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Original Research Article

Dietary Pattern and Anemic Status of Pregnant Women Attending Antenatal Clinic in a Mission Hospital in Benin City Edo State Nigeria

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Abstract: ***Background*:** Nutritional anemia is the most common type of anemia worldwide, and it can be caused by iron, folic acid and vitamin C deficiencies. ***Objective*:** The aim of this study was to determine the dietary intake pattern and anemic status of pregnant women attending antenatal clinic in a mission Hospital in Benin City. ***Methodology*:** A descriptive cross-sectional study design was used for this study among 381 pregnant women attending antenatal clinic in a mission hospital in Benin City selected using a systematic sampling technique. A pre-tested, structured, interviewer-administered questionnaire was used to collect information on socio-demographic characteristics and dietary pattern of the respondents. Anemia was assessed using pack cell volume (haematocrit). Data was analyzed using IBSM SPSS version 20.0 and statistical significance was set at $p < 0.05$ at 95% confidence interval. ***Results*:** One hundred and forty seven (38.6%) of the respondents had medium dietary diversity, while 234 (61.4%) of them had high dietary diversity score. No case of low dietary diversity score was reported. The food groups most frequently consumed were oils [347(91.1%)] and cereals [245(64.3%)] while the least frequently consumed food groups were organ meat [20(5.2%)], vitamin A rich fruits [128(33.6%)], egg [103(27.0%)], legumes [102(26.8%)] and dark green leafy vegetables [51(13.4%)]. One hundred and twenty (33.9%) respondents were anemic. There was no statistical association between dietary diversity score and anemic status (p= 1.000). ***Conclusion*:** The study revealed the need to strengthen interventions focusing on improving the consumption of micronutrient rich food during pregnancy.

Keywords: Dietary Pattern, Anemia, Pregnant Women, Nigeria.

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INTRODUCTION

Dietary diversity, defined as the quantitative variety of food types taken by a person during a certain timeframe, is crucial for achieving appropriate haemoglobin levels during pregnancy [1]. Maternal diet during pregnancy have been deemed critical since this must meet the nutrient requirement for both the child and the mother for satisfactory birth outcome [2]. Malnutrition is a significant problem in sub-Saharan Africa and Nigeria, attributed to escalating food costs, poverty, conflicts between ranchers and farmers, and underdevelopment. This has resulted in a decline in quality of life and total economic production, hindering human growth and rendering individuals in this area susceptible to food insecurity. Women in this area often experience malnutrition due to prioritising food intake for survival above the consumption of micronutrient-rich foods [3].

Micronutrient deficiency is a public health issue that needs considerable focus. This issue has been ascribed to the use of cereal-based diets that lack diversification [2]. The diets of these nations are deficient in fruits, vegetables, and animal-based dietary sources [4]. Regrettably, pregnant women and other women of reproductive age are most vulnerable due to their increased nutrients needs [4]. Inadequate food intake in pregnant women has resulted in the continued prevalence of iron deficiency anaemia and other micronutrient deficits in underdeveloped nations [5, 6].

Reports indicate that cereal eating during pregnancy is prevalent in Nigeria, whereas the intake of protein-rich foods is inadequate. This is essential throughout pregnancy for the healthy growth of the foetus and the proper maintenance of tissue healing [7]. Inadequate food consumption during pregnancy may lead to inadequate nutritional status, adversely affecting both mother and child health. Significant deficiencies in protein and energy are shown to reduce birth weight. The dietary variety score has been identified as a significant predictor of haemoglobin concentration in pregnant women [8]. And also women who had good diet were not anemic while those who had poor diet were anemic. Chicken, egg, spinach and fish diet can reduce the incidence of anemia by 3.6%, 25%, 54.5% and 12.2% can reduce the incidence of anemia [9].

Research from western part of Nigeria have reported that 75% of pregnant women had inadequate dietary energy intake. About 50% of all anemia cases among women of the reproductive age group can be corrected by dietary diversification and iron supplementation [10, 11]. Insufficient dietary variety during this period is seen as a significant factor contributing to maternal malnutrition in underdeveloped nations. Consuming a varied diet is an economical approach to address important micronutrient deficiencies [12], thereby, improving the nutritional status of the individual.

The outcomes of this research will serve as a reference for professionals in agriculture, health, education, and other sectors aiming to enhance and address the nutritional issues of pregnant women, especially in the study region and across Nigeria. The aim of this study was to determine the dietary intake pattern and anemic status of pregnant women attending antenatal clinic in in a mission hospital in Benin City.

METHODOLOGY

The study was carried out among 381 pregnant women attending antenatal clinic in a mission hospital in Benin City for year. The hospital offers secondary obstetric services with over 90 pregnant women who come for antenatal care on each clinic visit. A descriptive cross-sectional study design was used and systematic sampling technique was used to select study participants using an interval of six until the sample size was gotten. Pregnant women of all trimester were included in the study while women receiving therapy for anemia and hemoglobinopathies, severely ill women and those not willing to take part in the study were excluded from the study.

A structured interviewer-administered questionnaire was used to collect information from the participants after undergoing pretesting for clarity in another mission hospital. Anemia status was assessed using packed cell volume determined on each clinic day. Nutrient intake information was generated using 24 hour recalls. From the 24 hour recall, Dietary Diversity Score (DDS) of the study respondents were derived based on the 2008 FAO guideline for measuring household and individual dietary diversity [13]. The dietary diversity score (contains 14 food groups) of the respondents for this study was categorized into low (≤ 3 food groups), medium (4-5 food groups) and high dietary diversity score (≥ 6 food groups).[13] Dietary diversity scores were created by summing the number of individual foods or food groups consumed over a reference period.

Data was analyzed using SPSS version 20.0 and statistical significance was set at $p < 0.05$ at 95% confidence interval. Univariate analysis was used to summarise data on the various food groups. Bivariate analysis of dietary pattern and anemia was done. Ethical clearance for this study (ADM/E 22/A/VOL. VII/14638) was obtained from the University of

Benin Teaching Hospital Ethics and Research committee. Approval was sought from the management of St Philomena hospital and verbal informed consent was obtained from the participants before inclusion in the study.

RESULTS

A total of 381 respondents participated in this study. Of these, majority of the respondents [254 (66.7%)] were in the age group 21 to 30 years with a median (IQR) age of 30 (26 to 32) years. Almost all the respondents were married [378 (99.2%)] with majority in a monogamous setting [362 (95.0%)]. Most of the respondents were Christians [375 (98.4%)], employed [330 (86.6%)] and had attained tertiary education [279 (73.2%)] with the highest proportion earning a monthly income of between 18,000 to 37,000 naira [136 (35.7%)] and 58 (15.2%) earning below the minimum wage of 18,000 naira (Table 1).

Table 1: Socio-demographic characteristics of the respondents

Characteristics	Frequency (n = 381)	Percent
Age group (years)*		
< 21	3	0.8
21 – 30	254	66.7
31 – 40	124	32.5
Marital status		
Single	3	0.8
Married	378	99.2
Type of marriage (n=378)		
Monogamous	362	95.0
Polygamous	16	4.2
Level of education		
None	11	2.9
Primary	6	1.6
Secondary	85	22.3
Tertiary	279	73.2
Religion		
Christian	375	98.4
Muslim	2	0.5
ATR	4	1.0
Employment status		
Employed	330	86.6
Unemployed	51	13.4
Monthly income, ₦ (n = 330)		
< 18,000	58	15.2
18,000 – 36,999	136	35.7
37,000 – 54,999	43	11.3
55,000 – 72,000	51	13.4
>72,000	42	11.0

**Median (IQR) = 30 (26 to 32) years*

The food group most frequently consumed was oils and fats [347 (91.1%)] while the least consumed food group was organ meat [20 (5.2%)]. More than half of the respondents consumed oils and fats, other vegetables, cereals, flesh meat, vitamins rich vegetables and fish. (Table 2) One hundred and twenty nine (33.9%) respondents were anemic in this index pregnancy. Out of which 102 (79.1%) had mild anemia, while 27 (20.9%) had moderate anemia. No case of severe anemia was found in this study.

Table 2: Dietary intake pattern of the respondents (24 hours recall)

Items	Frequency (n = 381)*	Percent
Food groups		
Oils and fats	347	91.1
Other Vegetables	252	66.1
Cereals	245	64.3
Flesh meats	218	57.2

Items	Frequency (n = 381)*	Percent
Vitamin a rich Vegetables and tubers	216	56.7
Fish	198	52.0
White tubers and roots	152	39.9
Vitamin a rich Fruits	128	33.6
Sweets	123	32.3
Coffee/tea	123	32.3
Milk and milk Products	116	30.4
Other fruits	104	27.3
Egg	103	27.0
Legumes, nuts and seeds	102	26.8
Dark green Leafy Vegetables	51	13.4
Organ meat (iron-rich)	20	5.2

Consumption of oils and fats, cereals, vitamin A rich fruits and dark green leafy vegetables were significantly associated with lower prevalence of anemia. (Table 3) Majority of the respondents ate rice [306(80.3%)], oranges [218(57.2%)], other milk products [230(60.4%)] and pumpkin [216(56.7%)] more than three times a week. While fruits, egg, dark green leafy vegetables, wheat and organ meat were consumed less than three times a week. (Table 4)

Table 3: Food groups and anemia status

Food group	Anemic	Not Anemic	P-Value	OR (95% CI)
Flesh meat				
Yes	71 (18.6)	147 (38.6)	0.538	0.874 (0.570-1.341)
No	58 (15.2)	105 (27.6)		
Milk and milk product				
Yes	50 (13.1)	66 (17.3)	0.014	1.784 (1.135-2.803)
No	79 (20.7)	186 (48.8)		
Legumes				
Yes	42 (11)	60 (15.7)	0.087	1.545 (0.967-2.468)
No	87 (22.8)	192 (5.4)		
Other fruits				
Yes	31 (8.1)	73 (19.2)	0.333	0.776 (0.477-1.262)
No	98 (25.7)	179 (47)		
Other vegetables				
Yes	87 (22.8)	165 (43.3)	0.733	1.092 (0.699-1.714)
No	42 (11.0)	87 (22.8)		
Cereals				
Yes	62 (16.3)	183 (48.0)	<0.0001	0.349 (0.224-0.543)
No	67 (17.6)	69 (18.1)		
Egg				
Yes	39 (10.2)	64 (16.8)	0.331	1.273 (0.795-2.038)
No	90 (23.6)	188 (49.3)		
Fish				
Yes	73 (19.2)	125 (32.8)	0.233	1.324 (0.864-2.030)
No	56 (14.7)	127 (33.3)		
Oils and fats				
Yes	110 (28.9)	237 (62.2)	0.04	0.366 (0.179-0.748)
No	19 (5.0)	15 (3.9)		
Vitamin A rich veg				
Yes	76 (19.9)	140 (36.7)	0.531	1.147 (0.746-1.763)
No	53 (13.9)	112 (29.4)		
Organ meat				
Yes	10 (2.6)	10 (2.6)	0.117	2.034 (0.824-5.020)
No	119 (31.2)	242 (63.5)		
Vitmin A rich fruits				
Yes	23 (6.0)	103 (27.6)	<0001	0.304 (0.181-0.509)

Food group	Anemic	Not Anemic	P-Value	OR (95% CI)
No	106 (27.8)	147 (38.6)		
Dark green leafy veg Yes	29 (7.6)	22 (5.8)	<0001	3.032 (1.661-5.534)
No	100 (26.2)	230 (60.4)		
White root and tuber Yes	60 (15.7)	92 (24.1)	0.061	1.512 (0.983-2.326)
No	69 (18.1)	160 (42)		

⁺Chi-square test

Table 4: Frequency of intake of different food groups

Food group	< 3 times a week	> 3 times a week
Cereals	229 (60.1)	153 (39.9)
Vitamin A rich-vegetables	270 (70.9)	111 (29.1)
White tubers and roots	318 (83.5)	63 (16.5)
Dark green vegetables	242 (63.5)	139 (36.5)
Other vegetables	306 (80.3)	75 (19.7)
Vitamin A rich fruits	248 (65.1)	133 (34.9)
Other fruits	315 (82.7)	66 (17.3)
Organ Meat	284 (74.5)	97 (25.5)
Flesh meat	238 (62.5)	143 (37.5)
Fish	340 (89.2)	39 (10.2)
Legumes, nuts, seeds	231 (60.6)	150 (39.4)
Milk and milk products	217 (57)	164 (43)
Oils and Fat	266 (69.8)	115 (30.2)

No case of low dietary diversity score was reported, one hundred and forty seven (38.6%) respondents had medium dietary diversity, while two hundred and thirty four (61.4%) respondents had high dietary diversity score. One hundred and fifty five [155(66.2%)] respondents who had a high dietary diversity score were not anemic. Only 79 (33.8%) who had high dietary diversity and were anemic. Fifty (34.0%) respondents who had medium dietary diversity score had anemia while 97(66.0%) respondents who had medium dietary diversity were not anemic. One hundred and fifty five (66.2%) respondents with high dietary diversity score were not anemic. There was no statistical association between dietary diversity score and anemic status (p=1.000). The odds of respondents with medium dietary diversity score being anemic was 1.011 (0.654 – 1.564). (Table 5)

Table 5: Dietary diversity score and anemic status of respondents

	Anemic status			
Dietary diversity score	**Anemic n (%)**	**Not anemic n (%)**	**p-value**	**OR (95% CI)**
Medium	50 (34.0)	97 (66.0)	1.000	1.011 (0.654 – 1.564)
High	79 (33.8)	155 (66.2)		

⁺Chi-square test

DISCUSSION

This study found no case of low dietary diversity. Similar finding has been reported in a previous study in Ghana [14]. This is in contrast to a study in Ethiopia that showed a higher proportion of study participants (90.2%) were low dietary diversity consumers [15]. A high diversification of diet will lead to consumption of food from various food groups that will meet the nutritional needs of pregnant women [14]. This study found no statistical significance (p=1.000) between dietary diversity score and anemia. Similar finding was reported in a previous study in Dayak [16, 17]. The odds of respondents with medium dietary diversity being anemic was low. Another study found that high risk of anemia was found in the respondents with low dietary diversity in Ethiopia [18]. The medium and high dietary diversity reported in this study could be due to ANC sessions on the importance of nutrition in pregnancy. Poor dietary diversity can result in inadequate consumption of micronutrients and energy giving food thereby leading to anemia [13]. However high dietary diversity of pregnant women will improve their nutritional status and micronutrient intake leading to reduction in the prevalence of anemia. Respondents who had anemia

despite having high dietary diversity score might eat food low in iron that did not meet their RDI and had poor iron absorption leading to nutritional anemia [19].

Findings of this study shows that more than half of the respondents ate oils and fats, other vegetables, cereals, flesh meat, vitamins rich vegetables and fish. The most consumed food group is oils and fats, while the least consumed is organ meat. This is similar to a study in Ethiopia that found almost all the study participants (99.4%) consumed cereal products. A previous study in Ogun State has also reported a daily consumption of fruits, meat and fish and vegetables [20]. Similarly, another study reported that cereals is the most consumed food, while food of animal origin is the least consumed food [2]. These food are staple food commonly consumed in Nigeria. Fortification of grains will improve the absorption of iron because most of the foods consumed have low bioavailability of iron. These foods are sources of iron and they enhance iron absorption. Deficiency in these food groups will lead to anemic state. The poor consumption of fruit has been reported to be the main cause of micronutrient deficiency.

Over half of the respondents consumed vegetables. This is similar to findings in Ethiopia that reported high consumption of fruits [15]. These vegetables are basic ingredients used for cooking hence they are available for usage. Vegetables are a good source of folate, vitamin A and vitamin C. Dark green leafy vegetables is richer in iron than any other vegetables, hence low consumption of dark green leafy vegetables as reported in this study may lead to anemia among pregnant women. Majority of the respondents consumed rice, pumpkin, oranges and other milk product three or more times in a week, while fish, meat, other Vitamin A rich vegetables, fruits were consumed **<** 3 times a week. Respondents in a similar study in Kenya were noted to have a meal frequency below 3 times per day [2]. Consumption of oils and fats, cereals, vitamin A rich fruits and dark green leafy vegetables were associated with lower prevalence of anemia. A similar study found that consumption of fruits two or three times per week is associated with decreased risk of anemia. This could be as a result of vitamin C which enhances iron absorption. Also consumption of egg and red meat two or three times per week has been shown to elevate hemoglobin levels [15]. Food insecurity and food preference could be the reason for poor meal frequency in the study [21]. Thus, the benefits of good nutrition before and during pregnancy in maintaining hemoglobin level cannot be overemphasized.

Anemia is still a common occurrence in this study population. None of the women had severe anemia which corresponds to a previous study that found no severe anemia [22]. It has been reported that dietary diversity score was a strong predictor of haemoglobin concentration of the pregnant women [8]. And also women who had good diet were not anemic while those who had poor diet were anemic. Chicken, egg, spinach and fish diet can reduce the incidence of anemia by 3.6%, 25%, 54.5% and 12.2% can reduce the incidence of anemia [9]. These values are greatly influenced by varying socioeconomic conditions, socio-demographic conditions, iron supplementation, dietary pattern and environment factors [23]. Hence there is need to give attention to these factors that can influence the dietary pattern of pregnant women in other to reduce the burden of anemia.

Limitation of Study

The data gathered from respondents may be influenced by memory bias, since they are relied upon to report their food patterns from the previous day. The dietary variety tool does not assess the amount of food intake.

CONCLUSION

The findings of the study indicated medium to high dietary variety among respondents. No instances with a poor dietary variety score were observed. Fish, various vegetables, cereals, flesh meat, vitamin A-rich foods, and oils were mostly eaten, but organ meat, eggs, and fruits were consumed less. Dietary variety shown no correlation with anaemia among the responders.

Recommendations

The government should promote the fortification of grains and oils with micronutrients, such as iron and vitamin A, by local enterprises, given these products are mostly eaten by responders. This will enhance the consumption of iron and vitamin A among women. Intervention strategies for behavioural change communication are essential to enhance adherence to iron and folic acid supplements during pregnancy and to get financing.

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