Adherence to Iron and Folic Acid Supplementation Among Pregnant Women From Northern Ghana

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Haruna Seidu[1], Patience Kanyiri Gaa[2] and Victor Mogre[3]

[1]Department of Global and International Health, School of Public Health, University for Development Studies, Tamale, Ghana. [2]Department of Nutritional Sciences, School of Allied Health Sciences, University for Development Studies, Tamale, Ghana. [3]Department of Health Professions Education and Innovative Learning, School of Medicine, University for Development Studies, Tamale, Ghana.

ABSTRACT: Iron and folic Acid (IFA) supplementation is an effective intervention for reducing the incidence of anaemia during pregnancy. The WHO recommends at least 6 months intake of IFA to pregnant women. However, in Ghana some women experience challenges with adhering to IFA supplementation. The main objective of the study was to assess the level of adherence to iron and folic acid supplementation and its associated factors among pregnant women in a peri-urban municipality in Northern Ghana. A cross-sectional study was conducted from March to December 2021 among 400 pregnant women who attended ANC in Sagnarigu municipality in Ghana and were selected through a 3-stage random sampling technique. A structured questionnaire was used to collect data. The data were analysed using descriptive statistics, univariate and binary logistic regression statistical tools. Self-reported level of adherence to iron and folic acid supplementation was 84.5%. Knowledge of iron and folic acid supplementation (AOR = 0.08: 021, 0.343) was associated with adherence. Three other factors: time of first antenatal visit (AOR = 0.32: 0.153, 0.649) having history of anaemia [AOR = 2.67: 1.373, 5.201] having side effects of IFA [AOR = 3.70, CI: (1.756, 7.793)], and having knowledge of management of side effects of iron and folic acid supplementation (AOR = 0.08: 021, 0.343) were found to be significantly associated with adherence. Adherence to iron and folic supplementation among the pregnant women was generally frequent. Strategies to increase iron and folic acid supplementation adherence among pregnant women could focus on encouraging pregnant women to have early ANC visits and educating them on how to manage side effects.

KEYWORDS: Compliance, expectant mothers, supplements, maternal

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CORRESPONDING AUTHOR: Haruna Seidu, Department of Global and International Health, School of Public Health, University for Development Studies, C/o Nursing and Midwifery Training College, P.O Box 10 Nalerigu, Tamale +233, Ghana. Email: harunaseidu@gmail.com

Background

Anaemia constitutes one of the disorders that affect the health of close to 2 billion people in the world.[1,2] About 40% of pregnant women around the globe suffer from anaemia,[3] showing the extent to which pregnant women and their babies suffer from anaemia.[4] Studies indicate that Africa has more than half (55.8%) of its pregnant women suffering from anaemia.[2,3] In Ghana, the situation is not different, where more than 40% of pregnant women suffer from anaemia.[5]

Though there are multiple causes of anaemia such as malaria, genetic factors, and parasitic infections, anaemia resulting from iron deficiency remains the commonest, especially among pregnant women.[3] During pregnancy, women who have iron deficiency could reduce weight and develop conditions such as preterm labour, placenta previa, premature rupture of membrane, heart problems, haemorrhage, compromised immunity, poor cognitive development and loss of energy.[6,7]

Iron and folic acid remain essential for the prevention of anaemia most particularly during pregnancy.[8] The development of the foetus, placenta and the larger portion of blood that circulates in the body of the pregnant women increase the demand for these nutrients thereby increasing the vulnerability of pregnant women to anaemia.[9,10] Inadequate bioavailability of dietary iron makes it difficult for pregnant women to meet this demand through only food intake thereby creating the need for a food supplement.[11] To ensure an adequate supply of nutrients such as iron or folic acid throughout pregnancy, the WHO urges expectant mothers living at places with anaemia prevalence of 40% or more to stick to the intake of 60 mg of iron as well 400 µg folic acid every day and those living in areas with anaemia prevalence of 20% to take 120 mg iron and 2800 µg folic acid once every week as part of antenatal service.[8] A systematic review of 60 randomised trials involving 43 274 women assessed the effects of daily iron on pregnant women in which regular intake of supplements such as iron or both iron and folic acid reportedly reduced the tendency of expectant mothers becoming anaemic due to iron deficiency[12]

The effectiveness of taking IFA supplements everyday especially, to reduce the risk of anaemia in pregnancy has been demonstrated by some studies,[13] yet some pregnant women in Ghana still find reasons for not adhering to the national IFA supplementation.[14,15] According to WHO, adherence is a degree to which patients strictly adhere to medications exactly the way health professionals asked them to do.[16] During

pregnancy, the degree to which expectant mothers adhere to IFA is determined by[8] as the intake of ⩾ 90 IFA tablets on daily basis throughout pregnancy. Studies available have reported the proportion of pregnant women who adhere to daily intake of IFA in Ghana to be between 58.5% and 79.9%.[14,17,18]

The effectiveness of IFA supplementation during pregnancy is constrained by poor adherence[19] due to misinformation about the benefits of the supplements and complaints of expectant mothers regarding the common barriers of IFA.[15,19,20] Self-efficacy, attitude, and knowledge of women on IFA are identified as internal barriers and enablers to adherence.[21] Some studies demonstrated that expectant mothers who were well informed of the dreadful consequence of anaemia and the importance associated with haematinic in pregnancy either through counselling during antenatal care,[20] or under a high level of formal education[22] are most likely to adhere to IFA supplementation during pregnancy. Support from close relations and quality of health care received by women during antenatal care constitute relational barriers or enablers that influence the use of iron and folic acids among females who access antenatal care.[21]

In line with WHO guidelines, Ghana adopted the IFA supplementation programme as a rapid impact nutritional intervention to precisely overcome the occurrence of anaemia in pregnancy. IFA tablets are supplied either monthly or weekly to expectant mothers accessing antenatal care in healthcare facilities without any direct payment. The Ghana Demographic and Health Survey shows improvement in IFA supplementation and use of antihelminthic among pregnant women with close to half of pregnant women using the insecticide-treated net as well as improvement in IPT coverage yet the rate of occurrence of anaemia in pregnancy affects more than half of pregnant women (51%) in Ghana.[5]

Unpublished data from the Sagnarigu Health Directorate shows that about 36% of annual ANC attendants for the year 2019 had anaemia at the 36th week of gestation.[23] It is therefore not certain whether pregnant women in the municipal take iron and folic acid on daily basis in line with the WHO recommendation. This study seeks to assess the level of adherence and associated factors of IFA supplementation among pregnant women in the Sagnarigu Municipality.

Methods

Study design, study area and study period

From June to November 2021, a cross-sectional study was carried out in randomly selected health facilities in Sagnarigu Municipality. Sagnarigu is the administrative capital of the Municipality. The Municipality covers 200.4 km^2 land size and borders Savelugu—Nanton Municipality to the north, Tamale Metropolis on the south and East, Tolon District on the West, Kumbungu District on North-West. Geographic location of the Municipality falls at latitudes 9°16′ to 9°34′ North and longitudes 0°36′ to 0°57′ West. The Municipality has diverse ethnic groups, however, Dagomba is the predominant tribe in the Municipality. In addition to Dagomba, other groups of people found in the municipal are the Gonja, Konkomba, Gruni, Mamprusi, Akan, Dagaaba etc. from other parts of Ghana. The study area is formed of 79 communities. The detail of the 79 communities included 20 towns, 6 sub towns, and 53 village communities. The Municipality has a population of 341, 711 inhabitants with 50.2% being women.[24] There are 42 public and private health facilities in the Sagnarigu municipality of which the majority provide antenatal care services. Unpublished data from Sagnarigu Health Administration shows that malaria remains the main cause of sickness among patients accessing health care in Sagnarigu.

Source and study population

The source population included reproductive-age women aged 15 to 49 years. The study population consisted of pregnant women seeking antenatal care from 6 health facilities in Sagnarigu Municipality. Pregnant mothers who had attended antenatal care at least twice and been given iron supplements with folate in the last ANC visit preceding this study were eligible, as were expectant mothers who had antenatal cards with a completed medical history. Pregnant women who were admitted due to illness or who had been clinically diagnosed as mentally ill were barred from participating in this study.

Determination of sample size

The study adopted the Cochran formula, $n = Z^2 * p * q / d^2$ to calculate for the number of participants for the study.[25] An error (d) of 5% was assumed, at a confidence level of 95% with a corresponding score of normal distribution (Z) of 1.96. An assumed population adherence prevalence of 50% was used to compute a sample size of 384. To cater for non-response, 5% of the number of participants calculated for this study was added which yielded a total of 403 expectant mothers as the overall sample size.

Sampling procedure

The 6 sub-municipals in Sagnarigu municipality were considered clusters from which 3 sub-municipals were randomly selected. In the first part of the selection, the name of each of the 6 sub-municipals were written on a piece of sheet, bend over and scuffled in a cup. Three of the folded papers were removed out one after the other without replacement. A list of health facilities (health centres, polyclinics, and hospitals) that offer antenatal services in the 3 selected sub-municipals was obtained from the Sagnarigu Municipal Health Directorate. Six health facilities were randomly selected using the lottery method. Expectant mothers who met the eligibility criteria were randomly selected for this study. A total of 1560 pregnant

women from the 6 health facilities were put together to generate a sample frame. The study adopted systematic random sampling for selection of participants from the sample frame at an interval of 4.

Data collection procedure

The study collected data from the participants through the use of a structured questionnaire. Four trained nurses were employed to collect the data. One of the authors (ie, HS) and the 4 research assistants conducted pre-testing of the questionnaire among 20 pregnant women in the Tamale metropolis, a nearby city with similar socio-economic characteristics to the Sagnarigu municipality. This was carried out to ensure comprehensibility of the items of the questionnaire by the pregnant women. These questionnaires were not included into the study. A letter of introduction that was taken from the University for Development Studies was submitted to the Sagnarigu Municipal Director of Health to ask for permission to conduct this research within the health facilities of the municipality. The team gathered data via face-to-face interviews in the health facilities when the selected participants attended antenatal care. However, selected participants who failed to attend antenatal care were replaced instead of following up in their homes. The questionnaire was administered at a confined location in the health facility to ensure privacy. Data collectors provided explanation of what the study intends to achieve prior to obtaining informed consent of participants and those who consented were administered the questionnaire. During data collection, the items on the questionnaire were read out in English or translated into the local dialect of the participants and the responses of participants were ticked.

Data collection methods

A structured questionnaire was designed for gathering data. The items of the questionnaire were adapted from previous studies.[17,20,21] The questionnaire consisted of items that assessed socio-demographic features (eg, age, educational status, marital status, religious affiliation, and occupational status), obstetric data, knowledge of IFA, pregnant woman's knowledge of anaemia, dietary intake of iron-rich foods, and adherence to IFA. The dependent variable 'adherence to IFA' was assessed by self-report. A questionnaire about adherence to IFA in the last week preceding data collection was administered. It measured adherence to IFA" by eliciting the response of participants to the question "during the past 1 week of your pregnancy, how many times did you take iron or folic acid supplements? The study defines adherence to IFA as taking IFA supplements 90 times or more throughout the gestation period, therefore, pregnant women who reported to have taken at least 4 times of IFA tablets within the 7 days preceding the day for data collection were considered to have adhered to recommendation for IFA supplementation.[26] Meanwhile, pregnant women taking < 4 times of IFA tablets within the same week were considered to be non-adherent. A study conducted in one of the districts of northern Ghana used a similar definition for adherence to IFA.[27]

The variable 'awareness' was measured by eliciting the response of participants to the question 'have you ever heard of iron and folic acid supplements'. A 'yes' response meant that the participant was aware. Knowledge of IFA was assessed by asking participants 7 questions on iron and folic acid. The right responses were assessed out of a maximum of 7 scores. The level of knowledge of IFA composed; awareness of IFA; benefits of IFA; the recommended number of IFA tablets to be taken every day; duration of intake of IFA during pregnancy; and recommended time to begin IFA supplementation during pregnancy. Pregnant women's knowledge regarding anaemia was measured by a 7 item that assessed their understanding of the causes, symptoms, effects on pregnancy and how to prevent of anaemia during pregnancy. A response that was correct attracted a score of one and the response that was not correct was awarded zero. The responses that were correct attracted a score of one and incorrect answers were scored 0. The total score of a participant was computed to 100%. A participant who scored $\leqslant 70\%$ was classified as having low knowledge level and a score of $> 70\%$ was denoted high knowledge of IFA. This classification was based on the FAO minimum knowledge score to warrant a nutrition intervention.[28]

Dietary intake was assessed using a food-intake check list which is simplified form the 24-hour dietary recall approach which ask whether a particular food or list of foods was consumed in the past 24 hours.[28] Food groups that were assessed were organ meat, flesh meat, fish and sea food, legumes, and fruits and vegetables. Participants were asked the question: Yesterday, during the day and night, did you eat any of the following foods either on their own or as part of a meal? Participants who ate from at least 3 iron-rich food sources were described as adequate intake.[28]

Statistical analysis

The statistical package for the social sciences (SPSS) Version 21.0 was used for the data entry and analyses. Descriptive statistics of mean, standard deviation, percentage and frequencies were employed to describe demographic and obstetric characteristics, level of knowledge, dietary intake and adherence to IFA during pregnancy. A Chi-square test was employed to examine the relationship between categorical variables and adherence to IFA. Binary logistic regression analysis was performed to determine factors associated with IFA adherence. A P-value $\leqslant .05$ at 95% confidence interval was considered significant.

Ethical consideration

Ethical clearance was obtained from the Committee on Human Research and Publication and Ethics (EHPE) of the Kwame Nkrumah University of Science and Technology (Reference number: CHRPE/AP/237/21). Written informed consent was obtained for all participants who could read and write in the English Language and verbal consent obtained for those who could neither read nor write in the English language. Participants who consented to partake in this research were given a form to endorse before data was collected. Participants were made to understand that they had the right to pull out of this study at any point in time after the approval of informed consent. Given that in Ghana reproductive age is between 15 and 49 years, they were some of the participants younger than 18 years. For these participants informed consent was obtained through their parents and child assent forms.

Results

Socio-demographic characteristics of participants

Out of the estimated sample size of 403, 400 participants were interviewed resulting in a 99.2% response rate. The mean (SD) age of participants was 27.83 (5.9) years. The youngest and the oldest persons among the participants were between 18 and 47 years of age respectively. A majority (95.5%) of the participants were married; 85.2% were Muslims and more than half of the participants had attained at least basic school education. A little above 50% of the pregnant women had gainful employment and 90% of the women were married to men who were employed. The demographic and obstetric features of participants are presented in Table 1.

Table 1. Socio-demographic characteristics of the participants.

VARIABLE	FREQUENCY	PERCENTAGE (%)
Age group		
15-24	128	32.0
25-34	212	53.0
35-47	60	15.0
Marital status		
Married	392	98.0
Single	8	2.0
Religious affiliation		
Christianity	59	14.8
Islam	341	85.2
Educational status		
None	128	32.0
Low	105	26.2
High	167	41.8
Occupational status		
Employed	204	51.0
Unemployed	196	49.0
Average income		
<GHC 1.00	212	53.0
>GHC 1.00	188	47.0
Occupational status (partner)		
Employed	357	89.2
Unemployed	43	10.8
Partners' educational status		
None	70	17.4
Low	95	23.8
High	235	58.8

In classifying educational status, participants who did not obtain formal education were classified as 'none'. 'Low' level of education comprised those who obtained primary and junior high school level of education and those who obtained senior high school and tertiary levels of education were classified as 'high'.

Obstetric characteristics and medical history

The first-time participants started antenatal visits ranged from the 4th to the 20th week of gestation. The mean (SD) first-time visit to ANC among participants was the 10th (4.18) week of gestation. Approximately 76% of the participants initiated antenatal attendance within the first trimester. The duration of gestation among the participants was within 12 and 42 weeks. The mean (SD) gestational age was 29.03 (6.62) weeks. A majority (66.3%) of the participants were within the last trimester of gestation. More than half of the participants had accessed antenatal services 4 times or more. For less than 30% of participants that was their first pregnancy. Most (54.5%) of the women sampled had never been told of being anaemic during pregnancy and 32.3% had reportedly experienced adverse effects of IFA but 84.8% (n = 339) did not know measures taken to prevent adverse effects following the intake of IFA tablets (Shown in Table 2). The majority (72.8%, n = 291) of the participants received education on IFA during the first visit of current pregnancy.

Participants' knowledge regarding anaemia and IFA supplementation

The mean (SD) score knowledge of anaemia and IFA supplementation were 4.87 (1.9) and 5.34 (1.1) respectively. More than half of the participants (67.5%) exhibited adequate knowledge of both anaemia in pregnancy (67.5%) and

Table 2. Obstetric characteristics of the participants.

VARIABLE	FREQUENCY	PERCENTAGE (%)
First ANC visit		
First trimester	302	75.5
Second trimester	98	24.5
Gestational age		
First trimester	6	1.5
Second trimester	129	32.3
Third trimester	265	66.3
ANC visits		
<4	117	29.2
⩾4	283	70.8
Gravidity		
Primigravida	115	28.8
Multigravida	285	71.2
Parity		
Nulliparous	118	29.5
Primiparous	100	25.0
Multiparous	182	45.5
Had history of anaemia		
Yes	182	45.5
No	216	54.5
Side effects of IFA		
Yes	129	32.2
No	271	67.8

IFA supplementation (75.5). Table 3 shows the proportion of participants who answered correctly to the individual questions relating to anaemia during pregnancy and IFA supplementation.

Consumption of iron-rich foods among participants

Figure 1 shows the proportion of participants who consumed iron-rich foods. Approximately, almost 70% of the participants ate adequate rich-rich foods.

Level adherence to IFA

The proportion of the participants who adhered to IFA is shown in Figure 2. Out of the 400 participants who were interviewed, 84% (n = 338) reported to have adhered to IFA.

Table 3. Knowledge of anaemia and IFA supplementation.

VARIABLE	FREQUENCY	PERCENTAGE (%)
Ever heard about anaemia	372	93.0
Knows the meaning of anaemia	327	81.8
Knows what causes anaemia among pregnant women	278	69.5
Knows the symptoms of anaemia	283	70.8
Knows the effects of anaemia on the unborn	263	65.8
Knows the effects of anaemia on pregnant women	279	69.8
Knows about the prevention of anaemia	334	83.5
Aware of IFA supplementation	397	99.3
Knows that IFA supplementation is beneficial during pregnancy	396	99.0
Knows the recommended duration for taking IFA supplements during pregnancy	290	72.5
Knows the recommended time to start taking IFA during pregnancy	245	61.3

Adequate knowledge = Participants whose total score was above 70%.
Inadequate knowledge = participants whose total score was 70% or below.

Univariate analysis of factors associated with adherence to IFA supplementation

The results of the chi-square test as shown in Table 4 shows that age ($P = .680$), marital status ($P = .082$), religion ($P = .470$), educational status ($P = .211$), and occupational status ($P = .120$) were not significantly associated with adherence to IFA supplementation.

Timing of first antenatal attendance ($P = .005$), and anaemia status ($P = .003$) were significantly associated with adherence to IFA. Having adequate education on IFA ($P = .113$), health facility accessed ($P = .341$), having knowledge regarding anaemia ($P = .084$) and consuming adequate iron-rich foods ($P = .849$) were not associated with adherence to IFA. However, having knowledge of management of side effects of IFA (0.013) and knowledge of IFA (0.012) were significantly associated with adherence IFA supplementation (Shown in Table 5).

Binary logistic regression analysis of factors associated with adherence to IFA

Among participants who registered for ANC during their first trimester, there was a reduced chance of adhering to IFA supplementation compared to their counterparts who registered in

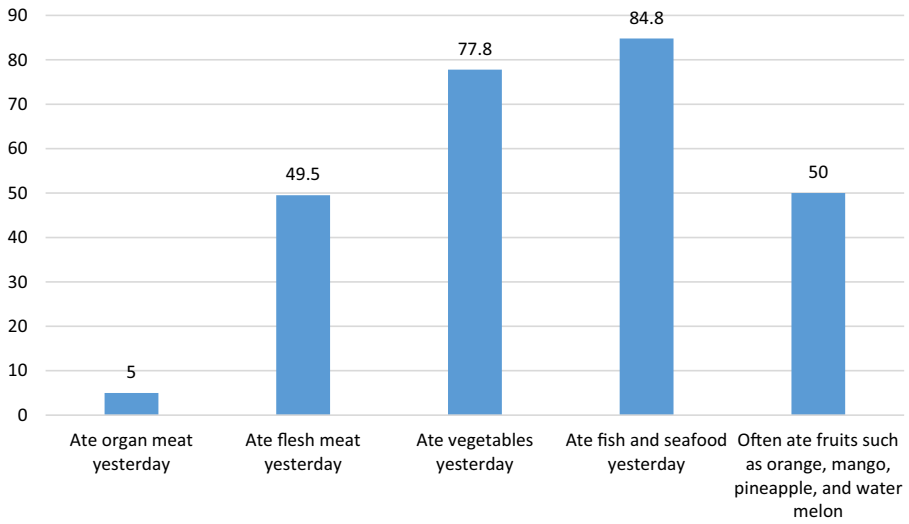

Figure 1. Proportion of participants consuming iron rich foods.

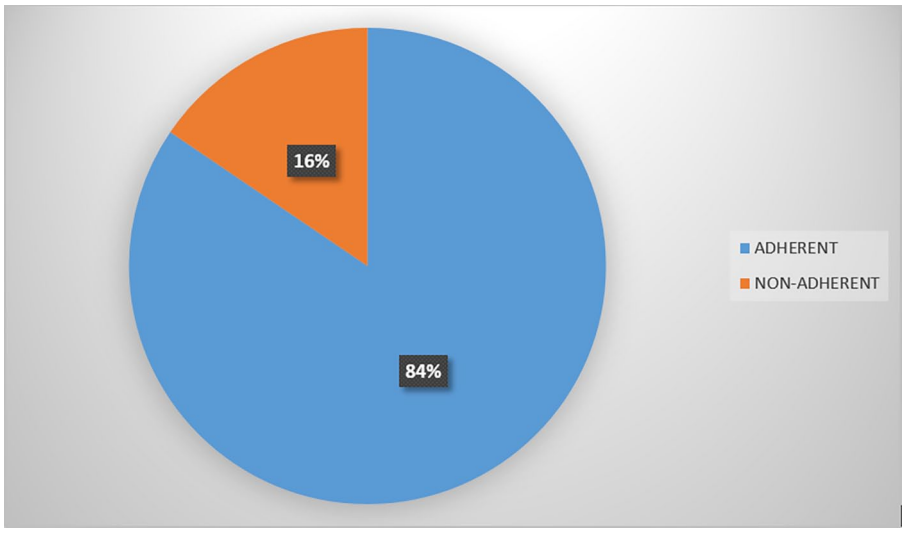

Figure 2. Proportion of participants adhering to IFA supplementation.

either second or third trimesters (AOR = 0.32; 95% CI: 0.153, 0.649, *P* = .002). The probability that pregnant women will adhere to IFA was more than 2 times higher among women who have ever suffered from anaemia than their counterparts who have never experienced anaemia (AOR = 2.67; 95% CI: 1.373, 5.201, *P* = .040). Pregnant women who reportedly experienced adverse events following the intake of IFA had an increased chance of adhering to IFA than their counterparts who had never experienced side effects of IFA (AOR = 3.70; 95% CI: 1.756, 7.793, *P* = .001). The participants who were rated to have knowledge regarding the management of adverse effects following intake of IFA had a reduced probability of taking IFA daily compared to their colleagues who did not have knowledge about management of adverse effects (AOR = .08; 95% CI: 021, .343, *P* = .001) (Shown in Table 6).

Discussion

We found in this study that the prevalence of adherence to IFA was 84%. These results suggest that majority of the participants followed the recommendations of their healthcare providers of adhering to the intake of IFA. The study reported a level of adherence that appeared lower than the 97.5% found in a cross-sectional study among 395 pregnant women who accessed antenatal care from some health facilities in South East Ethiopia.[29] The lower level of adherence in the current study may be explained by differences in the study settings. However, this current study reported a level of adherence to IFA that is above the level of adherence reported by previous studies from Ethiopia[22,30-35] and other African countries[17,27,36-41] which ranged from 12.0% in Uganda to 68.8% in Ghana. The varying rates may be due to varying methods of measuring

Table 4. Association between demographic characteristics and adherence to IFA supplementation.

VARIABLE	ADHERENCE TO IFA		*P*-VALUE
	YES (%)	NO (%)	
Age group			
15-24	110 (85.9)	18 (14.1)	0.680
25-34	176 (83.0)	36 (16.9)	
35-47	52 (86.7)	8 (13.3)	
Marital status			
Married	333 (84.9)	59 (15.1)	0.082
Single	5 (62.5)	3 (37.5)	
Religion			
Christianity	48 (81.3)	11 (18.7)	0.470
Islam	290 (85.0)	51 (15.0)	
ATR	0 (0)	0 (0)	
Educational status			
None	104 (81.3)	24 (18.7)	0.211
Low	94 (89.5)	11 (10.5)	
High	140 (83.8)	27 (16.2)	
Occupational status			0.120
Employed	178 (87.3)	26 (12.7)	
Unemployed	160 (81.6)	36 (18.4)	
Monthly average income			
<GHC 1.00	174 (82.1)	38 (17.9)	0.155
>GHC 1.00	164 (87.2)	24 (12.8)	
Occupational status (partner)			
Employed	302 (84.6)	55 (15.4)	0.881
Unemployed	36 (83.7)	7 (16.3)	
Partners' educational status			
None	58 (82.9)	12 (17.1)	0.897
Low	80 (84.2)	15 (15.8)	
High	200 (85.1)	35 (15.9)	

adherence. The proportion of participants who adhered to IFA in this study was comparable to a reported level of adherence of 81.8% by Debi et al.,[42] among 208 pregnant women from India and a reported adherence of 82.2% by Maina-Gathigi et al,[43] among 381 pregnant women who accessed antenatal care from a teaching hospital in Kenya.

It was found in the current study that pregnant women whose first time of visiting ANC was within the first trimester of gestation had a lesser chance of reporting higher adherence to intake of IFA during pregnancy than their counterparts whose first time of visiting ANC was within the second trimester of gestation. Such findings appeared inconsistent with previous reports from Ethiopia[30,44-47] and Pakistan.[48] A probable reason for the low rate of adherence among pregnant women who started ANC during the first trimester in the current study could be that these women might have faced challenges (such as unpleasant side effects) along the course of taking IFA. Furthermore, pregnant women whose timing of registration was as late as the second trimester of their pregnancy may have been made to understand the consequences of registering late by health professionals. This might have caused the women who registered late to religiously follow recommendations made by the health professionals to catch up. Though the findings showed that a greater number of the participants of this study who started ANC late rather adhered to IFA yet late initiation of IFA may reduce the impact of folic acid in preventing neural tube disorders and the full benefits of IFA may not be realised among these pregnant women. Health professionals should institute measures that will encourage and motivate pregnant women to continue to take the IFA throughout the period of pregnancy.

The participants of this study whose reports indicated that they had a reported history of anaemia during pregnancy, had a higher chance of reporting daily intake of iron and folic acid in pregnancy than their counterparts who had never experienced anaemia in any of their pregnancies. The possible reason could be that expectant mothers who reportedly experienced anaemia may heed to all recommendations and protocols to help reduce the risk of reoccurrence of anaemia. The results of this study agree with other studies that were previously carried out in some parts of Ethiopia.[29,30,46,47]

The participants who reported to have experienced an adverse event following the intake of IFA were having a higher probability of taking IFA tablets daily relative to their counterparts who had never experienced side effects of the IFA supplement. These findings were inconsistent with a similar study carried out in Ethiopia that found that expectant mothers who experienced side effects of IFA had an 8.5 higher chance of decreased adherence to IFA than their colleagues who were yet to experience adverse events following intake of IFA.[31] The possible reason that might have accounted for higher adherence among participants who experienced side effects in this study could be that the participants experienced mild side effects of IFA supplements that were not enough to deter them from adhering to IFA. If the form of side effects experienced appears convenient to participants the tendency is that participants will be motivated to adhere to the intake of IFA supplements. While more research is needed to determine the underlying causes of this finding, another likely explanation for relatively high adherence to IFA supplementation among pregnant women who experienced side effects could be that those

Table 5. Association between obstetric characteristics and adherence to IFA supplementation.

VARIABLE	ADHERENCE TO IFA		TOTAL	*P*-VALUE
	YES (%)	NO (%)		
Timing of First ANC visit				
First trimester	264 (87.4)	38 (12.6)	302 (75.5)	0.005
Second trimester	74 (75.5)	24 (24.5)	98 (24.5)	
Gestational age				
First trimester	5 (83.3)	1 (16.7)	6 (1.5)	0.997
Second trimester	109 (84.5)	20 (15.5)	129 (32.3)	
Third trimester	224 (84.5)	41 (15.5)	265 (66.2)	
ANC visits				
<4	99 (84.6)	18 (15.4)	117 (29.3)	0.967
⩾4	239 (84.5)	44 (15.5)	283 (70.7)	
Gravidity				
Primigravida	97 (84.3)	18 (15.7)	115 (28.7)	0.957
Multigravida	241 (84.6)	44 (15.4)	285 (71.3)	
Parity				
Nulliparous	101 (85.6)	17 (14.4)	118 (29.5)	0.878
Primiparous	85 (85.0)	15 (15.0)	100 (25.0)	
Multiparous	152 (83.5)	30 (16.5)	182 (45.5)	
Reported history of ever having anaemia				
Yes	143 (78.6)	39 (21.4)	182 (45.5)	0.003
No	195 (89.4)	23 (10.6)	218 (54.5)	
Experienced side effects after taking IFA				
Yes	69 (75.8)	22 (24.2)	91 (22.8)	0.009
No	269 (87.1)	40 (12.9)	309 (77.2)	

participants were more knowledgeable about the benefits of IFA, causing them to overlook the side effects and continue to follow the recommendations. Another important finding of this study was that participants who were rated to have knowledge regarding the management of the side effects of IFA supplements had a lesser chance of reporting higher adherence to IFA than their counterparts who had no knowledge regarding the management of IFA supplements. The reason may be that the knowledge of the women regarding the management may not result in overcoming some of the barriers that hindered regular intake of IFA supplementation.

The findings of this study found no significant association in relation to the level of knowledge of anaemia and adherence to IFA supplementation. However, published articles carried out in parts of Ethiopia[22,29,44-46,49] and in Ghana[27] found a significant association in relation to the level of knowledge of anaemia and IFA supplementation.

Limitations of this study are the use of self-reports to measure adherence to IFA and consumption of iron-rich foods which is prone recall and social desirability bias. This study followed a cross-sectional design which makes it difficult to establish a cause-effect relationship.

Conclusion

The rate of adherence to IFA was relatively frequent. ANC attendance and having knowledge on the management of the side effects of IFA were important factors of decreased adherence to IFA. Meanwhile having anaemia during pregnancy and having ever experienced side effects of IFA were associated with increased adherence to IFA. Pregnant women should be

Table 6. Binary logistic regression analysis of factors associated with adherence to IFA supplementation.

VARIABLE	BETA	AOR (95% CI)	*P*-VALUE
Age			
–24	–0.41	0.96 (0.27, 3.583)	.952
25-34	0.462	1.58 (0.582, 4.326)	.367
35-47	Ref	Ref	Ref
Marital status			
Married	–0.925	0.39 (0.061, 2.584)	.333
Single	Ref	Ref	Ref
Religion			
Christianity	0.212	1.23 (0.499, 3.060)	.647
Islam	Ref	Ref	Ref
Education			
None	– 0.097	0.91 (0.339, 2.433)	.847
Low	– 0.535	0.59 (0.243, 1.410)	
High	Ref	Ref	Ref
Occupational status			
Employed	–304	0.74 (0.176, 3.109)	.678
Unemployed	Ref	Ref	Ref
Average income			
<GHC 1.00	0.307	1.36 (0.321, 5.759)	.676
>GHC 1.00	Ref	Ref	Ref
Occupational status partners			
Employed	1.21	0.89 (0.317, 2.471)	.817
Unemployed	Ref	Ref	Ref
Partners' educational status			
None	0.083	1.09 (0.380, 3.111)	.877
Low	–0.397	0.67 (0.281, 1.607)	.372
High	Ref	Ref	Ref
Health facility			
Hospital	0.556	1.74 (0.151, 20.124)	.656
Health centre	0.500	1.65 (0.177, 15.349)	.660
Polyclinic	0.517	1.67 (0.191, 14.707)	.641
CHPS compound	Ref	Ref	Ref
Timing of first ANC visit			
First trimester	–1.153	0.32(0.153, 0.649)	.002
Second trimester	Ref	Ref	Ref
Gestational age			
First trimester	1.716	5.56(0.463, 66.820	.176
Second trimester	0.539	1.72(0.761, 3.863)	.193
Third trimester	Ref	Ref	Ref
ANC visits			
<4	–0.497	0.61(0.264, 1.399)	.242
⩾4	Ref	Ref	Ref
Gravidity			
Primegravida	1.136	3.11(0.510, 19.011)	.219
Multigravida	Ref	Ref	Ref
Parity			
Nulliparous	–1.101	0.33(0.051, 2.190)	.252
Primiparous	0.086	1.09(0.470, 2.526)	.841
Multiparous	Ref	Ref	Ref
Reported history of anaemia			
Yes	0.989	2.67(1.373, 5.201)	.040
No	Ref	Ref	Ref
Had received education IFA			
Yes	–0.402	0.67(0.328, 1.366)	.269
No	Ref	Ref	Ref
Ever experienced side effects			
Yes	1.308	3.70(1.756, 7.793)	.001
No	Ref	Ref	Ref
Had knowledge on the management of the side effects of IFA			
Yes	–2.463	0.08(021, 0.343)	.001
No	Ref	Ref	Ref
Level of knowledge regarding causes and prevention of anaemia			
Adequate	0.266	1.31(0.606, 2.809)	.497
Inadequate	Ref	Ref	Ref
Level of knowledge regarding IFA supplementation			
Adequate	0.582	1.79(0.852, 3.755)	.124
Inadequate	Ref	Ref	Ref
Dietary intake			
Adequate	–0.110	0.89(0.455, 1.763)	.751
Inadequate	Ref	Ref	Ref

Ref: reference category. AOR: adjusted odds ratio; CI: confidence interval.

encouraged to have early ANC and to continue to do so throughout the course of the pregnancy.

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Disclaimer

The views submitted in the article are that of the authors'

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