

Adherence to Iron-Folic Acid Supplementation and Associated Factors among Antenatal Care Attendants in Public Health Institutions: The Case of Borena District, Amhara, Ethiopia: Cross-Sectional Study

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Abstract: *Introduction:* Globally, iron deficiency is estimated to be responsible for half of all anemia cases. The reduction of iron deficiency anemia in pregnant women relies largely on their adherence to IFA supplementation. This study aimed to assess the factors associated with adherence to IFA supplementation among women attending antenatal checkups at health centers in Borena district, Ethiopia.

Methods: Institution-based cross-sectional study design was conducted on 348 pregnant women. The data were analyzed using SPSS version 20. Variables with a p-value of ≤ 0.2 in the univariable logistic regression analysis were included in the multivariable analysis. Adjusted odds ratio with 95% confidence interval was reported, and variables with $p < 0.05$ were considered statistically significant.

Result: A total of 340 pregnant women were enrolled. The study revealed that 45.6% (95% CI: 40.27, 50.92%) of women adhered to the IFA supplement use. Women of husbands with primary education [AOR: 1.95; 95% CI: 1.07, 3.57] and who had taken IFA for two months [AOR: 2.81; 95% CI: 1.37, 5.79] were positively associated with adherence to IFA supplementation. However, women with a previous history of abortion [AOR: 0.16; 95% CI: 0.50, 0.53], who had disease other than anemia [AOR: 0.48; 95% CI: 0.28-0.79] and lack of family support [AOR: 0.12; 95% CI: 0.04, 0.39] were less likely to adhere to the supplement.

Conclusion: This study revealed that nearly nine in twenty women adhered to the IFA supplement. Therefore, strengthening nutritional counseling, health education, and information on iron-folic acid supplementation in a health institution is important to improve adherence.

Keywords: Adherence, supplementation, Iron, folic acid, pregnant.

INTRODUCTION

Anemia is a condition marked by low levels of hemoglobin in the blood. It affects approximately 25% of people globally. In Ethiopia, 57% of children aged 6-59 months suffered from anemia, where 25% of children were classified with mild anemia, 29% with moderate anemia, and 3% with severe anemia. The magnitude of anemia among children in the Amhara region is 42%. In addition, 24% of women among women aged 15-49 in Ethiopia are anemic [1]. Twenty percent of maternal deaths in the world are attributed to anemia [2].

Iron is a key component of hemoglobin, and globally iron deficiency is estimated to be responsible for half of all anemia [1]. It is the leading single nutrient deficiency to cause anemia, particularly in developing countries.

Iron-deficiency anemia affects more women than men; up to 5% of childbearing age women develop iron deficiency anemia. The risk of iron deficiency anemia is highest in pregnant women; it affects one in six pregnant women. Iron deficiency anemia contributes to low birth weight, lowered resistance to infection, poor cognitive development, and reduced work capacity [3].

During pregnancy, women are at a higher risk of anemia due to an increase in blood volume. To prevent anemia, pregnant women are advised to take iron-folic acid supplements, eat iron-rich foods, and prevent intestinal worms. Iron-folic acid deficiency at conception and in early pregnancy is associated with an increased risk of neural tube defects, preeclampsia, spontaneous abortion, fetal death, fetal growth restriction, and preterm delivery [4, 5].

However, according to the recent Ethiopian demographic and health survey, about 58% of women did not take iron tablets during pregnancy. Only 5% of women took iron tablets for 90 days or more [1]. The 2019 Ethiopian Mini Demographic and Health Survey

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revealed that 60% of women took iron-folic acid (IFA) tablets during pregnancy, and 11% took them for the recommended period of 90 or more days. In Amhara regional state, 73.8% of women took IFA during pregnancy, and only 15.4% took it for 90 or more days [6].

The reduction of iron deficiency anemia in pregnant women relies largely on their adherence to IFA supplementation [7, 8]. According to the WHO, the recommended dose is 60mg/day for iron and 400µg/day of folic acid for 90 consecutive days [2]. Therefore, this study aimed to assess the level of adherence and associated factors to prenatal IFA supplementation among pregnant women who had attended ANC in public health centers at Borena district in South Wollo Zone, Ethiopia.

METHODS

Study Design and Setting

The institution-based cross-sectional study design was conducted at Borena district of Ethiopia in January 2017. The district is located 581 km from the capital Addis Ababa. The district's total population was estimated as 185,399, where 50.5% were females. There are seven health centers in the district.

Study Population and Sampling Technique

A sample size of 348 was determined using a single population proportion formula by considering a 28.9% rate of adherence to IFA supplementation in the northwestern zone of Tigray [4], 95% confidence level, 5% margin of error (d), and a non-response rate of 10%. Then, all seven health centers in the district were included in the study. Accordingly, 814 women were expected to attend second and above ANC checkups in all health centers. Then, the sample size was allocated to each health center using the proportional to population size technique. Pregnant women who were taking IFA tablets in the previous ANC checkup(s) and came at least for the second visit were included in the study. The study participants were selected by systematic random sampling technique. The first participant was chosen randomly by the lottery method. However, women who were seriously ill at the time of data collection were excluded.

Study Variables

The dependent variable was adherence to iron-folic acid supplementation. It was defined as consuming at

least 70% of the expected dose of iron-folic acid tablets in the previous week before the study, which is equivalent to consuming at least five tablets per week, was considered adhered/compliant iron-folic supplement. The respondents who consumed less than five IFA tablets were considered not adhering [9].

The independent variables were:

- socio-demographic (i.e., maternal age, marital status, residence, educational status, occupational status, family size, family monthly income),
- obstetric factors (i.e., gravidity, parity, gestational age, number of ANC visits),
- maternal knowledge status (i.e., knowledge about anemia and benefits of taking IFA tablets),
- family support,
- the existence of health problems other than anemia and perceived side effects.

A woman was considered to have good knowledge of anemia when she was aware of anemia and knew at least one of its major causes, symptoms, consequences, risk group, and prevention methods during pregnancy [9]. A woman was considered to have good knowledge of the benefits of iron-folic acid when she had answered 75% of the questions correctly. In contrast, those who answered two or less were considered as having poor knowledge [10].

Data Collection Procedures and Quality Control Methods

Data were collected using a structured and pre-tested questionnaire adapted from the EDHS 2011 [11] and published literature (Amharic version). The questionnaire was first developed in English, then translated into the local language (Amharic). Seven grade twelve students and seven nurses who can speak the local language were recruited as data collectors and supervisors. The data collectors and the supervisors were trained for two days by the investigators on the purpose of the study and interviewing techniques.

Data Management and Analysis

The data were checked for completeness and consistency. Moreover, the data were coded, entered, cleaned, and edited using Epi-data. Then, it was exported to SPSS version 20 for statistical analysis. Descriptive statistics were computed, and variables

having a p-value of ≤ 0.2 in the univariable logistic regression analysis were included in the multivariable analysis. Adjusted odds ratio with 95% confidence interval was reported, and variables with $p < 0.05$ were considered statistically significant.

Ethical Consideration

The study was approved by the Institutional Review Committee (IRC) of Bahirdar University. A support letter was obtained from Amhara Health Bureau and the district health office. Then, informed consent was secured from study participants after explaining the purpose of the study, potential risks, the benefits, and the right to withdraw. Confidentiality was assured throughout the research process.

RESULTS

Socio-Demographic Characteristics of the Study Participants

A total of 340 pregnant women were enrolled in this study, with a response rate of 97.7%. The mean (\pm SD) age of the study participants was 27.11(\pm 5.78) years. Almost nine in ten (87.9%) were rural residents, and around half of the pregnant women (49.7%) were Ethiopian Orthodox by religion. Almost all (99.4%) were currently married. About 62.1% of women were housewives, and 69.1% were illiterate (Table 1).

Obstetric and Medical History of the Study Participants

About 74% of women were multigravida, and more than half (51.2%) were multiparous. Only 3.2% of the study participants were in the first trimester (Table 2).

Self-Reported IFA Adherence of IFA among the Study Participants

Nearly 61% of the study participants started IFA tablets in the first trimester, and only 0.9% of women had received IFA supplements during the first month of pregnancy. This study revealed that 45.6% (95% CI: 40.27, 50.92%) of mothers adhered to the IFA supplement use. More than half (51.8%) of the respondents reported the IFA supplement's side effects (Table 3).

Factors Associated with Adherence to Iron-Folic Acid Supplementation

On univariable logistic regression analysis; maternal (education and occupational status), husband (education and occupational status), family monthly income, parity, history of stillbirth, history of abortion, gestational ages of mothers, ANC checkup, diagnosis

Table 1: Socio-Demographic Characteristics of Pregnant Women Attending Antenatal Care at Borena District, Ethiopia, 2017 (n=340)

Variables	Frequency	Percent
Age (in years)		
15-19	26	7.6
20-34	264	77.6
35-49	50	14.7
Marital status		
Currently married	338	99.4
Currently unmarried	2	0.6
Religion		
Orthodox	169	49.7
Muslim	167	49.1
Protestant	4	1.2
Residence		
Rural	299	87.9
Urban	41	12.1
Family size		
1-3	169	49.7
4-7	159	46.8
≥ 8	12	3.5
Educational status of the mother		
No education	235	69.1
Primary	66	19.4
Secondary	18	5.3
Tertiary and above	21	6.2
Occupational status of the mother		
Housewife	211	62.1
Farmer	87	25.6
Merchant	30	8.8
Others*	12	3.5
Educational status of husband (n=338)		
No education	181	53.6
Primary	78	23.1
Secondary	38	11.2
Tertiary and above	41	12.1
Occupational status of husband (n=338)		
Farmer	240	71.0
Merchant	56	16.6
Daily laborer	35	10.4
Others*	7	2.1
Monthly income (ETB)		
500	9	2.6
501-1000	87	25.6
>1000	244	71.8

*Private employee and student.

of any disease other than anemia, knowledge on anemia and IFA tablets, and family support to take IFA

were statistically significant at a p-value of <0.2 and included in multivariable logistic regression. The final model revealed that husband education, history of abortion, a disease diagnosed other than anemia, duration of IFA tablet intake, and family support to take IFA tablet were associated with adherence to IFA supplement use.

Table 2: Obstetric and Medical History of Pregnant Women Attending Antenatal Care in Borena District, Ethiopia, 2017 (n=340)

Variables	Frequency	Percent
Gravidity		
Primigravida	89	26.2
Multigravida	251	73.8
Parity		
Nullipara	90	26.5
Primipara	76	22.4
Multipara	174	51.2
History of abortion	20	5.9
History of stillbirth	10	2.9
Number of ANC visits		
2-3	310	91.2
≥4	30	8.8
ANC starting time		
First trimester	211	65
Second trimester	118	34.7
Third trimester	1	0.3
Gestational age (GA) of mothers		
First trimester	11	3.2
Second trimester	179	52.6
Third trimester	150	44.1
Disease diagnosis other than anemia		
Yes	217	63.8
No	123	36.2

Women of husbands with primary education [AOR: 1.95; 95% CI: 1.07, 3.57] were about two times more likely to adhere to IFA supplement use compared to those without formal education. Women with a previous history of abortion [AOR: 0.16; 95% CI: 0.50, 0.53] were 84% less likely to adhere to IFA supplement use as than women without a history of abortion. Mothers who had any disease diagnosis other than anemia [AOR: 0.48; 95% CI: 0.28-0.79] were about 52% less likely to adhere to IFA supplement use than those who

Table 3: Maternal Knowledge on Anemia, Benefits of IFA Tablets, and Self-Reported Adherence of IFA among Pregnant Women Attending Antenatal Care at Borena District, Ethiopia, 2017 (n=340)

Variable	Frequency	Percent
Advised about IFA		
Yes	320	94.1
No	20	5.9
Obtain 90 IFA tablets		
Yes	331	97.4
No	9	3.6
Knowledge about anemia		
Good knowledge	219	64.4
Poor knowledge	121	35.6
Knowledge about IFA		
Good knowledge	318	93.5
Poor knowledge	22	6.5
Initiation of IFA		
First trimester	207	60.9
Second trimester	131	38.5
Third trimester	2	0.6
Duration of IFA intake (days)		
30	71	20.9
60	105	30.9
≥90	164	48.2
Adherence to IFA supplement use		
Adherence	155	45.6
Non-adherence	185	54.4
Reason for non-adherence (n=185)		
Fear of side effects	176	95.1
Lack of family support	32	17.3
Too many pills	68	36.8
Forget fullness	176	95.1
Fear of having a big baby	18	9.7
Unpleasant tastes	46	24.9
Perceived side effect of IFA (n=176)		
Nausea and vomiting	136	77.3
Gastric upset	41	23.3
Heartburn	106	60.2
Diarrhea	7	4.0
Constipation	18	10.2

were not diagnosed. Pregnant mothers who had taken IFA for two months [AOR: 2.81; 95% CI: 1.37, 5.79]

Table 4: Univariable and Multivariable Logistic Regression Analysis on the Predictors of IFA Adherence among Women Attending Antenatal Checkups in Borena District, Ethiopia, 2017 (n=340)

Variables	Adherence to IFA supplement		COR (95% CI)	AOR (95% CI)
	Adherence	Non-adherence		
Husband education				
No education	73	110	1.00	1.00
Primarily	45	33	0.49(0.28, 0.83)*	1.95(1.07, 3.57)*
Secondary	10	28	1.86(0.85, 4.06)	0.64(0.27, 1.54)
Tertiary and above	27	14	0.34(0.17, 0.70)*	2.15 (0.98, 4.69)
History of abortion				
Yes	15	5	0.26(0.09, 0.73)*	0.16(0.05, 0.53)*
No	140	180	1.00	1.00
Having disease other than anemia				
Yes	108	109	0.62(0.39, 0.98)*	0.48(0.28, 0.79)*
No	47	76	1.00	1.00
How many months taking IFA				
One month	21	50	1.00	1.00
Two months	52	53	0.43(0.23, 0.81)*	2.81(1.37, 5.79)*
Three and above months	82	82	0.42(0.23, 0.76)*	1.907(0.96, 3.78)
Family support to take IFA				
Yes	151	157	1.00	1.00
No	4	28	0.15(0.05, 0.43)*	0.12 (0.04, 0.39)*

^{1.00}Reference. *Significant at p-value <0.05.

were about three times more likely to adhere to IFA supplement use compared to those who had taken IFA for one month. Women who had not received family support [AOR: 0.12; 95% CI: 0.04, 0.39] were less likely to adhere to the IFA supplement as compared to those who received the support (Table 4).

DISCUSSION

This study revealed that 45.6% of pregnant women had adhered to iron-folic acid supplementation and is relatively consistent with the findings at Debre-Tabor General Hospital of Ethiopia [12], Egypt [3], Cambodia [7], and Malaysia [13]. However, it is higher than the findings from Tigray (37.2%) [4], Northwest Ethiopia (20.4%) [14], South Ethiopia (39.2%) [15] and Addis Ababa (60%) [16]. On the other hand, the finding was lower than a study done in Northwest Ethiopia (55.3%) [17], Asella Town (59.8%) [18], and rural districts of Ethiopia (74.9%) [9]. The variation may be due to the difference in the accessibility of health services and geographic locations.

Women of educated husbands adhered more to IFA supplement use than women of uneducated husbands. The possible reason might be that educated husbands may have better knowledge about anemia and IFA supplementation. Hence, husbands will support their wives to take IFA by anticipating pregnancy outcomes. The finding was supported by findings at Addis Ababa [16], Tanzania [19], and Nepal [20].

This study found that a history of abortion can affect IFA supplementation. The study also revealed that women with disease diagnoses other than anemia were 52% less likely to adhere to IFA supplement use than those who did not have another disease. The finding was supported by a study done in Tanzania [19]. This study also revealed that pregnant mothers taking IFA for two months were about three times more likely to adhere to IFA supplement use than taking IFA for one month. The finding is consistent with other studies conducted in Cambodia [7] and the Philippines [21].

Women who had not received family support were less likely to adhere to IFA supplement use than those who received support. Likewise, in Adawa town of

Ethiopia, pregnant women who received partner support had higher odds of adherence to the supplement than those who lacked partner support [22]. The reason could be families may encourage and support pregnant mothers to take IFA supplements.

About 52% of mothers had experienced side effects, which is higher as compared to the finding in Cambodia (21%) [7], the Philippines (24.3%) [21], and Nepal (10%) [20]. This difference may probably result from getting inadequate counseling during the antenatal checkup.

CONCLUSION

This study revealed that pregnant women (45.6% (95% CI: 40.27, 50.92) adhered to the IFA supplement. Having a history of abortion, husband education, having disease diagnosis other than anemia, duration of IFA tablet intake, and family support was an independent predictor of adherence to IFA supplement. Therefore, strengthening family support to pregnant mothers will be important to improve adherence to iron-folic acid supplementation. It is also better if health facilities strengthen institutional counseling, health education, and information program on iron-folic acid supplementation. This study could be subjected to recall bias, which may over or underestimate the magnitude of adherence. Hence, further longitudinal study using pill count will be important to assess IFA adherence.

DECLARATIONS

Ethics Approval and Consent to Participate

The study was approved by the Institutional Review Committee (IRC) of Bahirdar University.

Consent to Publish

Not applicable.

Availability of Data and Materials

The findings were declared from the available data source. All possible required information is included in the manuscript. Moreover, raw data is available in the hand of the corresponding author. Coauthors gave full responsibility for the corresponding author to share and/or discuss with editors and reviewers.

COMPETING INTERESTS

No conflict of interest to declare.

FUNDING

No funding was received.

AUTHORS' CONTRIBUTIONS

SHA and EW conceived the study. SHA, EW, and MLL designed the study, performed the data analysis and interpretation. SHA supervised the data collection. MLL drafted and finalized the manuscript. All authors read and approved the final manuscript.

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Received on 10-12-2020

Accepted on 12-01-2022

Published on 11-03-2022

<https://doi.org/10.6000/1929-4247.2022.11.01.5>