and waist and hip circumferences. Analysis of covariance was used to measure the differences among the three groups in relation to BMI, PBF and WHR, controlling for the following covariates: age, socio-economic status; use of oral contraceptives; smoking; energy intake level; cooking oil intake; physical activity level; lactation score, parity. The three groups of women differed significantly for BMI (P = 0.04), PBF (P = 0.0008) and WHR (P = 0.0001). Multiparous women presented higher BMI (P= 0. 01)and PBF (0.03) compared with primi - and nulliparous groups; PBF was also associated with age and high economic status. Primi and multiparous women showed a higher WHR than nulliparous women (P<0.0001). Age and smoking habit were also factors associated with higher WHR (Rodrigues & Da Costa ,2001).

In another study on parity implications for anthropometrical variables, lifestyle behaviours and dietary habits in pregnant women in Spain, the nulliparous reported a better self-perceived health status and nutritional balance, and a lower incidence of gestational diabetes mellitus. However, the multiparous showed healthier lifestyle habits (lower rates of smoking and alcohol consumption) and more physically active patterns. Research findings also indicated that nulliparous pregnant women consumed more dairy products, fresh fruits and nuts and less bread, rice/ pasta/ potatoes, meat, sausages and buns/ pastries than multiparous pregnant women (Goni ; Cuervo, : Santiago, Zazpe & Martinez, 2014).

IJDRE vol. 2 (1) 2022

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In a recent study on the nutritional status and functional capacity of elderly in selected communities in Ibadan, Oyo State, Nigeria, data which corroborates with the present study revealed that the Body Mass Index distributions/classifications of the respondents. Majority of the respondents (66.7%) were normal that is has the body mass index that falls between 18-24.99 kgm², 8.2% were overweight, 8.0% were obese and 17.1% of the respondent were underweight. Research result also showed that the mean energy and nutrient intake of female and male respondents. The mean energy intake of both male and female respondents (1503.59 ± 383.08 kcal, 1156.40 ± 413.60 kcal) was less than RDA by 26.8% and 38.3% respectively. Also, mean protein intake was 84.8% and 93.6% of the RDA among female and male elderly respectively. Carbohydrate intake of both female and male respondents was found to be 159.41% and 198.60% of RDA respectively and the mean vitamin A intake among (1109) and female respondents (751.76) was above the RDA by 23.2% and 7.4% respectively. Intake of water soluble vitamins like vitamin C and vitamin B complex (B1, B2, B9 and B12), sodium, phosphorus, potassium, magnesium and calcium were below the RDA among both male and female respondents (Okwulehie, Lemchi, Iheme, & Obi- Anyanwu , 2021).

Conclusions

The results indicated a non-significant change in the anthropometric characteristics of the post-pregnant women to that of nulliparous women thereby establishing that anthropometric changes among post-pregnant women in Lagos State when compared to nulliparous women is just a function of individual increase in nutrient intake as the situation may demand. Results of the study revealed increase in BMI with increasing parity. However, women with varying parities seem to engage in more intensive activities than the nulliparous.

Recommendations

The following recommendation were made based on the findings of the study:
1. Physical activity should be encouraged to commensurate nutrient intake. Mothers, especially pregnant and lactating women should be counseled on the need for exercise during these physiological states.
2. Nutrition education should be given to women on adequate food consumption in order to prevent overweight which can culminate into obesity and other nutritional disorders.
3. Nutritionists and Home Economists should organize intensive nutritional programmes for pregnant women during ante natal clinic and after pregnancy during post- natal clinic.
4. Nutritionist and Home Economists should undertake the evaluation of nutrient intake of women throughout pregnancy and after delivery.
5. The study on nutrient intake, activity level and post pregnancy anthropometric changes among women should be conducted in other states in Nigeria.

References

Akpochafor, W. (1999). Sociology of Nigerian Society. Warri, Feb-Africana : 157-162.

Ayatollah, S.M.T (2004): Nutritional Assessment of Lactating Women in Shiraz in relation to Recommended Dietary Allowances. Eastern Mediterranean Health Journal, 10 No.6, 2004.

Bowman, B.A & Russell, R.M (2001): Present Knowledge in Nutrition 8th Ed. ILSI Press Washington DC: 406-531.

Estefania, A; Cristina, J; Cristina, B; Meritxell, P; Basora, J; Arija V & the ECLIPSES Group Study (2022) Nutrient Intake During Pregnancy and Post- Partum; ECLIPSES Study, 12, 1325; doi: 10.3390/nu 12051325 www.mdpi.com/journal/nutrients.

Gall, M.D; Gall, J.P & Borg, W.R. (2007) *Educational Research: An Introduction* United States of America: Pearson Educational Incorporated : 302-303.

Goni, L ; Cuervo, M ; Santiago, S ; Zazpe, I, Martinez J.A. (2014). Parity Implications for Anthropometrical Variables, Lifestyle Behaviours and Dietary Habits in Pregnant Women Anales dei sistema sanitario de Navana 37 (3) : 349-362.

Kawatra, A & Sahgal, S (2004); Nutrient Intake of Lactating Mother from Rural And Urban Areas. *Indian Journal of Social Research* Vol. 39 (2): 91-99.

Ohlin, A & Rossner, S. (1996). Factors related to body weight changes during and after pregnancy. The Stock Holm Pregnancy and Weight Development Study. Obesity Research 271-276.

Okwulehie, F.C; Lemchi, S.N; Iheme, G.O; Obi- Anyanwu, J.N (2021). Nutritional Status and Functional Capacity of Elderly in Selected Communities in Ibadan, Oyo State. Nigerian *Journal of Nutritional Sciences September*, 2021: 42(2): 41- 52

Rodrigues, M, L.C.F. & Da Costa, T. H.M. (2001). Nutrition Society 2001. Association of the Maternal experience and changes in adipose measure of IBM waist: hip ratio and percentage body fat. *In urban Brazilian Women British Journal of Nutrition*

Rosenbergs, R.A. & Keteyian, S. J. (2003). Fundamentals of Exercise Physiology for Fitness, Performance and Health. New York: McGraw Hill Companies.

Worthington- Roberts, B. S; & Williams, S.R (1996) Nutrition Throughout the Life Cycle New York: McGraw Hill Companies.