

Factors Influencing Folic Acid and Iron Supplement Use Among Pregnant Women at Hoima Regional Referral Hospital in Uganda

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ABSTRACT

The study sought to assess adherence levels to Folic Acid and Iron supplementation among expectant women attending antenatal care at Hoima Regional Referral Hospital. Findings revealed a 58.8% adherence rate among pregnant mothers. Among adherents, the majority were younger than 30, Christians, rural residents, cohabiting, had primary education, and were homemakers. Notably, only a minority were experiencing their first pregnancy. Regarding awareness and advice, a significant percentage knew about the preventive benefits of Iron-folic acid supplements against anemia, had received advice on supplementation benefits and the necessity of not missing doses. However, awareness about the specific benefits, dosage, and sources of folic acid and iron was limited. While most attended early ANC visits, only a fraction knew about folic acid benefits and sources, the correct dosage, or foods containing folic acid. Additionally, just over half met the recommended ANC visit frequency. Factors influencing adherence were largely tied to demographics such as age, religion, residence, partnership status, education, and employment, alongside knowledge gaps about supplementation benefits and dosages. Conversely, behaviors like alcohol intake, late or infrequent ANC attendance, and negative experiences during ANC acted as barriers to adherence.

Keywords: Pregnancy, Anaemia, Antenatal Care, Folic acid, Iron supplementation.

INTRODUCTION

Pregnancy is a period of a significant increase in iron requirement over and above the non-pregnant state [1, 2]. Although iron requirements are reduced in the first trimester because of the absence of menstruation, they rise steadily thereafter from approximately 0.8 mg per day in the first month to approximately 10 mg per day during the last 6 weeks of pregnancy [3]. The increased iron requirement is due to the expansion of maternal red blood cell mass for increased oxygen transport, including the transfer of iron, to both the growing fetus and the placental structures, and as a needed reserve for blood loss and lochia at parturition [4]. Due to increased iron requirements, pregnancy is also a period

of increased risk for anaemia, thus, a high proportion of women become anaemic during pregnancy [5, 6]. Anaemia is diagnosed as a haemoglobin concentration of less than 11 g/dl for mild anaemia, between 7-9.9 g/dl for moderate anaemia, and less than 7g/dl considered as severe anaemia [7-9]. The World Health Organization recommends, as a part of antenatal care (ANC) programs, a standard daily oral dose of 30-60 mg iron and 400 µg folic acid supplements to begin as early as possible and continue throughout pregnancy [10, 11]. Getachew *et al.* [12] stated that daily Folic Acid and Iron Supplementation reduces anemia and various adverse obstetric outcomes such as preterm delivery, low birth weight,

hemorrhage, perinatal and maternal morbidity, and mortality, lowered resistance to infection, poor cognitive development and reduced maternal work capacity. Globally, anaemia due to folic acid and iron is still a public health problem affecting nearly two billion people [13, 14]. According to the World Health Organization (WHO) report, 38.2% of global and 46.3% of African region pregnant women are affected by anaemia [15]. Despite vulnerability across the population, anaemia is prevalent in pregnant women (> 40%) and young children because of the increased demand for iron-folic acid (IFA) [12]. The World Health Organization (WHO) has recommended that all pregnant women take a standard dose of 30-60 mg of elemental iron along with 400 µg of folic acid daily for the first 6 months [10, 11]. Additionally, in areas where the prevalence of anaemia is over 40%, the WHO recommends postpartum supplementation for 3 months [4]. Evidence from developing countries suggests that the outcome of antenatal IFA supplementation programs is influenced by the behaviour of the pregnant women and the healthcare providers. The pregnant women reported they forgot or were unwilling to take the supplements, while healthcare providers gave inadequate counseling and distribution of iron tablets [16]. In low- and middle-income countries (LMIC), a high proportion of pregnant women suffer from anaemia mainly due to poor adherence to the daily iron-folic acid regimen [4, 17]. Uganda is among countries where there are very high levels of anaemia due to iron and folic acid deficiency among women of

reproductive age (15-49 years) and pregnant women irrespective of the available interventions to arrest it [18]. According to the 2006 Uganda Demographic and Health Survey (UDHS), 49.0% of Ugandan women aged 15-49 years were anaemic (Hb <12.0 g/dL), while 64.4% of those pregnant had sub-optimal haemoglobin (Hb) levels (Hb <11.0 g/dL) [19]. Concerning the research done at Mulago National Referral Hospital by Kiwanuka *et al.* [20], about 12% (11.6%) of the mothers attending the antenatal clinic adhered to iron supplements over 30-day period, mothers, who had had four or more antenatal visits before the survey, had more than 2 week supply of iron supplements in the previous visit, prior health education, were more likely to adhere to iron supplements. Inadequate drug supplies and fear of side effects were the main reasons why participants missed the iron supplements. In Hoima District, little research has been done about the adherence of mothers to folic acid and iron supplementation among pregnant women, and yet maternal anaemia is at an increase, no publications have so far been made, thus a need for this research. Hoima District is one of the districts of Uganda with high levels of maternal death some of whom are due to anaemia from iron and folic acid deficiency irrespective of their availability, an indication of either poor adherence and/or other related factors, this research will therefore intend to undertake a comprehensive study into folic acid and iron supplementation at the maternal child health clinic at the Hoima regional referral hospital.

METHODOLOGY

Study Design

This was a descriptive cross-sectional study. It involved the use of quantitative data and qualitative collection methods. Survey questionnaires were administered to the respondents.

Area of Study

The study was carried out in the Maternal-Child Health Clinic of Hoima Regional Referral Hospital; commonly known as Hoima Hospital located in Hoima District,

Western Uganda; approximately 200 kilometers (120 mi)., by road, northwest of Kampala, Uganda's capital and largest city. The coordinates are 1°25'40.0"N, 31°21'16.0" E (Latitude: 1.427778; Longitude: 31.354444). It is the referral hospital for the districts of Bulisa, Hoima, Kibaale, Kiryandongo, and Masindi. It is a public hospital, funded by the Uganda Ministry of Health and general care in the hospital is free. It is one of the thirteen

(13). Regional Referral Hospitals in Uganda. The hospital is designated as one of the fifteen (15). Internship Hospitals in Uganda where graduates of Ugandan medical schools can serve one year of internship under the supervision of qualified specialists and consultants. The bed capacity of Hoima Hospital is quoted as 280, in 2013. Of the 337 gazette staff positions, only 251 were filled as at March 2011, leaving 85 vacant positions.

Study Population

The study population consisted of all pregnant women attending ANC at the Maternal-Child Health Clinic of Hoima Regional Referral Hospital.

Inclusion criteria

All pregnant women attending ANC at Hoima Regional Referral Hospital gave informed consent after explaining to them the purpose of the study and its ethical considerations.

Exclusion criteria

All critically ill pregnant women attending ANC at Hoima Regional Referral Hospital and those not critically but did not give informed consent after explaining to them the purpose of the study and its ethical considerations.

Sample Size Determination

The sample size was determined using the Kish-Leslie [21] formula: $n = z^2 p (1-p) / E^2$; Where n = Estimated minimum sample, size required

$P = 54.1\%$ based on a study in Ethiopia by Boti *et al.* [22],

$Z = 1.96$ (for 95% Confidence Interval)

$e =$ Margin of error set at 5%

$$n = 1.96^2 \times \frac{0.541(1 - 0.541)}{0.05^2}$$

$$n = 0.9539422704$$

$$0.0025$$

$$n = 381.57690816.$$

However, using the "Finite Population Correction for Proportions" formula

$$n = \frac{n_1}{1 + \left[\frac{n_1 - 1}{N} \right]}$$

where;

N is the population size (for this case number of patients at the hospital, e.g. 100 per day) and n_1 is the sample obtained above;

$$\text{Sample size was;} \quad \frac{381.57690816}{4.8057690816} = 79.39975926453803$$

Thus 80 participants were used.

Sampling Procedures

A simple random sampling method was used to get respondents to avoid bias. Small pieces of paper were written on numbers from 1 to 10 and whoever picked an even number and consented was allowed to participate in the study.

Data Collection Methods and Management

The data collection involved a face-to-face interview using a structured questionnaire.

Data Analysis

Data analysis was conducted using SPSS statistical software. Exploratory data techniques were used at the initial stage of analysis and cover the structure of data and identify outliers or unusual entered values. Quantitative data was coded and processed using SPSS version 22.0.

Descriptive statistics such as frequencies were used to summarize, organize, and simplify the data that was collected. Quantitative data was presented using frequency tables. The qualitative data generated from the interview and observation guide was categorized into themes by research objectives and was reported in a narrative form along with quantitative presentation and was used to enforce the quantitative data.

Quality Control

Research assistants were oriented on the data collection process before the actual collection. The research tools were pretested before data collection and used a biostatistician in the analysis of data.

Ethical Consideration

Prospective respondents were briefed about the study, including their rights to refuse participation, to opt out at any time, and not to answer specific questions (Aday & Cornelius, [23]) without incurring any negative consequences. Those who agreed to participate in the study signed consent forms. All data that was obtained was treated confidentially and no names or addresses were recorded on the questionnaires, research reports, or any other documents. Respondents provided

answers voluntarily and were not coerced or remunerated in any way. Permission to carry out the research was sought from The Institutional Research and Ethics

Committee (IREC) of Kampala International University as well as the university administration.

RESULTS

The level of adherence to Folic Acid and Iron Supplementation among pregnant women at Hoima Regional Referral Hospital.

The adherence to folic acid and iron supplementations stood at 58.8% among pregnant mothers at Hoima Hospital.

The effect of social-demographic factors on the adherence to folic acid and iron supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

According to the study findings, majority 24(51.1%), 40(85.1%), 32(68.1%), 33(70.2%),

38(80.9%) and 34(72.3%) of those adherent to folic acid and iron supplementations were <30 years of age, Christian by religion, from rural residence, living with their Partners, at most accomplished primary level of education and Housewives/farmers by occupation respectively. While only 14(29.8%) pregnant mothers were in for their first pregnancy. However, avoiding alcohol (P-value 0.006*) was found to significantly affect adherence to folic acid and iron supplements among the pregnant mothers at Hoima Regional Referral Hospital.

Table 1: The cross tabs of social-demographic factors on the adherence to folic acid and iron supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

Variable	Adherent to Folic acid and iron Supplementations		TOTAL N (%)	P-Value	OR [95% C.I]
	Yes N(%)	No N(%)			
Age (years)					
<30	24(51.1%)	17(51.5%)	41(51.2%)	0.968	0.98(0.40-2.39)
≥30	23(48.9%)	16(48.5%)	39(48.8%)	Ref	1
Religion					
Christian	40(85.1%)	25(75.8%)	65(81.2%)	0.292	1.83(0.59-5.66)
Moslem	7(14.9%)	8(24.2%)	15(18.8%)	Ref	1
Residence					
Urban	15(31.9%)	8(24.2%)	23(28.8%)	0.455	1.47(0.54-4.00)
Rural	32(68.1%)	25(75.8%)	57(71.2%)	Ref	1
Marital Status					
Living alone	14(29.8%)	7(21.9%)	21(26.6%)	0.435	1.52(0.53-4.31)
Living with Partner	33(70.2%)	25(78.1%)	58(73.4%)	Ref	1
Education level					
≤ Primary	38(80.9%)	21(65.6%)	59(74.7%)	0.127	2.21(0.79-6.19)
≥ Secondary	9(19.1%)	11(34.4%)	20(25.3%)	Ref	1
Occupation					
Housewife/farmer	34(72.3%)	22(68.8%)	56(70.9%)	0.730	1.19(0.45-3.18)
Businesswoman	13(27.7%)	10(31.2%)	23(29.1%)	Ref	1
Takes Alcohol					
Yes	2(4.3%)	8(25.0%)	10(12.7%)	0.006*	0.13(0.03-0.68)
No	45(95.7%)	24(75.0%)	69(87.3%)	Ref	1
First pregnancy					
Yes	14(29.8%)	15(46.9%)	29(36.7%)	0.122	0.48(0.19-1.22)
No	33(70.2%)	17(53.1%)	50(63.3%)	Ref	1

* Significant, P-Value=<0.05; OR=Odds Ratios; Ref=Reference category

The influence of knowledge on the adherence to folic acid and iron supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

According to the study findings, the majority of the adherents 45(97.8%), 46(97.9%), 37(90.2%) agreed to have known before that Iron-folic acid supplements prevent anaemia (P-value=<0.001*), had advised taking folic acid tablets and iron supplements (P-value=<0.001*) as well as their benefits (P-value=0.003*), and told

not to miss any dose respectively. Similarly, having ever had a premature birth (P-Value=0.025*), and knowing the correct dosage of folic acid (P-value=0.036*), were statistically significant. However, only 30(63.8%) knew the benefits of folic acid and iron supplementation, 6(12.8%) were aware of the dosage of folic acid, 17(36.2%) knew the foods containing folic acid yet 42(89.4%) went for ANC early at <16 weeks and only 30(63.8%) had gone ≥4 times for ANC.

Table 2: The cross tabs of knowledge influence on the adherence to folic acid and iron supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

Variable	Adherent to Folic acid & Iron Supplementations		TOTAL N (%)	P-Value	OR [95% C.I]
	Yes N(%)	No N(%)			
I have always known that Iron-folic acid supplements prevent anaemia					
True	45(97.8%)	17(54.8%)	62(80.5%)	<0.001*	37.06(4.52-303.87)
False	1(2.2%)	14(45.2%)	15(19.5%)	Ref	1
I take them because they are for free, otherwise, I would not					
True	15(31.9%)	12(37.5%)	27(34.2%)	0.607	0.78(0.30-2.01)
False	32(68.1%)	20(62.5%)	52(65.8%)	Ref	1
The health worker advised me to take the tabs as well as telling me about the benefits of their use					
True	46(97.9%)	16(50.0%)	62(78.5%)	<0.001*	46.00(5.64-375.21)
False	1(2.1%)	16(50.0%)	17(21.5%)	Ref	1
Someone always reminds me to take the tabs.					
True	0(0.0%)	2(6.9%)	2(2.6%)	0.068	2.74(2.03-3.70)
False	47(100.0%)	27(93.1%)	74(97.4%)	Ref	1
I take the tab whenever am taking other drugs					
True	12(29.3%)	9(32.1%)	21(30.4%)	0.799	0.87(0.31-2.47)
False	29(70.7%)	19(67.9%)	48(69.6%)	Ref	1
Told not to miss any dose					
True	37(90.2%)	17(60.7%)	54(78.3%)	0.003*	5.99(1.66-21.54)
False	4(9.8%)	11(39.3%)	15(21.7%)	Ref	1
Ever had a premature birth					
Yes	4(8.5%)	9(27.3%)	13(16.2%)	0.025*	0.25(0.07-.89)
No	43(91.5%)	24(72.7%)	67(83.8%)	Ref	1
Ever heard of folic acid					
Yes	31(66.0%)	15(46.9%)	46(58.2%)	0.091	2.19(0.88-5.51)

No	16(34.0%)	17(53.1%)	33(41.8%)	Ref	1
Knows the benefits of folic acid supplementation					
Yes	30(63.8%)	14(43.8%)	44(55.7%)	0.078	2.27(0.91-5.68)
No	17(36.2%)	18(56.2%)	35(44.3%)	Ref	1
Aware of correct dosage of Folic acid					
Yes	6(12.8%)	0(0.0%)	6(7.6%)	0.036*	1.78(1.45-2.18)
No	41(87.2%)	32(100.0%)	73(92.4%)	Ref	1
Knows the foods containing folic acid					
Yes	17(36.2%)	10(31.2%)	27(34.2%)	0.651	1.25(0.48-3.24)
No	30(63.8%)	22(68.8%)	52(65.8%)	Ref	1
Gestation age at 1st ANC visit					
<16 weeks (early)	42(89.4%)	26(81.2%)	68(86.1%)	0.307	1.94(0.54-6.99)
≥16 weeks (late)	5(10.6%)	6(18.8%)	11(13.9%)	Ref	1
ANC attendance altogether					
<4 times	17(36.2%)	14(43.8%)	31(39.2%)	0.498	0.73(0.29-1.82)
≥4 times	30(63.8%)	18(56.2%)	48(60.8%)	Ref	1

* Significant, P-Value=<0.05; OR=Odds Ratios; Ref=Reference category

DISCUSSION

The level of adherence to Folic Acid and Iron Supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

The adherence to folic acid and iron supplementations stood at 58.8% among pregnant mothers attending ANC at Hoima Regional Referral Hospital. This is higher compared to findings by Boti *et al.* [22] in which it was concluded that from Burji district, one of the five districts in the Segen area of Ethiopia, 51.4% of pregnant women adhered to FAIS; taking ≥4 tablets per week or consuming 20 tablets in a month daily without missing the prescribed doses. This value was also higher compared to a study conducted at Debre Tabor General Hospital, Ethiopia, by Gebremariam *et al.* [24], where adherence to FAIS among pregnant women was low (44%) and was adherent to FAIS. This improvement could be attributed to a considerable level of sensitization where goal-oriented ANC has been on the rise thus enabling the mothers to acquire thorough sensitization on the use and

benefits of folic acid and iron supplementation during pregnancy. However, this is lower than the findings by Ibrahim *et al.* [25] in which it was concluded that 63.3% of the pregnant mothers were adherent to folic acid and iron. Similarly, it was earlier reported that Kenya adopted the global Folic Acid and Iron Supplementation intervention with a target of 80% coverage, in Kiambu county, Kenya, but the adherence and compliance are still not promising [26].

The impact of social-demographic factors on the adherence to folic acid and iron supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

According to the study findings, the majority of those adherent to folic acid and iron supplementations were <30 years of age Christian by religion, from rural residence, and living with their Partners. This complements a recent study carried out at the University of Gondor Hospital, Ethiopia by Birhanu *et al.* [15] in which it was stipulated that mothers who had

husbands were more likely to comply with their supplements compared to their single counterparts. However, in this study, higher adherence was among the mothers who had at most accomplished primary level of education but were Housewives/farmers by occupation. This contradicts Passarelli *et al.* [27] who showed that a higher level of education had a positive association with adherence to folic acid supplement therapy. This could be because as one studies more, higher knowledge is acquired as well as the potential effect of education on self-care behaviours, the more educated mothers are, the more likely to meet their needs during pregnancy and, thus, more likely to adhere to the folic acid and iron supplementation. Thus a study by Mbule *et al.* [18] adds that maternal education status had a significant association with adherence to Folic acid and Iron supplementation. Pregnant women who had secondary and above education were nearly 2.5 times more likely to adhere to FAIS than those pregnant women who had primary education. Similarly, it was revealed that taking alcohol was significantly preventive with 0.13 odds of adherence to folic acid and iron supplements among the pregnant mothers at Hoima Regional Referral Hospital.

The influence of knowledge on the adherence to folic acid and iron supplementation among pregnant women attending ANC at Hoima Regional Referral Hospital.

According to the study findings, the majority of the adherents agreed to have known before those Iron-folic acid supplements prevent anaemia and these were 37.06 times more likely to adhere. This is in line with an earlier study by Nisar *et al.* [16] Burji district, where it was demonstrated that pregnant women who had good knowledge of FAIS were nearly 2 times more likely to adhere to FAIS. This could be due to stipulations as recently put forth by Boti *et al.* [22] that knowledge helped women to have a good perception of the benefits of taking iron tablets. Similarly, those who had been advised to take folic acid tablets and iron

supplements as well as told their benefits had 46.00 odds of adherence. Also, having been told not to miss any dose, pregnant mothers were 5.99 times more likely to adhere to folic acid and iron supplements among the pregnant mothers at Hoima Regional Referral Hospital. This complements a study by Ibrahim *et al.* [25], in which, it was demonstrated that only 45.6% of pregnant women in the study sample had correct knowledge about folic acid. Only 37.8% knew the benefits of folic acid, and 46.7% had satisfactory knowledge about folic acid. Thus knowing the correct dosage of folic acid had 1.78 odds of adherence; as shown in the current study. However, a study by Mbule *et al.* [18], concluded that only a small proportion of pregnant women could positively identify some food rich in iron. Organ meat and red meat were rarely known to be rich sources of iron, the low levels of awareness about these aspects could, therefore, be attributed to low ANC attendance by pregnant women, and consequently low adherence. In the current study; only a few of the pregnant mothers knew the benefits of folic acid and iron supplementation, its dosage, and the foods containing folic acid despite having gone for ANC early at <16 weeks and only gone ≥ 4 times for ANC. This complements studies by Birhanu *et al.* [15] and Boti *et al.* [22], in which adherence was better among pregnant women who were early registered for antenatal care service as compared to late registered women, especially as early as ≤ 16 weeks for ANC were 2.49 times more likely to have adhered to FAIS than those who had later. Also, Getachew *et al.* [12], in their study, found that having ≥ 4 ANC visits was associated with increased adherence as compared to those mothers who had <4 visits. Furthermore, based on the study that was conducted at Mulago National Referral Hospital, mothers were found not to get enough iron supplements to last them till the next visit thus less likely to adhere to the supplements as prescribed [20]. Similarly, having ever had a premature birth was statistically significant and preventive from adherence by 0.25 odds. This complements a study by

Mbule *et al.* [18], in which it was concluded that limited knowledge about the negative outcomes of anaemia interferes with ANC

The adherence to folic acid and iron supplementations stood at 58.8% among pregnant mothers at Hoima Hospital. This is critical with socio-demographics, especially being <30 years of age, Christian by religion, from rural residence, living with their Partners, at the most accomplished primary level of education, and Housewives as well as knowledge of the importance, dosage of folic acid, correct dosage, food sources and advise and emphasis to adhere. However, alcohol intake late and limited attendance for ANC as well as a bad experience after having attended ANC prevented many from adhering to folic acid and iron supplementation.

Recommendations

The stakeholders should ensure that there is a thorough sensitization and more education concerning the benefits of adherence and the associated

attendance, IFA use, dietary practices, and the use of anti-helminths medicine.

CONCLUSION

disadvantages of poor or failure to adhere to drugs especially folic acid and iron supplementations during pregnancy. The healthcare givers too should be increased in numbers at the antenatal care clinic and if possible at community levels; and emphasized to thoroughly work on these pregnant mothers; encouraging them on how to carry on with their pregnancy including avoidance of alcohol intake. The sensitization should also emphasize and aim at imparting more knowledge of the importance, and dosage of folic acid, correct dosage, and food sources and advise couples to offer support and if possible accompany them on some ANC visits to get to know or be counseled on how to deal with their partners during pregnancy and as well remind them to adhere to folic acid and iron supplements where necessary.

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