

Original Research Article

Folic acid usage and associated factors among pregnant women attending a tertiary health facility in Nigeria

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ABSTRACT

Background: Folic acid (FA) is an essential water-soluble vitamin that cannot be synthesized in the human body; hence its major source is from diet. It plays a key role in embryonic development. FA supplementation in pregnancy reduces the risk of megaloblastic anaemia, preterm delivery and neural tube defects. The aim of the current study was to evaluate the use of FA and factors associated with uptake amongst pregnant women at the University of Port Harcourt Teaching Hospital.

Methods: A descriptive cross-sectional study involving 451 antenatal attendees at the University of Port Harcourt Teaching Hospital from 1 January to 31 March 2020. After consent was obtained, a structured interviewer-administered questionnaire was used to collect information from the women. Data was entered into a spread sheet and analyzed with SPSS version 25. The results are presented in means and percentages. The confidence interval was set at 95% and a p value of <0.05 was deemed statistically significant. Chi square test and Pearson's correlation were used to determine association between usage of FA and variables.

Results: Most of the women, 258 (57.21%) were between the ages of 30 and 39 years and were primarily nulliparous 122 (27.1%). Moreover, two-thirds of them 330 (73.2%) had post-secondary education and nearly all 409 (90.7%) of the women were married. Majority 370 (82.0%) of the pregnant women were currently taking folic acid but only 109 (24.2%) commenced before pregnancy. Use of FA was significantly associated with socio-demographic characteristics such as age, marital status, level of education and occupation ($p < 0.05$). In addition, parity, planned pregnancy, history of having a child with neural tube defect, and timing of commencement of folic acid were all significantly associated with folic acid usage ($p < 0.05$).

Conclusions: Only a small proportion of pregnant women have used FA before their pregnancies. A public health policy or strategy to increase the pre-conceptional use of folic acid is needed.

Keywords: Folic acid, Pregnancy, Usage, Port Harcourt, Southern Nigeria

INTRODUCTION

FA is an essential micronutrient required for several metabolic processes. It is one of the essential vitamins that can only be obtained through diet, rather than being synthesized de novo. It is essential for numerous body

functions such as synthesis, repair and methylation of deoxy ribonucleic acid (DNA).¹ In addition, it is a cofactor in some biological reactions, and it is important in erythropoiesis. It plays an essential role in the development of the central nervous system during the period of embryogenesis and aids in rapid cell division and growth as seen in utero. Hence, the demand for FA

increases during pregnancy to support the growth of the developing fetus.¹

FA deficiency often results from a lack of folate in the diet and the symptoms and signs are often subtle. However, severe FA deficiency before or during pregnancy is associated with megaloblastic anaemia, reduced white blood cell and platelet count, as well as impaired function in the mother.² Perinatal complications include preterm births, low-birth-weight babies and infants with congenital heart defects, and neural tube defects (NTDs). Congenital abnormalities including NTDs pose major physical, psychological and public health challenges.^{2,3}

The causes of FA deficiency can be broadly divided into; poor intake, reduced absorption and increased body requirement. Pregnancy increases the demand for folic acid. Ageing and medications such as phenytoin reduces the absorption and utilization of folic acid by the body. Folic acid deficiency can also occur when there is inadequate dietary intake.^{4,5}

NTDs are the most dreaded consequence of folate deficiency. They are congenital structural anomalies of embryonic origin that results from failure of the neural tube to close between day 21 and day 28 post conception, and they cause defects in the brain, spinal cord, and their surrounding structures.⁶⁻⁸ They are linked to fetal and newborn mortality, morbidity, psychological maladjustment, severe lifelong disability and enormous economic expenditures. Globally, spina bifida and anencephaly are the most prevalent birth abnormalities. These are caused by a failure in the closure of the neural tube, leaving the spinal cord unprotected by its usual bony sheath, hence vulnerable to infection and physical trauma.⁶⁻⁸ They occur worldwide and are the second most common major congenital abnormalities occurring in 2-3% of live births.^{6,7} In Nigeria, the incidence of neural tube abnormalities ranges from 0.85 to 7 per 1000 live births.⁴ NTD was reported to be 0.95/1000 live births in Port Harcourt, 0.85/1000 live births in Abakiliki, 2.2/1000 live births in Sokoto, 2.75/1000 live births in Kano, and 7/1000 live births in the middle belt region of Nigeria.^{1,9-11} The rate of NTDs in Europe, Asia, and the United States of America is 5.14-12.5/10,000 live births.¹² It was observed in Nigeria that the abnormalities were more typically related with high parity, with female babies being the most affected.⁴ FA intake during the peri-conception period is adequate if commenced one month before conception and continued for the first three months after conception. This helps to protect against a variety of congenital anomalies, such as neural tube defects, heart defects and craniofacial abnormalities.^{1,6,13} Although, FA is found in natural foods such as green leafy vegetables, citrus fruits, legumes, eggs and bananas, folate deficiency remains common in women of reproductive age due to ignorance, poverty, illiteracy, food taboos, low intake or cooking losses because folate can be destroyed by heat.^{6,14}

The WHO recommends 400 micrograms of folic acid daily throughout the peri-conception period to prevent neural tube anomalies. Women who have had babies with neural tube anomalies, on the other hand, should be given higher doses of FA, up to 5 milligrams daily as well as boost their folic acid consumption through diet.^{6,15,16} In Nigeria, the Federal Government, through the National Agency for Food and Drug Administration and Control (NAFDAC), also advised folic acid fortification of staple foods such as wheat flour and morning cereal.¹⁷ In UPTH, women who desire children are encouraged to take peri-conception FA. Despite the WHO and numerous governments' recommendations, FA intake by women of reproductive age remains inadequate, particularly in developing countries in Sub-Saharan Africa including Nigeria, leading to a higher prevalence of NTDs and other congenital malformations.^{4,18} Despite the fact that FA usage among pregnant women has been reported in several literature, there are no published reports at the university of Port Harcourt Teaching Hospital. As a result, the study attempted to evaluate folic acid usage among pregnant women as a preventive measure for neural tube abnormalities as well as the factors that influence its use.

METHODS

The research was carried out at the antenatal clinic of the University of Port Harcourt Teaching Hospital (UPTH). The University of Port Harcourt Teaching Hospital is a 884-bed tertiary hospital in Alakahia, in Obio Akpor Local Government Area of Rivers State, Southern Nigeria.

Every year, an average of 2000 deliveries were conducted. It served as a referral center for all levels of health care in Rivers and neighbouring states. Every week, the antenatal clinic was open from Monday through Friday and each session was led by a team of consultants, resident doctors, house officers, nurses and other health professionals. On each of these days, an average of 120 antenatal patients were seen. An estimated 2000 women attended the antenatal clinic each year. This was a descriptive cross-sectional study of all pregnant women who attended the antenatal clinic of the University of Port Harcourt teaching hospital between 1 January 2020 and 31 March 2020. All pregnant women receiving antenatal care at the University of Port Harcourt Teaching Hospital who gave consent were recruited for the study. Those who had multiple visits within the period under consideration were excluded in their subsequent visits.

The sample size for this study was determined using the Fisher's formulae,

$$N = \frac{Z^2 P (1-P)}{d^2},$$

Where, P is the prevalence of pregnant women who had knowledge of FA in a study done in Nigeria, which was 64%.^{6,19}

As a result, the minimal sample size was calculated to be 407. However, after obtaining informed written consent from those who met the inclusion criteria, a total of 451 consecutive women who attended the antenatal clinic were recruited into the study. The benefits of the study and confidentiality were explained to the women. A pretested structured interviewer-administered questionnaire was used to obtain information from the women. These included socio-demographic and reproductive characteristics, use of folic acid, and timing of commencement of folic acid.

Statistical analysis

Data obtained was collated, entered into a spread sheet, and analyzed using SPSS version 25. Results are expressed in means and percentages and presented in tables. Confidence interval was set at 95% and a p value of <0.05 was statistically significant. Chi square test and Pearson’s correlation were used to determine association between knowledge of folic acid and variables.

RESULTS

A total of 451 women were recruited into this study after obtaining written informed consent from them. The mean age was 31.13±5.18 years. Most 258 (57.2%) of the women were in the 30-39 years age group, while 24 (5.3%) of them were aged 40 years and above. The majority 409 (90.7%) of the women were married, while only 2 (0.4%) were divorced or separated. Two-third 330 (73.17%) of the respondents had post-secondary education, with 174 (38.6%) of them engaged in non-manual skilled occupation, while one-sixth 73 (16.2%) were unemployed. This is shown in (Table 1).

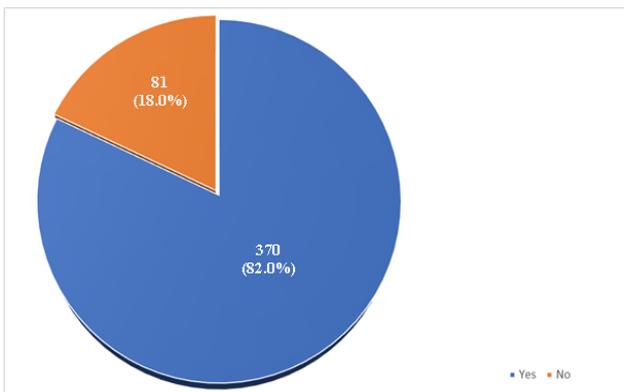


Figure 1: Use of folic acid among pregnant women.

Most of the women were nulliparas 122 (27.1%), with 32 (7.1%) having more than four deliveries. The current pregnancy was planned in 319 (70.7%) of the women, with 438 (97.1%) of the women conceiving

spontaneously and 13 (2.9%) conceiving through IVF. Only 11 (2.4%) of the women had a history of a stillbirth or a baby with a congenital problem, with 7 (1.6%) having newborns with neural tube defects. The reproductive characteristics of the women are listed in (Table 2).

Many 370 (82.0%) of the women were currently on folic acid supplementation as shown in (Figure 1).

However, only 109 (24.2%) reported that they commenced folic acid supplementation before pregnancy, while majority 194 (43.0%) of the participants reported that they started using folic acid in the first trimester of their current pregnancy (Figure 2).

Table 1: Socio-demographic characteristics of the women (n=451).

Variables	N	%
Age (years)		
<20	5	1.1
20-29	164	36.4
30-39	258	57.2
40-49	24	5.3
Mean age 31.13±5.18		
Marital status		
Single	40	8.9
Married	409	90.7
Divorced/separated	2	0.4
Level of education		
None	8	1.8
Primary	17	3.8
Secondary	96	21.3
Post-secondary	330	73.2
Occupational status		
Unemployed	73	16.2
Semi-skilled	66	14.6
Non-manual skilled	174	38.6
Intermediate	112	24.8
Professional	26	5.8

The proportion of participants aged 30-39 years that used folic acid daily was 219 (84.9%), while folic acid was taken daily by 126 (76.8%) of study participants aged between 20-29 years, and 22 (91.7%) of those aged 40-49 years ($\chi^2=7.517_F$, $p=0.047$). About 341 (83.4%) of the married participants reported using folic acid in the current pregnancy, while the proportion of single women using folic acid was 27 (67.5%) ($\chi^2=5.918_F$, $p=0.058$). The highest proportion of participants reporting daily folic acid use (58%) was among those with post-secondary ($\chi^2=27.165_F$, $p=0.0001$). With regards to occupational status, 100% of professionals used folic acid daily ($\chi^2=16.509$, $p=0.002$).

Hence, (Table 3) showed that folic acid supplementation for prevention of NTDs was significantly associated with

age, level of education and occupation (<0.05), with younger, educated women and women with professional occupation using folic acid daily. The proportion of women with two previous deliveries that used folic acid daily was 101 (88.6%) and the proportion of primiparous women that used folic acid daily was 106 (87.6%), while 93 (76.2%) of nulliparous women used folic acid daily ($\chi^2=14.896$, $p=0.005$). About one-fifth 100 (75.8%) of women who reported not planning their pregnancy used folic acid daily, while more than half 270 (61.6%) of the study participants that reported planning their current

pregnancy used folic acid daily ($\chi^2=4.999$, $p=0.025$). A higher proportion 365 (82.0%) of women with no history of having a child with NTDs had daily supplementation of folic acid compared to 5 (71.4%) of those with a history of NTDs ($p=0.036$). Parity, planned pregnancy, and history of having a child with NTDs, were all significantly associated with folic acid usage ($p<0.05$). However, there was no significant correlation between folic acid usage and the women’s method of conception and having a history of stillbirth or baby with congenital defects (Table 4).

Table 2: Reproductive characteristics of the women (n=451).

Variables	N	%
Parity		
0	122	27.1
1	121	26.8
2	114	25.3
3	62	13.7
≥4	32	7.1
Planned pregnancy		
Yes	319	70.7
No	132	29.3
Method of conception		
Spontaneous	438	97.1
ART (IVF)	13	2.9
History of having still birth or baby with congenital defect		
Yes	11	2.4
No	440	97.6
History of having a child with neural tube defect		
Yes	7	1.6
No	444	98.4

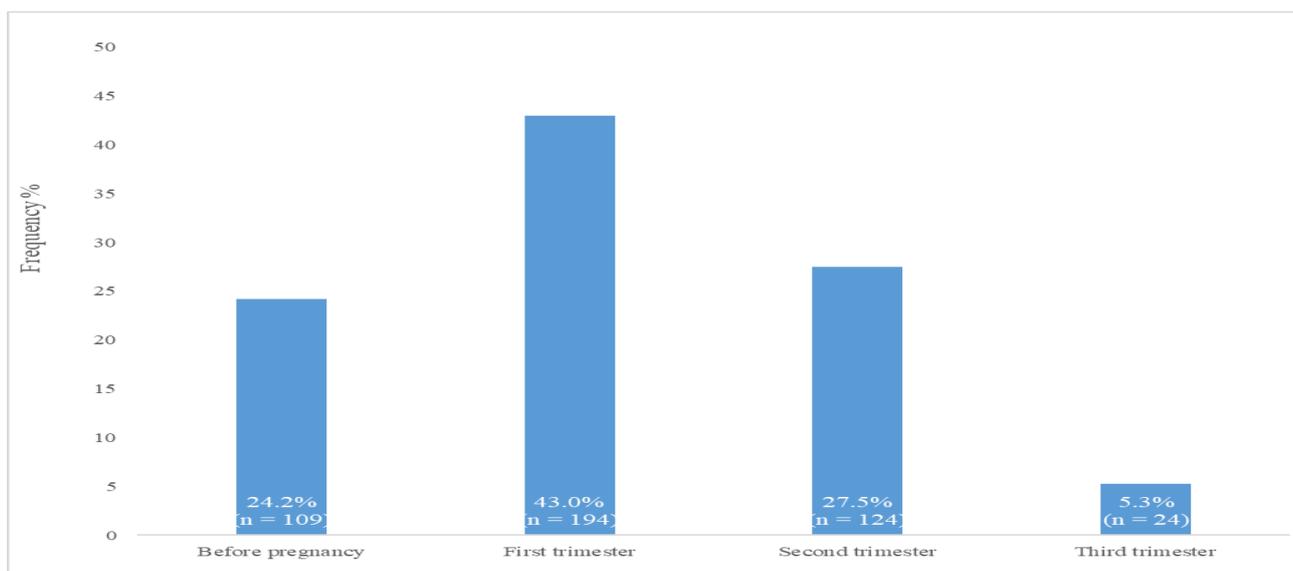


Figure 2: Timing of commencement of folic acid use among pregnant women.

Table 3: Relationship between Socio-demographic characteristics and use of folic acid among pregnant women.

Variables	Use of folic acid		Total N (%)	Chi square	P value
	Yes N (%)	No N (%)			
Age category (years)					
<20	3 (60.0)	2 (40.0)	5 (100.0)	7.517 _F	0.047
20-29	126 (76.8)	38 (23.2)	164 (100.0)		
30-39	219 (84.9)	39 (15.1)	258 (100.0)		
40-49	22 (91.7)	2 (8.3)	24 (100.0)		
Marital status					
Single	27 (67.5)	13 (32.5)	40 (100.0)	5.918 _F	0.058
Married	341 (83.4)	68 (16.6)	409 (100.0)		
Divorced/Separated	2 (100.0)	0 (0.0)	2 (100.0)		
Level of education					
None	7 (87.5)	1 (12.5)	8 (100.0)	27.165 _F	0.0001
Primary	9 (52.9)	8 (47.1)	17 (100.0)		
Secondary	65 (67.7)	31 (32.3)	96 (100.0)		
Post-secondary	289 (87.6)	41 (12.4)	330 (100.0)		
Occupational status					
Unemployed	57 (78.1)	16 (21.9)	73 (100.0)	16.509	0.002
Semi-skilled	45 (68.2)	21 (31.8)	66 (100.0)		
Non-manual skilled	146 (83.9)	28 (16.1)	174 (100.0)		
Intermediate	96 (85.7)	16 (14.3)	112 (100.0)		
Professional	26 (100.0)	0 (0.0)	26 (100.0)		

Table 4: Relationship between Reproductive characteristics and use of folic acid among pregnant women.

Variables	Use of folic acid		Total N (%)	Chi square	P value
	Yes N (%)	No N (%)			
Parity					
0	93 (76.2)	29 (23.8)	122 (100.0)	14.896	0.005
1	106 (87.6)	15 (12.4)	121 (100.0)		
2	101 (88.6)	13 (11.4)	114 (100.0)		
3	49 (79.0)	13 (21.0)	62 (100.0)		
≥4	21 (65.6)	11 (34.4)	32 (100.0)		
Planned pregnancy					
Yes	270 (61.6)	168 (38.4)	438 (100.0)	4.999	0.025
No	100 (75.8)	32 (24.2)	132 (100.0)		
Method of conception					
Spontaneous	357 (81.5)	81 (18.5)	438 (100.0)	2.930	0.087
ART (IVF)	13 (100.0)	0 (0.0)	13 (100.0)		
History of having still birth or baby with congenital defect					
Yes	9 (81.8)	2 (18.2)	11 (100.0)	F	1.000
No	361 (82.0)	79 (18.0)	440 (100.0)		
History of having a child with neural tube defect					
Yes	5 (71.4)	2 (28.6)	7 (100.0)	F	0.036
No	365 (82.0)	80 (18.0)	444 (100.0)		

DISCUSSION

Folic acid intake during the peri-conception period is adequate if commenced one month before conception and

continued for the first three months after conception. This helps to protect against a variety of congenital anomalies, such as neural tube defects, heart defects, and craniofacial abnormalities.^{1,6,13}

The mean age of 31.13 ± 5.18 years is within the age bracket for women of reproductive years (15-49 years).

The finding is similar to report from a study carried out in Ibadan, where the mean age of the respondents was 30.0 ± 4.6 years.²⁵ However, it differs from the studies conducted in Benin, Jos and South Ethiopia that reported a mean age of 28.7 ± 4.2 years, 29.9 ± 4.7 years, and 27.5 ± 5.1 years respectively.^{5,26,27} In this study, age was a major determinant of folic acid use. This observation is noteworthy because optimal folic acid intake among a higher proportion of women of reproductive age will result in more babies being born without the burden of neural tube defects.

Majority of the respondents were married, had post-secondary education, and were mostly employed. Women with higher socioeconomic status are more likely to be financially secure, which leads to better access to information through various media channels and improved compliance for folic acid intake, better access to health facilities and services, improved health-seeking behaviour, safer pregnancies, and healthier children. This observation is like the reports from Ibadan and Benin.^{25,26} This similarity may be because these studies were all conducted in Nigeria. It was however at variance with the study conducted in Ethiopia, which showed that most of the women had primary education and were unemployed, hence were unaware of the role of folic acid in preventing NTDs.⁷ This corroborates previous report that a low level of maternal education and unemployment are possible risk factors for neural tube defects during pregnancy, due in part to poor knowledge.²⁸

In the present study, pregnancy was planned by 70.7% of the respondents, which was consistent with the planning of pregnancy in 68% in Benin and 71% in Ethiopia, but higher than the 62% recorded in Jos.^{6,7,26} It was however, much lower than the 85% reported in Ibadan.²⁵ This variance may be because women in the south-western region of Nigeria have better health seeking behaviour and are more enlightened compared to women in the south-south and northern regions.

Concerning folic acid usage among the respondents, most of them were currently on folic acid supplements in their pregnancy. The finding is like reports from the studies done in Ibadan, Benin, and Ethiopia.^{7,25,26} This conclusion is consistent with what one might expect from a population living in an urban area with easy access to both secondary and tertiary health facilities that are well equipped to provide maternal and child health care services. This observation may be explained by the women's high socioeconomic class and tertiary education. However, despite the high proportion of women currently on folic acid supplements, only one-fourth (24.2%) of the respondents started taking folic acid before pregnancy, most started at first trimester, at which time the protective effect of folic acid against NTDs is still beneficial. This is like the 28.7% reported in Ghana

but higher than the reports from Enugu, Ibadan, Jos, Ethiopia, and Sudan.^{4,6,7,21,22,25} It was however lower than reports from Netherlands where 63% of the women started folic acid in the peri-conception period.²³ This significant difference is probably due to the higher level of awareness from health education, educational status, and good health seeking behavior of Dutch women. As a result, relevant authorities should ramp up efforts to continue advocating for peri-conception use of folic acid among women of reproductive age.

There was significant association between folic acid use and various socio-demographic variables except marital status. Women who were younger, employed, with post-secondary education used folic acid as recommended. Although, there was no association between folic acid use and marital status, more married women in the present study used folic acid more appropriately. There was a substantial relationship between folic acid intake and pregnancy planning; women who planned their pregnancy used folic acid more appropriately. This finding is similar to reports obtained by researchers in Benin.²⁶ Women who plan their pregnancies are more likely to seek prenatal care and begin folic acid supplementation, and their pregnancies have better results.^{29,30} Pregnancy planning is an excellent time to adopt behaviors that will benefit both the mother and the fetus's health. Planned pregnancy also provides for the most effective use of limited resources in lowering newborn and child mortality through quality health care, such as immunization services, access to adequate nutrition, water, and sanitation facilities. These child survival strategies increase the life expectancy in children. This differs from that reported in Ibadan, where it was observed that the use of folic acid supplements was hampered by the pregnancy plan.²⁵

CONCLUSION

The majority of the respondents were already taking folic acid but only a small proportion started before pregnancy. The factors found to be significantly associated with folic acid usage were age, level of education, occupation, parity, planned pregnancy, and history of having a child with neural tube defects. Women receiving antenatal care should be educated on the importance of folic acid supplementation in pregnancy as this will reinforce uptake. In addition, planned pregnancies should be encouraged to sustain the practice of peri-conception folic acid supplementation. Furthermore, there should be more advocacies for the fortification of staple foods as this will help build folic acid reserves in women of reproductive age and prevent neural tube defects.

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