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Original Research Article

Assessment of knowledge and practice of periconceptional folate intake among women attending the antenatal clinic at Bowen Teaching Hospital, Ogbomoso, Oyo State, Nigeria

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ABSTRACT

Background: Folate has an important role in reducing risk of neural tube defects in fetus and megaloblastic anemia in women of reproductive age. This study assessed the knowledge and practice of periconceptional folate intake among pregnant women attending clinic at Bowen University Teaching Hospital, Ogbomoso, Oyo State, Nigeria.
Methods: Two hundred and seventeen pregnant women were selected using simple random sampling technique. A semi-structured questionnaire was used for data collection. Descriptive and inferential statistics such as mean, frequency, percentage, standard deviation and Chi-square were used for data analysis.
Results: The study showed that most respondents were young adults aged 19–30 years (63.6%) with a mean age of 28.32±5.05 years. Majority were married (92.2%), and had at least secondary education (53.5%). Very few (7.4%) of the pregnant women had a history of stillbirth or a baby with a congenital defect, whereas 3.2% had a history of a child with a neural tube defect. Nutritional knowledge of folate intake was low (25.8%) while practice of folate intake was high (88.0%). There was no significance association ($p>0.05$) between nutritional knowledge and practice of folate intake at ($\chi^2=0.02$, $p=0.890$). Key factors influencing folate rich food intake include lack of knowledge of folate rich food, poor economic status and pregnancy unplanned with mean scores (4.41), (3.22) and (3.50) respectively.
Conclusion: The study revealed that the number of respondents that had good nutritional knowledge of folate intake was low, while those that had good dietary practices were high.

Keywords: Nutritional knowledge, Dietary practice, Periconceptional, Folate intake, Pregnant women

INTRODUCTION

Folate is an essential micronutrient necessary for fetal body metabolism, growth and development in pregnant women, and cannot be produced by human body and ought to be gotten either through diet or from supplements.[1] Numerous studies have shown that folate is essential for lowering the risk of megaloblastic anaemia in women of reproductive age and their children, as well as neural tube abnormalities in foetuses.[2] Since folate cannot be produced by the body, it must be consumed in sufficient amounts throughout the periconceptional period, which is the time before and after conception, in order to prevent neural tube abnormalities.[3,4] It is found in broccoli, green leafy vegetables, grains, cereals and peas. It is referred to as folate in folic acid fortified food.[5]

Folic acid plays vital functions in the deoxyribonucleic acid (DNA) synthesis and subsequently cell division which is crucial for differentiation and cell development

and is essential in cell signaling, cell structure, catalytic enzyme sites, enzymatic reactions and protein translation.[6] These procedures are crucial for development of fetus organs which takes place during organogenesis all through the fourth (4th) and eighth (8th) weeks of gestation.[6]

Several studies have revealed that folate deficiency in the periconceptional period contributes to several neonatal abnormalities, most especially neural tube defects.[6-8] The most prevalent birth defect linked with deficiency of folic acid is the neural tube defects (NTDs) which is the embryonic precursor to the spinal column and brain.[6,8] NTDs include anencephaly, spina bifida, diastematomyelia, syringomyelia, encephalocele, lipoma of the conus medullaris and various tethered cord syndromes.[9] Recent research shows that approximately 500,000 children worldwide are born with spinal bifida and anencephaly each year.[2]

Furthermore, folic acid prevents growth retardation, preterm delivery, cleft lip, reduced head and chest and congenital heart defects.[10] It was recommended by the Centers for Disease Control and Prevention (CDC) that entire women of childbearing age should consume 0.4mg of folic acid daily and 5mg for women who are at greater danger of NTDs.[11] Supplementation of iron-folic acid is presently the recommended approaches to avert adverse birth outcomes and hematologic difficulties during pregnancy.[12] In Nigeria, pregnant women are given 0.4mg of folic acid throughout antenatal care as a routine treatment; however, lack of awareness concerning the benefit of intake of folic acid among women of childbearing age could hinder the usage.[8,13] Therefore, this study assessed the nutritional knowledge and practice of periconceptional folate intake among pregnant women attending antenatal clinic at Bowen University Teaching Hospital, Ogbomoso, Oyo State, Nigeria.

METHODS

Study design

A descriptive cross-sectional study design was employed.

Study location and study period

This study was conducted at Bowen University Teaching Hospital (BUTH), Ogbomoso, Oyo State, Nigeria, the clinical training arm of Bowen University. The institution was established on March 18, 1907, by American Baptist Missionaries Dr. George Gren and his wife Lydia under the Foreign Mission Board of the Southern Baptist Convention.[14] BUTH hosts the College of Nursing Sciences and provides services in outpatient care, surgery, and specialist clinical practice while actively participating in research. Recent studies between 2022 and 2024 have focused on glycaemic control among diabetic patients, diabetic foot-care practices, and caesarean section outcomes, reflecting the hospital's contribution to evidence-based healthcare.[15-17] Data collection for the present research was carried out during antenatal clinic days between February 2025 and March 2025.

Inclusion criteria

Pregnant women in their second and third trimesters, willing and able to provide informed consent were included.

Exclusion criteria

Women not within the specified gestational stage and pregnant women who declined participation were excluded.

Sampling procedure

A preliminary visit was made to the antenatal clinic to obtain information on the estimated population of registered pregnant women in their second and third trimesters. An introductory letter was submitted to the head of the antenatal unit to secure approval for participant recruitment. On antenatal days, the antenatal register served as the sampling frame from which eligible women were selected using simple random sampling. The objective of the study was explained to the respondents before enrolment. A semi-structured questionnaire was administered personally to each participant who met the criteria and consented to participate.

Sample size determination

The minimum sample size was calculated using Cochran's formula given, where: Z=1.96 (standard normal value at 95% CI), d=0.05 (precision), p=0.17 (prevalence of poor knowledge), and q=1-p=0.83.[18]

$$n = (Z^2pq)/d^2$$

$$n = (1.96)^2 \times 0.17 \times 0.83/(0.05)^2 = 216.8 \approx 217$$

A total of 217 pregnant women were recruited for the study.

Data analysis

Data were analyzed using IBM statistical package for the social sciences (SPSS) version 20. Descriptive statistics summarized socio-demographic data, knowledge levels, and practice of periconceptional folate intake. A 5-point Likert scale was used to assess factors influencing folate-rich food consumption. The interpretation of mean scores followed; strongly agree: 4.21–5.00, agree: 3.41–4.20, neutral: 2.61–3.40, disagree: 1.81–2.60 and strongly disagree: 1.00–1.80.

This enabled identification of factors exerting strong influence on folate-rich food consumption. The Chi-square test was used to determine the relationship between nutritional knowledge and practice of periconceptional

folate intake, with $p<0.05$ considered statistically significant.

RESULTS

Socio-demographic characteristics of respondents (n=217)

Table 1 revealed the socio-demographic characteristics of respondents; the study comprised 217 respondents, with a mean age of approximately 28.32±5.05. Above average (63.6%) of the participants were young adults between the age of 19–30 years while 36.4% were older than 30. Majority (92.2%) were married, with 7.4% single and 0.5% separated/divorced. Ethnically, the respondents were predominantly Yoruba (80.2%), (10.6%) Igbo and (9.2%) Hausa. Religiously, 57.6% were Christian and 41.5% were Muslim; traditional worshippers comprised less than 1% of respondents. Regarding education, slightly above average of respondents (53.5%) had secondary education; 29.5% had tertiary education, 13.8% had primary education, and 3.2% reported no formal education. Based on place of residence, 49.8% of the respondents were from rural while 50.2% urban settings. Most respondents (77.4%) were employed while 22.6% were unemployed. Two-thirds (66.8%) of the women were multiparous and one-third (33.2%) were primiparous. At the time of antenatal clinic attendance, the largest subgroup was in the second trimester (59.4%), followed by the first trimester (23.0%) and third trimester (17.5%). Nearly all pregnancies (99.5%) were conceived naturally; only (0.5%) resulted from ART/IVF. Pregnancy intention was high: 96.8% reported the pregnancy was wanted and (92.6%) reported it was planned. A minority (7.4%) reported a history of stillbirth or having a baby with a congenital defect, while 3.2% reported a history of a child with a neural tube defect.

Nutritional knowledge of the respondents on folate intake (n=217)

Table 2 showed the nutritional knowledge of folate intake among the respondents was generally low. 34.6% had ever heard of folate, while 65.4% had not. When asked about their understanding of folate, 72.8% provided incorrect responses while 27.2% gave correct explanations. Awareness of food sources rich in folate was limited, with only 35.5% correctly identifying them, and over half (54.4%) correctly naming specific folate-rich foods.

Regarding awareness of the importance of folate consumption before pregnancy, 38.2% responded correctly, while 61.8% did not recognize its importance. Knowledge of the appropriate duration of folate intake before conception was also poor, with only 32.7% providing correct responses. In terms of pregnancy, 36.4% knew that folate should be consumed during pregnancy, but when asked to specify the correct timing, only 24.4% answered correctly.

Awareness of the benefits of folate consumption during pregnancy was poor, as 41.9% correctly recognizing its importance for the unborn baby, while 58.1% did not. Furthermore, only 35.9% correctly identified that folate deficiency could lead to abnormalities in newborns. However, all respondents (100%) gave correct response when asked about the general benefits of folate-rich diets, though 34.1% identified the adverse effects of insufficient folate intake. Sources of information on folate were scarce, with (65.0%) reporting no source. Among those who had received information, the most common sources were media (11.5%), health practitioners (9.7%), family/friends (8.8%), and newspapers (5.1%). Therefore, 74.2% of the respondents had poor knowledge of folate intake, while 25.8% attained good knowledge of folate intake.

Dietary practices of the respondents regarding folate intake (n=217)

Table 3 showed the practice of folate intake among the respondents was generally high, in contrast to the limited knowledge observed. Majority (89.9%) reported consuming diets rich in folate prior to their current pregnancy, and greater proportion (91.2%) indicated that they were currently consuming such diets. Similarly, (90.8%) reported that they consume folate-rich foods on a regular basis. In terms of dietary patterns, all respondents (100%) listed at least one type of folate-rich food consumed. While fruit intake practices were favorable with 94.5% consuming fruits multiple times per week vegetable consumption was less optimal.

Although 89.9% reported consuming vegetables frequently, only 42.4% met the recommended number of vegetable meals per week, suggesting some inconsistency between frequency and adequacy of intake. When asked about past behavior, 81.6% reported consuming folate-rich foods in a previous pregnancy, while 18.4% had not. Practices of folate intake scores were far more favorable: 88.0% reported good practice, while just 12.0% fell into the poor-practice category.

Factors influencing folate intake of the respondents

The major factors influencing the consumption of folate rich food among respondents were revealed in Table 4. Result showed that lack of knowledge on folate rich food (4.41) has the strong influence on folate intake while planned pregnancy (2.88) had a neutral.

Association between nutritional knowledge and practice of folate intake

Table 5 showed the association between nutritional knowledge and practice of folate intake showed that among women with poor nutritional knowledge. The Chi-square test revealed no statistically significant association between nutritional knowledge and practice of folate intake ($\chi^2=0.02$, $p=0.890$).

Table 1: Socio-demographic characteristics of respondents (n=217).

Variables		Frequency	Percentage	Mean±SD
Age (years)	19–30	138	63.6	28.32±5.05
	Greater than 30	79	36.4	
Marital status	Single	16	7.4	
	Married	200	92.2	
	Separated/divorced	1	0.5	
Ethnic group	Yoruba	174	80.2	
	Igbo	23	10.6	
	Hausa	20	9.2	
Religion	Christianity	125	57.6	
	Islam	90	41.5	
	Traditional worshippers	2	0.9	
Highest level of education	No formal education	7	3.2	
	Primary education	30	13.8	
	Secondary education	116	53.5	
	Tertiary education	64	29.5	
Place of residence	Rural	108	49.8	
	Urban	109	50.2	
Employment status	Employed	168	77.4	
	Unemployed	49	22.6	
Parity	Primiparous	72	33.2	
	Multiparous	145	66.8	
Gestational age at antenatal clinic	First trimester (1–13 weeks)	50	23.0	
	Second trimester (14–28 weeks)	129	59.4	
	Third trimester (29–38 weeks)	38	17.5	
Method of conception	Natural/spontaneous	216	99.5	
	ART/IVF	1	0.5	
Was this pregnancy wanted	Yes	210	96.8	
	No	7	3.2	
Did you plan to have this pregnancy?	Yes	201	92.6	
	No	16	7.4	
History of stillbirth or baby with congenital defect	Yes	16	7.4	
	No	201	92.6	
History of neural tube defect	Yes	7	3.2	
	No	210	96.8	
Total		217	100.0	

Table 2: Nutritional knowledge of the respondents on folate intake (n=217).

Variable	Incorrect, N (%)	Correct, N (%)
Heard of folate before	142 (65.4)	75 (34.6)
Understanding of folate	158 (72.8)	59 (27.2)
Awareness of food sources rich in folate	140 (64.5)	77 (35.5)
Type of food considered rich in folate	99 (45.6)	118 (54.4)
Knowledge that folate-rich diet before pregnancy is important	134 (61.8)	83 (38.2)
Knowledge of recommended duration before current pregnancy	146 (67.3)	71 (32.7)
Knowledge of appropriate time to consume folate during pregnancy	138 (63.6)	79 (36.4)
Correct knowledge of specific appropriate time during pregnancy	164 (75.6)	53 (24.4)
Awareness that folate during pregnancy benefits the baby	126 (58.1)	91 (41.9)
Awareness that folate deficiency may lead to abnormalities in newborns	139 (64.1)	78 (35.9)
Knowledge of benefits of consuming folate-rich diet	—	217 (100.0)

Continued.

Variable	Incorrect, N (%)	Correct, N (%)
Knowledge of adverse effects of insufficient folate intake during pregnancy	143 (65.9)	74 (34.1)
Good nutritional knowledge	56 (25.8)	
Bad nutritional knowledge	161 (74.2)	

Table 3: Dietary practice of respondents regarding folate intake (N=217).

Variable	Incorrect, N (%)	Correct, N (%)
Consumed diet rich in folate before pregnancy	22 (10.1)	195 (89.9)
Currently consuming diet rich in folate	19 (8.8)	198 (91.2)
Type of folate-rich diet consumed	—	217 (100.0)
Consume folate-rich diet regularly	20 (9.2)	197 (90.8)
Number of vegetable meals per week (adequate versus inadequate)	125 (57.6)	92 (42.4)
Frequency of vegetable consumption (adequate versus inadequate)	22 (10.1)	195 (89.9)
Number of times fruits are taken weekly (adequate versus inadequate)	12 (5.5)	205 (94.5)
Consumed folate-rich diet in previous pregnancy	40 (18.4)	177 (81.6)
Good dietary practice	191 (88.0)	
Bad dietary practice	26 (12.0)	

Table 4: Factors influencing folate intake (n=217).

Variable	SD Freq. (%)	D Freq. (%)	N Freq. (%)	A Freq. (%)	SA Freq. (%)	Mean±SD
Lack of knowledge on folate-rich foods	1 (0.5)	3 (1.4)	48 (22.1)	19 (8.8)	146 (67.3)	4.41±0.91
Age of pregnant women	30 (13.8)	8 (3.7)	73 (33.6)	34 (15.7)	72 (33.2)	3.51±1.35
Educational level of pregnant woman	2 (0.9)	4 (1.8)	61 (28.1)	43 (19.8)	107 (49.3)	4.15±0.95
Poor economic status	2 (0.9)	7 (3.2)	128 (59.0)	30 (13.8)	50 (23.0)	3.55±0.91
History of birth defects	8 (3.7)	8 (3.7)	157 (72.4)	16 (7.4)	28 (12.9)	3.22±0.85
History of miscarriages	17 (7.8)	13 (6.0)	152 (70.0)	14 (6.5)	21 (9.7)	3.04±0.91
Planned pregnancy	42 (19.4)	7 (3.2)	125 (57.6)	22 (10.1)	21 (9.7)	2.88±1.13
Unplanned pregnancy	3 (1.4)	8 (3.7)	136 (62.7)	17 (7.8)	53 (24.4)	3.50±0.95
History of childbearing	10 (4.6)	9 (4.1)	154 (71.0)	19 (8.8)	25 (11.5)	3.18±0.86

Table 5: Association between nutritional knowledge and dietary practice of folate intake (n=217).

Nutritional knowledge (folate) category	Poor dietary practice (%)	Good dietary practice (%)	Total (%)	χ^2	P value
Poor knowledge (<9 points)	19 (11.8)	142 (88.2)	161 (74.2)	0.02	0.890
Good knowledge (≥9 points)	7 (12.5)	49 (87.5)	56 (25.8)		
Total	26 (12.0)	191 (88.0)	217 (100.0)		

DISCUSSION

This study assessed the nutritional knowledge and dietary practice of periconceptional folate intake among women attending antenatal clinic at BUTH, Ogbomoso, Oyo State, Nigeria. According to the results, it was revealed that most respondents were young adults aged 19–30 years (63.6%) and were predominantly married (92.2%) with a mean age of approximately 28±5.05. This was similar to a study conducted among pregnant women attending antenatal clinic of the University of Port Harcourt Teaching Hospital who revealed that the mean age of pregnant women was 31.13±5.18 years.[19] The mean ages of studies carried out among pregnant women attending clinics at two hospitals in Ibadan and at three Italian birth centers within the Lazio region were 29.3±5.0 years and 31.9 years which were similar with the finding of the study.[20,21] Based on the marital status, findings of the study revealed that larger percentage (92.2%) of the respondents were married which was consistent with a study conducted in University of Port Harcourt Teaching Hospital and Lebanon area (96.9%).[22]

The outcome of this study was also similar with a study conducted within Lazio region which revealed that 93.3% of the respondents were married.[21] Also, another study stated that 90.7% of the respondents were married.[19]

Majority of the respondents were Yoruba (80.2%), followed by Igbo (10.6%) and Hausa (9.2%), reflecting the hospital's catchment area. Knowledge of folate differed significantly by ethnicity, with Yoruba women demonstrating higher awareness compared to Igbo and Hausa women. Results further showed that respondents' education emerged as a strong determinant of folate knowledge. While (53.5%) of respondents had secondary education, those with tertiary education (29.5%) were significantly more likely to demonstrate good nutritional knowledge (57.8%) compared to women with no formal education (3.2%). This finding mirrors previous studies in Nigeria and other African countries, where maternal education strongly predicted awareness and correct use of folic acid.[23]

Education equips women with the skills to access, understand, and act on health information, underscoring the importance of female education in improving maternal and child health outcomes. It was revealed that women with higher educational level are more likely to be learned and also have better access to information via numerous media networks and enhanced compliance for intake of folic acid, better access to health facilities and services, enhance health-seeking behaviour, safer pregnancies, and healthier children.[7,19,24]

According to this study, the respondents were evenly distributed between rural (49.8%) and urban (50.2%) areas. Urban areas often provide greater exposure to health campaigns, better access to fortified foods, and more frequent ANC attendance. Employment status also played a role: employed women were more likely to practice folate intake (91.7%) compared to unemployed women (75.5%). This aligned with evidence that financial empowerment enhances women's ability to purchase folate-rich foods and adhere to supplementation.[24] Findings of the study also revealed that most respondents were multiparous (66.8%), yet primiparous women demonstrated significantly better folate knowledge (43.1% versus 17.2%). Gestational age at booking also mattered, with first-trimester attendees showing higher knowledge levels (40%) compared to those in the second (20.2%) or third trimester (26.3%). Greater proportion of the respondents revealed that their current pregnancy wanted (96.8%) and planned (92.6%). Planned pregnancy was positively associated with better folate practice. This is in line with a study that showed that women who actively prepare for pregnancy are more likely to initiate folic acid supplementation before conception.[25] This corroborated with another study conducted among Italian pregnant women in Legion area which specified that 82.2% of the pregnant women planned their pregnancies.[21] It was observed that women who planned their pregnancies are more likely to seek prenatal care and commence folic acid supplementation, and their pregnancies have better outcomes.[26,27] Pregnancy planning is an exceptional period to accept behaviours that will benefit both the mother and the fetus's health. Likewise, planned pregnancy provides for the most effective use of limited resources in lowering newborn and child mortality via quality health care, such as access to suitable nutrition, sanitation, water facilities, and immunization services.[19]

From the study, findings revealed that only few percentages had history of still birth or baby with congenital defect (7.4%) and history of a child with neural tube defect (3.2%). This may be attributed to high educational level of pregnant women which enhanced their knowledge to prevent neural tube defects.[28] The finding of this study was in corroboration with another study conducted in Port Harcourt who reported that 2.4% of the respondents stated that they had history of a stillbirth or baby with congenital defect and 1.6% had newborns with neural tube defects.[19] Congenital abnormalities can develop at any time after the first month of pregnancy.[29]

The findings from this study also revealed that the overall nutritional knowledge of folate among pregnant women at Bowen Teaching Hospital was generally poor. Only 25.8% of respondents demonstrated good nutritional knowledge about folate rich food intake. Several specific gaps were observed in awareness of folate definition, food sources, timing, and preventive benefits, all of which are critical for achieving effective periconceptional folate coverage. Although one-third of the respondents (34.6%) had heard of folate, only 27.2% could correctly explain what it is. This suggests that while the term "folate" or "folic acid" may be somewhat familiar, conceptual understanding is lacking. Similar findings have been reported in Enugu, where 83% of women had heard of folic acid, but only 10% knew the correct timing of intake.[30] This study was also similar with a study in Ghana where it was discovered that awareness of folic acid was moderate, in-depth knowledge about its role in preventing neural tube defects (NTDs) was very low.[31] In this study, 35.5% of women correctly identified folate-rich food sources, and 54.4% could name specific foods such as fruits and vegetables. This was in line with another findings in Port Harcourt, where less than half of women could name appropriate dietary sources of folate. Poor nutritional knowledge may contribute to suboptimal intake, especially where supplements are unavailable or unaffordable. Perhaps the most critical gap was knowledge of the timing of folate intake. Only 38.2% knew that folate is important before pregnancy, and just 32.7% were aware of the recommended preconception duration. Even fewer (24.4%) correctly identified the specific appropriate time during pregnancy (i.e., the first trimester). In terms of health outcomes, only 41.9% of respondents were aware that folate benefits the unborn baby, and 35.9% recognized its role in preventing birth abnormalities. Although all respondents (100%) mentioned at least one general benefit of a folate-rich diet, only 34.1% were aware of the risks of insufficient folate intake. This echoes findings from

Sudan, where most women started folic acid during pregnancy but few understood its preventive role against congenital anomalies.[33] Limited knowledge of the risks associated with folate deficiency may contribute to low prioritization of supplements and dietary sources. However, 65% of respondents reported having no source of information on folate. Among those who had received information, the most common sources were media (11.5%), health practitioners (9.7%), family/friends (8.8%), and newspapers (5.1%). This indicates a gap in formal health education channels, especially from healthcare workers who are expected to provide consistent nutrition counselling during ANC. Similarly, another study which conducted in Nigerian also report that most women rely on informal or mass media sources for folate information, with healthcare providers playing a relatively smaller role.[34] Strengthening health-worker-led education could help bridge this gap.

The assessment of dietary practice revealed that, in contrast to the generally low nutritional knowledge of folate rich food intake, the majority of respondents demonstrated good folate-related practices. Specifically, 89.9% reported consuming diets rich in folate before pregnancy, (91.2%) indicated they were currently consuming folate-rich foods, and (90.8%) reported consuming them regularly. Additionally, almost all respondents (100%) could list at least one folate-rich food they consumed. This finding highlights an interesting paradox: despite poor understanding of folate's role and timing, actual dietary and supplement practices were encouragingly high. Furthermore, the high proportion of women consuming folate-rich foods before and during pregnancy suggests that ANC services and cultural dietary patterns may be sustaining practice even in the absence of strong knowledge. However, only (81.6%) reported consuming folate-rich foods in a previous pregnancy, suggesting that practices have improved over time, possibly due to increasing health promotion at ANC clinics. While fruit intake practices were very high (94.5%) consumed fruits multiple times per week), vegetable consumption was less optimal. Although (89.9%) reported frequent vegetable intake, only 42.4% met the recommended number of vegetable meals per week. This discrepancy highlights a common pattern in maternal diets: frequent but inadequate portion sizes or variety, which may limit the actual folate contribution of these foods. This is similar to a Nigerian study on dietary diversity among pregnant women similarly reported high frequency of food group consumption but inadequate nutrient sufficiency.[35] The results further showed that good dietary practice (88.0%) was far more common than good nutritional knowledge (25.8%), and chi-square analysis confirmed no significant association between nutritional knowledge of folate intake and dietary practice ($p=0.890$). This disconnect indicates that dietary practice was largely influenced by external factors such as ANC-based supplementation and cultural food norms, rather than understanding of folate's preventive role. A similar pattern has been documented in Sudan, where most women consumed folic acid during pregnancy but few started preconceptionally or understood its role in NTD prevention.[36]

The findings from this study also revealed several factors perceived to influence folate intake among pregnant women attending ANC at Bowen Teaching Hospital. The strongest barrier reported was lack of knowledge of folate-rich foods, with (4.41) mean score. This underscores the critical role of health education in shaping maternal dietary behavior. Similar studies across Nigeria and sub-Saharan Africa consistently identify poor nutritional knowledge as a major determinant of inadequate folate consumption and low preconception folic acid use.[37]

On the other hand, another study reported that folate is most effective when consumed during the periconceptional period, which many women miss due to ignorance about timing and benefits.[37] In terms of educational level, which was another significant factor, with nearly half of respondents (49.3%) strongly agreeing that education influences folate intake. A similar study reported that, women with higher education are more likely to understand dietary recommendations and adhere to supplementation guidelines.[38]

Furthermore, poor economic status with mean value (3.55) was also recognized as a factor influencing folate rich food intake. Nationwide data in Nigeria confirm that food insecurity among pregnant women significantly reduces fruit and vegetable consumption, thereby limiting dietary folate intake.[39] Other factors explored included maternal age, parity (history of childbearing), and obstetric history (miscarriages or birth defects). About (33.2%) of women strongly agreed that age influences folate intake, while (71.0%) were unsure whether childbearing history mattered. Interestingly, most women did not perceive history of miscarriage or birth defects as strong motivators for folate intake, despite evidence that such obstetric outcomes are preventable with adequate folate use.[40]

This may reflect poor awareness of folate's role in preventing neural tube defects and other congenital anomalies. Pregnancy intention also emerged as a factor. More than half of respondents (57.6%) agreed that planned pregnancy positively influenced folate intake, while (24.4%) strongly agreed that unplanned pregnancies limit folate use. This finding is supported by previous Nigerian and African studies showing that women with unplanned pregnancies are less likely to initiate folic acid supplementation before conception or early in pregnancy.[37] Since over 40% of pregnancies in Nigeria are unplanned, this represents a major barrier to effective periconceptional folate intake. Overall, these findings confirm that knowledge, economic status, and pregnancy planning are the most critical determinants of folate intake. Addressing these factors requires a multi-level approach: improving maternal education and awareness, ensuring economic access to folate-rich foods and supplements, and

strengthening periconception counselling for women of reproductive age.

The findings also showed that among women with poor nutritional knowledge, 88.2% reported good practice while (11.8%) reported poor practice. Also, among those with good knowledge, 87.5% demonstrated good practice and (12.5%) reported poor practice. Altogether, 88.0% of the respondents reported good practice, irrespective of their level of knowledge. The Chi-square test revealed no statistically significant association between nutritional knowledge and dietary practice of folate intake, χ^2=0.02, p=0.890. This suggests that women's practice of folate intake was not significantly influenced by their level of nutritional knowledge.

Limitations

This study has some limitations. The cross-sectional design precludes causal inferences, and findings are limited to pregnant women attending a single tertiary hospital, which may reduce generalizability to other populations. Additionally, data were self-reported, which could introduce recall or social desirability bias. The short study period (February–March 2025) may have restricted participant diversity. Despite these limitations, the study provides valuable insights into folate knowledge and practice among pregnant women in this setting.

CONCLUSION

The findings of this study showed that nutritional knowledge of folate intake was low but practice of folate rich food intake was high. No significance association exists between the nutritional knowledge and practice of folate intake among respondents. The findings revealed that the key factors influencing folate intake among respondents were lack of knowledge on folate rich food, economic status, and pregnancy planning. It is therefore important to create an awareness for the importance of early consumption of folate rich food by women of reproductive age.

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REFERENCES

1. Naithani M, Saxena V, Mirza AA, Kumari R, Sharma K, Bharadwaj J. Assessment of folic acid supplementation in pregnant women by estimation of serum levels of tetrahydrofolic acid, dihydrofolate reductase, and homocysteine. Scientifica (Cairo). 2016;2016:1520685.
2. Akwaa Harrison O, Ifie I, Nkwonta C, Dzandu BA, Gattor AO, et al. Knowledge, awareness, and use of folic acid among women of childbearing age living in a peri-urban community in Ghana: a cross-sectional survey. BMC Pregnancy Childbirth. 2024;24(1):241.
3. Mao Y, Hu H, Chen D, Fang Y, Liu J, Li M, Zhou W. Investigating continuation of folic acid supplementation during peri-conceptional period: a community-based cross-sectional study. Reprod Health. 2023;20(1):34.
4. Loperfido F, Sottotetti F, Bianco I, El Masri D, Maccarini B, Ferrara C, et al. Folic acid supplementation in European women of reproductive age and during pregnancy with excessive weight: a systematic review. Reprod Health. 2025;22(1):13.
5. National Institutes of Health, Office of Dietary Supplements. Folate: fact sheet for consumers. 2021. Available at: https://ods.od.nih.gov/factsheets/Folate-Consumer/. Accessed on 05 March 2026.
6. Mahmood L. The metabolic processes of folic acid and vitamin B12 deficiency. J Health Res Rev Dev Ctries. 2014;1(1):5-9.
7. Obarisiagbon OE, Ogboghodo EO. Folic acid usage and its associated factors among antenatal attendees in a tertiary health facility: implications for child health. Ann Afr Med Res. 2020;3(1).
8. Okon UA, Ibrahim BS, Usman R, Adedire E, Balogun MS, Olayinka A. Awareness and use of folic acid among women of childbearing age in Benue State, Nigeria. Pan Afr Med J. 2020;37(1).
9. National Population Commission (NPC). Nigeria demographic and health survey 2021–22: key indicators report. Abuja (Nigeria): NPC. 2022. Available at: https://dhsprogram.com/pubs/pdf/PR157/PR157.pdf. Accessed on 05 March 2026.
10. Gadgil M, Joshi K, Pandit A, Otiv S, Joshi R, Brenna JT, et al. Imbalance of folic acid and vitamin B12 is associated with birth outcome: an Indian pregnant women study. Eur J Clin Nutr. 2014;68(6):726-9.
11. Samson K. The effect of once weekly folic acid supplementation on red blood cell folate concentrations in women to determine the potential to prevent neural tube defects [dissertation]. Vancouver: University of British Columbia. 2020. Available at: https://open.library.ubc.ca/soa/cIRcle/collections/ubctheses/24/items/1.0392610. Accessed on 05 March 2026.
12. Caniglia EC, Zash R, Swanson SA, Smith E, Sudfeld C, Finkelstein JL, et al. Iron, folic acid, and multiple micronutrient supplementation strategies during pregnancy and adverse birth outcomes in Botswana. Lancet Glob Health. 2022;10(6):e850-61.
13. Anzaku AS. Assessing folic acid awareness and its usage for the prevention of neural tube defects among pregnant women in Jos, Nigeria. J Basic Clin Reprod Sci. 2013;2(1):13-7.
14. Oluleye OPA. The Nigerian Baptist Convention: a glimpse of family discipleship in Thomas Jefferson and Lurana Bowen's philosophy of Christianising Central Africa. Southwestern Baptist Theological Seminary. 2019. Available at: https://jurnal.fs.umi.ac.id/index.php/tamaddun-life/article/view/302. Accessed on 05 March 2026.

15. Idowu AO, Komolafe OA, Dosumu OO. Long-term glycaemic control among type 2 diabetes patients in a teaching hospital in Nigeria. J Clin Sci. 2022;19(4):217-24.
16. Idowu AO, Akinbodewa AA, Olumuyiwa AA, Komolafe OA. Knowledge and practice of diabetic foot care among patients attending a Nigerian teaching hospital. Niger J Clin Pract. 2023;26(9):1251-8.
17. Dosumu OO, Oyetunde KO, Komolafe OA. Outcome of emergency and elective cesarean sections in a Nigerian teaching hospital. Ann Ib Postgrad Med. 2024;22(1):56-64.
18. Ozueh CO, Alegbeleye JO. Knowledge of folic acid supplementation among pregnant women at a tertiary hospital in Southern Nigeria. Arch Curr Res Int. 2022;22(1):34-44.
19. Alegbeleye J, Ozueh C. Folic acid usage and associated factors among pregnant women attending a tertiary health facility in Nigeria. Int J Adv Med. 2022;9(5):60-75.
20. Lawal TA, Adeleye AO. Determinants of folic acid intake during preconception and in early pregnancy by mothers in Ibadan, Nigeria. Pan Afr Med J. 2014;19(1).
21. Maraschini A, D'Aloja P, Lega I, Buoncristiano M, Kirchmayer U, Ventura M, et al. Do Italian pregnant women use periconceptional folate supplementation? Ann Ist Super Sanita. 2017;53(2):118-24.
22. Medawar G, Wehbe T, Abou Jaoude E. Awareness and use of folic acid among women of childbearing age. Ann Glob Health. 2019;85(1).
23. Akomolafe TO, Hansen AR, Rochani H. Women's intention and factors associated with duration of iron-folic acid supplement use in Karu, Nasarawa State, Nigeria: a cross-sectional study. BMC Pregnancy Childbirth. 2025;25(1):499.
24. Thompson KL. Nutrition in pregnancy: population health perspectives. In: Life cycle nutrition for public health professionals. Springer. 2024:47.
25. Chitayat D, Matsui D, Amitai Y, Kennedy D, Vohra S, Rieder M, et al. Folic acid supplementation for pregnant women and those planning pregnancy: 2015 update. J Clin Pharmacol. 2016;56(2):170-5.
26. Nilsen RM, Leoncini E, Gastaldi P, Allegri V, Agostino R, Faravelli F, et al. Prevalence and determinants of preconception folic acid use: an Italian multicenter survey. Ital J Pediatr. 2016;42:1-10.
27. Sijpkens MK, van Voorst SF, Rosman AN, de Jong-Potjer LC, Denktaş S, Koch BC, et al. Change in lifestyle behaviors after preconception care: a prospective cohort study. Am J Health Promot. 2021;35(1):116-20.
28. Adebo OO, Dairo DM, Ndikom CM, Adejumo PO. Knowledge and uptake of folic acid among pregnant women attending a secondary health facility in Nigeria. Br J Midwifery. 2017;25(6):358-64.
29. Albader NA, Negm DR, El Gabry EK, El-Sayed MM, Arzoo S. Knowledge and practice of folic acid supplementation and impact of income level on awareness among women of childbearing age in Saudi Arabia. Trop J Pharm Res. 2019;18(6):1323-30.
30. Olaniyi OA. Knowledge, perception and intake of micronutrients (iron and folic acid) among female civil servants of reproductive age at the Oyo State Secretariat, Ibadan, Nigeria. 2019.
31. Amaambo F. Assessment of neural tube defects in two Northern Namibia hospitals: incidence, seasonal variation, risk factors and prevention strategies for folate sensitive defects. University of Namibia. 2021. Available at: https://repository.unam.edu.na/server/api/core/bitstreams/0568b34d-39ac-40a9-8651-a66940269f17/content. Accessed on 05 March 2026.
32. Amadi GA, Wachukwu-Chikodi HI, Okoroma-Asa UE. Assessment of anemia status among pregnant women attending antenatal care in medical facilities in Port Harcourt, Rivers State. Res J Food Sci Qual Control. 2024;10(2):1-15.
33. Aliyu LD. Fetal congenital anomalies in Africa: diagnostic and management challenges. In: Congenital anomalies in newborn infants: clinical and etiopathological perspectives. 2021. Available at: https://www.intechopen.com/chapters/71783. Accessed on 05 March 2026.
34. Umeano-Enemuoh JC, Uzochukwu B, Ezumah N, Mangham-Jefferies L, Wiseman V, Onwujekwe O. A qualitative study on health workers' and community members' perceived sources, role of information and communication on malaria treatment, prevention and control in southeast Nigeria. BMC Infect Dis. 2015;15(1):437.
35. Olatona FA, Olowu OJ, Goodman OO, Amu EO. Dietary habits, diversity, and predictors among pregnant women attending primary health care centers for antenatal care in Lagos, Nigeria. J Fam Med Prim Care. 2021;10(8):3076-83.
36. Hassan AA, Hassan AM, Bashir AO, Adam GK, AlHabardi N, Adam I. Periconceptional folic acid usage and its associated factors in eastern Sudan: a cross-sectional study. Womens Health (Lond). 2024;20:17455057231224176.
37. Aweke MN, Fentie EA, Agimas MC, Baffa LD, Shewarega ES, Belew AK, et al. Folic acid supplementation during preconception period in sub-Saharan African countries: a systematic review and meta-analysis. PLoS One. 2025;20(1):e0318422.
38. Funnell G, Naicker K, Chang J, Hill N, Kayyali R. A cross-sectional survey investigating women's information sources, behaviour, expectations, knowledge and level of satisfaction on advice received about diet and supplements before and during pregnancy. BMC Pregnancy Childbirth. 2018;18(1):182.
39. Ujah OI, Olaore P, Ogbu CE, Okopi JA, Kirby RS. Prevalence and determinants of food insecurity among pregnant women in Nigeria: a multilevel mixed effects analysis. PLOS Glob Public Health. 2023;3(10):e0002363.

40. World Health Organization. Daily iron and folic acid supplementation during pregnancy. WHO Elena. 2023. Available at: https://www.who.int/tools/elena/interventions/iron-pregnancy. Accessed on 05 March 2026.

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