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Poor Dietary Intake of Energy and Retinol among Pregnant Women: Implications for Pregnancy Outcome in Southwest Nigeria

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Abstract: This paper examines the impact of adequate intake energy and retinol on pregnancy outcome among selected pregnant women in Osun State, Southwest Nigeria. Eight hundred and forty (840) pregnant and 250 non-pregnant women were involved in the survey conducted in 2006 which used a 24-hour diet recall to assess their dietary intake. Food models were used to assist memory and portion size of foods taken. The results indicate that dietary energy intake in this study was inadequate in about 75% of the pregnant women and 65% of the non-pregnant women. With the exception of protein intakes in Ife North, inadequate intake was less than 15% in all LGA. The structure of the menu, however, point to a preponderance of protein of plant origin. Compared with protein intake, the dietary intake of Vitamin A (Retinol) was inadequate in all the LGA and among pregnant and non-pregnant women. The paucity of animal protein in the diet may be responsible for this. Almost 70% of the pregnant women also had inadequate Vitamin C intakes. The study therefore, reiterates that emphasis on dietary sources of energy, iron, vitamin A and folic acid during pregnancy should be the key discussion during antenatal visits. Food demonstration during the antenatal visits offers the best strategies.

Key words: Malnutrition, pregnancy, antenatal, outcome, miscarriage, dietary, prevalence

Introduction

Nigeria is one of the countries with the highest maternal mortality rate in the world (Harrison, 1997; Orji *et al*., 2002) and malnutrition during pregnancy has been recognized as one of the major factors for this high maternal mortality in developing countries (Rush, 2000; Keen, 2003). This is because maternal malnutrition worsens the other causes of maternal morbidity such as anaemia, postpartum haemorrhage, obstructed labour and infections among others. Several studies have shown that poor dietary pattern before and during pregnancy is one of the major causes of malnutrition (Sanusi and Oredipe, 2002; Ojofeitimi *et al*., 1982).

Although, the demand for energy and other nutrients increase during pregnancy, some pregnant women deliberately reduce their dietary intake in an attempt to have smaller babies (Ojofeitimi *et al*., 1982). This is because of the fear that uncontrolled dietary intake during pregnancy results in big baby which in turn leads to increased risk for caesarean section (Ojofeitimi *et al*., 1982; Ojofeitimi and Tanimowo, 1980). The consequence of this faulty dietary habits is maternal malnutrition leading to increase in the incidence of anemia in pregnancy, low birth weight, poor maternal weight gain and increase risk for neural tube defects, cleft lip, cleft palate and maternal mortality and morbidity (Keen, 2003; Sanusi and Oredipe, 2002; Sanusi and Omoni, 2000; Sanusi and Akinyele, 1999; Fall, 2003; Wald *et al*., 1998; Langley-Evans and Langley-Evans, 2002; Barker, 1997).

Adequate nutrition, especially for women and children remains an important concern in Nigeria. A comparison of the National Demographic and Health Survey (NDHS) 1990 and 1999 showed that stunting and wasting seem to have increased among children aged 0-36 months (from 36 to 46 percent and from 11 to 12 percent respectively). Early nutritional intervention at the onset of pregnancy will certainly reduce the prevalence of stuntingness and wasting among these children, hence the need for this study.

Materials and Methoods

The study was conducted in Osun state, Nigeria. The state which came into existence on 27th August 1991 has 30 Local Government Areas with a total population of 2,158,143 (1,043,126 males and 1,115,017 females). According to the 2002 Nigeria Reproductive Health service provision survey, the state is the fourth primary level health facility providers by number in Nigeria with 15 Dispensaries, 65 Health posts, 10 Maternity Centers and 408 Primary Health Centers with a ratio of 1 PHC to 10,000 people. There are three Teaching Hospitals, two Federal Hospitals, six States General Hospitals located

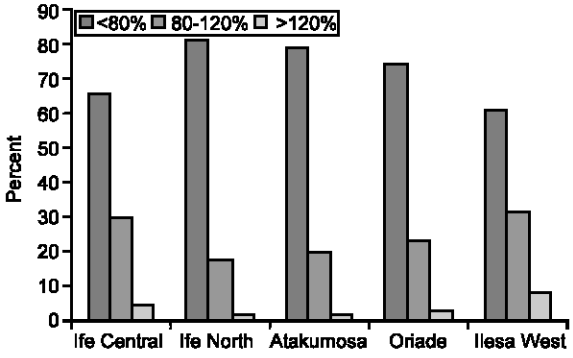

Fig. 1: Adequacy of Energy Intakes in the Selected LGAs

in urban and rural communities in the state. The major occupation of the people is farming, both for export and food crops.

For data generation, a descriptive and cross-sectional design was employed. The first stage of sampling was the selection of six Local Government Area (LGA) (3 urban and 3 rural) from the 30 LGA in the state using urban and rural status. The urban LGA are: Ife Central, Ife East and Ilesa West, while the rural LGA include Atakumosa East and West and Oriade.

Eight hundred and forty-four women of reproductive age (15-49) were randomly selected for interview with probability of selection proportional to the population size and availability of health facility in each of the LGA. Based on these criteria, two hundred and seventy-five (275) were from Ife Central LGA, one hundred and nineteen (119) from Ife North LGA, seventy-six (76) from Atakumosa east and west LGAs, one hundred and four (104) from Oriade LGA and one hundred and twenty-five (125) from Ilesa West LGA. However, to qualify for inclusion in the sample, certain conditions must be met. Among these are: the woman must be willing to participate, be under 35 years, should be at least 3 months pregnant with adequate evidence and should be willing to deliver at the maternity centers, her height should be above 1.5 metres to obviate cephalo-pelvic disproportion, should not have had history of miscarriage, still birth or obstructed labour and not suffering from oedema or any other related medical problems that increase weight or accumulates fluids related to pregnancy and should be of singleton pregnancy. Dietary intake of these pregnant women was assessed using the 24 hour dietary recall. The pregnant women were interviewed at the health facilities during the antenatal care while the non-pregnant women of reproductive age in the same communities were interviewed in their homes to serve as control. Socio-demographic data such as age, occupation, family income and parity were collected.

To assess the dietary intake of the respondents, a 24-hour diet recall was done for each subject to assess the usual dietary intake. Food models were used to assist memory and portion size of foods taken. However, for comparison, dietary intakes of two hundred and fifty (250) randomly selected non-pregnant women were assessed using the same instrument. The interviewers were trained and techniques standardized.

The instrument for data harvesting was validated and pre-tested. Interviewers were trained and procedures standardized. Food models were used to aid correctness of portion sizes. The dietary supplement was analysed to know the nutrient context/100g. Weighing scales were procured for each of the health facilities used for the study.

The 24-hour dietary recall was analysed using an electronic software Total-Diet Assessment (TDA)® to obtain the nutrient content of the foods. Prior to this, the amount of food consumed was converted to weight. Adequacy of nutrient intake was assessed using the WHO Recommended Dietary intake (RDA) for international use (Passmore and Nicol, 1974).

Descriptive Statistics that includes means, standard deviation, percentages and proportion were derived. The chi-squared was used to compare frequency between nominal values. The Statistical Package for Social Sciences (SPSS) version 11 was used for all analyses.

The protocol for this study was reviewed and approved by the Ethical Board of the Obafemi Awolowo University Teaching Hospital Comlex Ile-Ife. The participants in this study also gave informed consent after the details of the study were explained to each of them and voluntary participation requested.

Results and Discussion

The background characteristics of respondents showed a youthful population with more than 40% of the population in age group 20-29. The major ethnic group is Yoruba; though other ethnic groups are still found in the study locations. More than 70% had received formal education, the highest being secondary education. More than 80 percent professed to be Christian as against 16.4 percent Muslims. Examination of occupational distribution revealed that the dominant occupation among the respondents was trading (41.2%).

Fig. 1 shows that in each of the LGA, more than sixty percent had inadequate dietary energy intake (see Table 1). As presented in Fig. 2, dietary protein intake was adequate in more than 65% of the women. This however, is predominantly plant proteins, which is limited in essential amino acids. As shown in Table 1, dietary intake of vitamin A in all the LGA was inadequate, but dietary intake of vitamin C was far better in Ife North, Atakumosa and Ilesa West than in Ife Central and Oriade.

Table 1 further shows further that dietary foliate intake was adequate in all the LGA. Intake of calcium was

Table 1: Adequacy of Dietary Energy and Micronutrient Intakes by Local Government Area

%RDA Energy	Ife Central (N = 275)	Ife North (N = 119)	Atakumosa (N = 76)	Oriade (N = 104)	Ilesa West (N = 125)
<80%	65.5	80.7	78.9	74.0	60.8
80-120%	29.8	17.6	19.7	23.1	31.2
>120%	4.7	1.7	1.7	2.9	8.0
%RDA Protein					
<80%	13.1	21.0	9.2	13.4	8.8
80-120%	18.2	12.6	13.2	18.3	15.2
>120%	68.7	66.4	77.6	68.3	76.0
%RDA Vitamin A					
<80%	100.0	100.0	100.0	100.0	100.0
80-120%	-	-	-	-	-
>120%	-	-	-	-	-
%RDA Vitamin C					
<80%	85.4	36.1	25.0	64.4	29.6
80-120%	5.8	16.8	26.3	10.6	16.8
>120%	8.7	47.1	48.7	25.0	53.6
%RDA Folate					
<80%	25.5	22.7	15.8	12.5	11.2
80-120%	14.3	13.4	11.8	2.5	4.8
>120%	60.2	63.9	72.4	85.0	84.0
%RDA Calcium					
<80%	96.0	94.1	89.5	95.0	88.7
80-120%	3.3	4.2	10.5	5.0	8.9
>120%	0.7	1.7	-	-	2.4
%RDA Zinc					
<80%	94.2	82.4	86.8	88.3	80.8
80-120%	4.4	12.6	10.5	9.7	11.2
>120%	1.4	5.0	2.6	1.9	8.0
%RDA Iron					
<80%	84.6	89.0	94.7	83.6	82.2
80-120%	9.3	8.5	2.6	13.5	11.4
>120%	6.1	2.5	2.6	2.9	6.5
Total	100.0	100.0	100.0	100.0	100.0

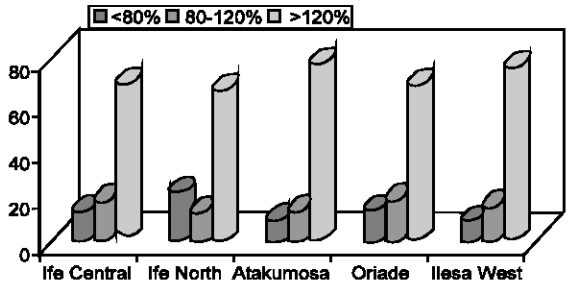

Fig. 2: Adequacy of Protein Intakes in the Selected LGAs

generally poor among the respondents. In addition, intake of dietary iron and zinc were extremely poor in all the LGA, particularly among the pregnant women.

Dietary energy intake in this study was inadequate in about 75% of the pregnant women and 65% of the non-pregnant women (Table 2). The Recommended Dietary Allowance (RDA) was 2200Cal and 2550Cal for non-pregnant and pregnant women respectively (WHO, 1997). This inadequacy of dietary energy intake is similar in the five LGA assessed. Furthermore, the difference in intakes of dietary energy between the pregnant and non-pregnant was not significant ($p = 0.05$). Earlier investigators had reported diet restrictions and nutritional aversion during pregnancy based on health, religion and tradition in these locations (Oboro *et al.*, 2003; Ojofeitimi *et al.*, 1982). This high degree of inadequate dietary energy is consistent with household food insecurity (Abudu and Akinkugbe, 1982). Sanus *et al.* (2006) had found a 70% prevalence of household food insecurity in their study in Lagos and Ibadan. Similarly, Maziya-Dixon *et al.* (2004) had reported a high prevalence of about 60% of severe household food insecurity in the moist savannah in which the present study locations situate.

Dietary protein intakes were more than adequate in all LGA, averaging 65%. With the exception of protein intakes in Ife North, inadequate intake was less than 15% in all LGA. The structure of the menu, however, point to a preponderance of protein of plant origin. Compared with protein intake, the dietary intake of Vitamin A (Retinol) in the LGAs was inadequate in all the LGA and among pregnant and non-pregnant women. The paucity of animal protein in the diet may be responsible for this. Almost 70% of the pregnant women had inadequate Vitamin C intakes (Table 1).

Table 2: Adequacy of Dietary Energy and Micronutrient Intakes

Variable	Not Pregnant (N = 250)	Pregnant (N = 844)
%RDA Energy		
<80%	65.4	75.5
80-120%	28.9	21.9
>120%	5.7	2.6
%RDA Protein		
<80%	12.0	16.4
80-120%	10.9	20.3
>120%	77.1	62.8
%RDA Vitamin A		
<80%	100.0	100.0
80-120%	-	-
>120%	-	-
%RDA Vitamin C		
<80%	46.6	68.0
80-120%	11.1	15.9
>120%	42.8	16.1
%RDA Folate		
<80%	11.6	28.2
80-120%	7.3	16.1
>120%	81.0	55.7
%RDA Calcium		
<80%	88.2	99.4
80-120%	10.3	-
>120%	1.5	0.6
%RDA Zinc		
<80%	81.4	93.9
80-120%	12.9	4.9
>120%	5.7	1.2
%RDA Iron		
<80%	79.9	78.3
80-120%	16.6	16.2
>120%	3.4	5.5

Intake of foliate is high in all the LGA with over 60% having intakes of over 120% RDA. Over 71% of the pregnant women had adequate dietary intake of folate indicating that as high as 28% of the pregnant women did not have adequate intake of foliate. This however does not pose a problem since pregnant women usually use supplementary folic acid. The inadequacy of dietary iron in all the LGA is an issue which is surprising in this study, although iron supplements are given during pregnancy.

As shown in Table 2 a third of the pregnant women and about 30% of non-pregnant women had adequate dietary energy intakes. But dietary protein was adequate in both pregnant and non-pregnant women. Both pregnant and non-pregnant women's intake of vitamin A was inadequate (Table 2). There was a higher intake of vitamin C among the non-pregnant than the pregnant women. However, more of the pregnant than non-pregnant women had inadequate intake of foliate.

Conclusion: Studies have established that women who have better nutritional status at the time they become pregnant are better able to meet the demands imposed by the pregnancy and tend to have more successful outcomes (Ojofeitimi *et al.*, 1982). There is no doubt that malnutrition is pervasive and even if it does not result in death, the burden it implies in terms of retarded development and vulnerability to diseases is great.

Though there are other social and behavioural factors that clearly impair foetal development such as malaria, HIV/AIDS, maternal smoking, but maternal nutritional status is an important determinant of the outcome of a pregnancy. The ability of a woman to carry a healthy pregnancy and successfully suckle her infant during its first year of life requires that she has the capability to provide all the energy and nutrients that are required. Woman with good nutritional status at the time they become pregnant are better able to meet the demands imposed by the pregnancy and have more successful outcomes. This study had shown that nutritional intervention during pregnancy would overcome poor maternal weight gain and reduce the incidence of low birth weight and premature deliveries using locally available and affordable foodstuff.

In spite of iron supplementation during pregnancy, inadequacy of dietary iron intake could still exist, more so when the major sources of proteins are from plant origin. More importantly, iron deficiency anaemia has been linked with adverse pregnancy outcomes; low birth weight, preterm, stillbirth, neonatal infection, maternal morbidity and mortality. These findings indicate that specific policies should be developed by appropriate governmental agencies and ministries to control and prevent both micronutrients and energy deficiencies during pregnancy in order to reduce the high maternal morbidity and mortality in Nigeria. Emphasis on dietary sources of energy, iron, vitamin A and folic acid during pregnancy should be the key discussion during antenatal visits. Food demonstration during the antenatal visits offers the best strategies.

The role of health workers in improving maternal health is quite instructive; if health workers are given the necessary orientation, they could be a very useful outlet for enlightening the women on discarding old-fashioned practices of food avoidance and achieve a better maternal nutrition status. This could help in reduction of maternal malnutrition, morbidity and mortality. Policy makers and programme officers could thus use health workers as instruments to achieve necessary social change as regards food prohibitions.

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References

Abudu, O. and A. Akinkugbe, 1982. "Clinical causes and classification of perinatal mortality in Lagos". Int. J. Gynaecol. Obstet., 20: 443-7.

Barker, D.J., 1997. Maternal Nutrition, fetal nutrition and disease in Later Life. Nutr., 13: 807-813.

Fall, C.H.D., 2003. Macronutrient and fetal growth J. Nutr., 33 (Suppl 2): 17475-17565.

Harrison, K.A., 1997. Maternal Mortality in Nigeria. The real Issues Af. J. Reprod health, 1: 7-13.

Keen, C.C., 2003. The possibility of macronutrient deficiencies being significant contributing factors to the occurrence of pregnancy complications. J. Nutr., 133 (suppl. 2): 15975-16055.

Langley-Evans, S.C. and A.T. Langley-Evans, 2002. "Use of folic acid Supplements in the first trimester of pregnancy" J.R-Soc. Health, 122: 181-186.

Maziya-Dixon, B., I.O. Akinyele, E.B. Oguntona, S. Nokoe, R.A. Sanusi and E. Harris, 2004. Nigeria food consumption and Nutrition survey 2001-2003 IITA/USAID/UNICEF/USDA, Printed by IITA.

Nigeria Demographic and Health Survey (NDHS), 1990. Demographic and Health Surveys 1990, Federal Office of Statistics, Lagos Nigeria and IRD/Macro International Inc., Columbia, Maryland, USA.

Nigeria Demographic and Health Survey (NDHS), 1999. Demographic and Health Surveys, 1999, Calverton, Maryland: National Population Commission and ORC/Macro.

Ojofeitimi, E.O. and C.M. Tanimowo, 1980. "Nutritional Beliefs Among Pregnant Nigeria Women", Int. J. Gynaecol. Obset., pp: 66-69.

Ojofeitimi, E.O., E. Elegbe and J. Babatunde, 1982. "Diet Restriction by Pregnant Women in Nigeria", Int. J. Gynaecol. Obset., 20: 19-103.

Orji, E.O., I.O. Ogunlola and U. Onwndiegwu, 2002. "Brought in maternal death in South West Nigeria". J. Obstetrics Gynaecol., 22: 385-388.

Oboro, V.O., T.O. Tabowei, J.J. Jemikolajah, J.O. Bosah and D. Agu, 2003. "Pregnancy outcome among Null parons teenagers in suburban Nigeria" J. Obstetric Gynaecol., 23: 166-9.

Passmore, R. and B.M. Nicol, 1974. Handbook on human nutritional requirements. FAO Nutrition Study No. 28, WHO Monograph Series No. 61.

Rush, D., 2000. "Nutrition and Maternal Mortality in the Developing Countries" Am. J. Clin. Nutr., 72 (SuppLl. 2125-2405) J. Obstet. Gynaecol., 2002, 22: 385-388.

Sanusi, R.A. and I.O. Akinyele, 1999. "Assessment of material Nutrition during pregnancy in Ibadan" West Af. J. Foods Nutr., 2: 73-77.

Sanusi, R.A. and V.A. Oredipe, 2002. "Nutritional Status in Pregnancy and Prediction of Low Broth Weight: Evaluation of Table of Reference". Trop. J. Obstet. Canynewl., 19: 63-67.

Sanusi, R.A. and A.O. Omoni, 2000. "Birth Weight and Pregnancy Weight gain in Ibadan, Nigeria". West Af. J. Foods Nutr., 2: 6-11.

Sanusi, R.A., C.A. Badejo and Y.B. Oyindamola, 2006. Measuring Household food insecurity in selected local government areas of Lagos and Ibadan, Nigeria. Pak. J. Nutr., 5: 62-67.

Wald, N.J., M. Law and R. Jordan, 1998. "Folic acid and food fortification to prevent neural tubes defects". Lancet, 351: 834-836.

WHO, 1997. Maternal Health around the World, Geneva.