Journal of Pregnancy and Child Health

Shewasinad and Negash, J Preg Child Health
2017, 4:3
DOI: 10.4172/2376-127X.1000335

Research Article OMICS International

Adherence and Associated Factors of Prenatal Iron Folic Acid Supplementation among Pregnant Women Who Attend Ante Natal Care in Health Facility at Mizan-Aman Town, Bench Maji Zone, Ethiopia, 2015

Sisay Shewasinad* **and Sophonias Negash**

Department of Medicine, Addis Ababa University, Ethiopia

***Corresponding author:** Shewasinad Sisay, Department of Medicine, Addis Ababa University, Ethiopia, Tel: 251911669861; E-mail: sisyehu@gmail.com

Received date: May 26, 2017; **Accepted date:** June 05, 2017; **Published date:** June 10, 2017

Abstract

Background: Globally, more than 25% of population is highly affected by anaemia. At least half of anaemia worldwide is because of Iron Folic Acid (IFA) deficiency, which is due primarily to a lack of dietary iron bioavailability or increased requirements such as pregnancy. IFA is also responsible for 95% of anaemia during pregnancy.

Objective: To assess Adherence And Associated Factors Of Prenatal Iron Folic Acid Supplementation Among Pregnant Women Who Attend Ante Natal Care In Health Facility At Mizan-Aman Town, Bench Maji Zone, Ethiopia, 2015.

Methods: A cross sectional facility based quantitative study complemented by in-depth interview of key informants was implemented. A total of 462 pregnant women from Ante natal clinics were studied from May 29, 2015-June 23, 2015.

Results: Among 462 pregnant women, the adherence level of IFA supplement was 326 (70.6%). The most reasons for adherence were clinician counselling, 280 (95.6%), believe that adherence increase their blood volume 56 (19%) and fear of illness 53 (18%).

Conclusion and recommendation: Adherence rate to iron-folic acid supplementation were medium. Comprehensive counselling should focus on the importance of adherence to iron folic acid supplements and duration of supplement utilization.

Keywords: Adherence; prenatal; Iron folic acid; Pregnant; Antenatal care

Introduction

Background

Iron folic acid (IFA) adherence is the extent to which patients take medication or condition of sticking to dose and time for taking iron/foliate supplements as prescribed by their health care providers or per recommendations [1,2]. Women are said to be adhered to iron/folic acid supplement if they took 65% or more of the supplement, equivalent to taking supplement at least 4 days a week [3,4].

Iron deficiency is due primarily to a lack of bio-available dietary iron [5,6] or increased requirements during childhood, pregnancy, post-partum periods [7]. Though Ethiopia has a wide range of agro-climatic conditions and grows a variety of cereals, root crops and vegetables, there is lack of dietary diversity, which results in a shortage of minerals and vitamins [8].

Iron supplementation program is a globally recommended intervention to overcome this problem since it is almost impossible to meet the need of iron during pregnancy just by dietary intake, as there should be another way [9].

Folic acid requirements are increased in pregnancy because of the rapidly dividing cells in the fetus and elevated urinary losses. Since neural tube closes by day 28 of pregnancy, it is recommended that, folic acid supplementation should be initiated as early as possible to decrease the risk of neural tube defects [10].

Anaemia refers to a condition in which the haemoglobin content of the blood is lower than normal as a result of a deficiency of one or more essential nutrients [11]. Globally, above 25% (around 2 billion) of population are highly affected by anaemia [12]. At least half of anaemia worldwide is due to iron deficiency [7]. with the rest due to conditions such as folate, vitamin B12 or vitamin A deficiency, chronic inflammation, parasitic infections and inherited disorders[10].

Globally Anaemia in pregnancy is estimated to be 41.8% [13]. It is around 24.1% in the Americas, 48.2% in South East Asia, 25.1% in Europe, 44.2% in East Mediterranean, 30.7% in West Pacific and highest in Africa at 57.1% [14]. Likewise, According to Ethiopian demographic and health survey, (EDHS) 2011 prevalence of anaemia in pregnant mothers was 22% in Ethiopia and in Addis Ababa, it is 9.3% [15].

Statement of the problem

Anaemia increases risk for maternal and child mortality and has negative consequence on the cognitive and physical development of

children, and on work productivity in adults [7]. Even if it affects all subpopulations, pregnant women are at a higher risk of anaemia [16].

Iron deficiency anaemia is the most and single common cause of anaemia in pregnancy and is responsible for 95% of anaemia during pregnancy reflecting the increased demands for iron in pregnancy [17].

In pregnancy, anaemia has a significant impact on the health of the fetus as well as that of the mother. 20% of maternal deaths in Africa have been attributed to anaemia [18].

IFA deficiency anaemia contributes adverse effects on mother and child health. Daily oral IFA supplementation is recommended as part of the Antenatal care to reduce the risk of low birth weight, maternal anaemia and iron deficiency [10]. Maternal risks include low weight gain, preterm labour, placenta previa, premature rupture of membrane, cardiac arrest, hemorrhage, lowered resistance to infection, poor cognitive development and reduced work capacity. Similarly, fetal and neonatal risks include prematurity, low birth weight, fetal distress which contribute to perinatal morbidity and mortality as well as infants born to anemic mothers will more likely to become anemic themselves [4].

Iron is also vital in increasing hemoglobin level of human blood and has an important role in the synthesis of DNA and RNA, cell replication and gene programming [19].

In the United States, approximately 4000 pregnancies are affected by neural tube defects (NTD) each year; more than half of these defects could be prevented with daily intake of 400 micrograms of folic acid throughout the periconceptional period [20].

The prevalence of Folic acid supplementation intake in periconceptional period in Korea, Canada, Qatar, USA and United Arab Emirates is 10.3%, 25%, 20.3%, 32% and 45% respectively [21].

The recommended intake for Folate is increased during pregnancy from 2 mg to 4 mg per day. It is estimated that 500 mg of iron is needed for the increase in maternal red blood cell volume and 300 mg of iron for fetal erythropoiesis [22].

In many populations, the amount of iron absorbed from the diet is not sufficient to meet many individual requirements. This is especially likely to be true during infancy and pregnancy, when physiological iron requirements are the highest [23].

To tackle this worldwide problem, there is a great effort in supplying iron folic acid for pregnant women. International Nutritional Anaemia Consultancy Group (INACG) recommended daily iron intake of 60 mg/iron and 400 µg folic acid for 6 months where anaemia prevalence is 40% or more and 60 mg iron and 400 µg folic acid for 6 months during pregnancy and 3 months after delivery where there is 40% or less prevalence of anaemia [23]. WHO also recommend giving all pregnant women a standard dose of 60 mg Iron+400 µg folic acid daily for 6 months [24].

The Ethiopian national guideline for control and prevention of micronutrient deficiencies highlights the need of daily IFA supplementation for at least 6 months during pregnancy and 3 months postpartum period [25].

While many antenatal care programs distribute IFA supplements to pregnant women, the effectiveness of these interventions in reducing maternal anaemia and neural tube defect (NTD) has been inadequate. Poor compliance with IFA treatment (e.g. failure to take pills) is the probable reason for the ineffectiveness of such programs [26]. Compliance with IFA supplementation plays a major role in the prevention and treatment of iron deficiency anaemia particularly among pregnant women whose iron requirement starts at the second trimester and progresses until the third trimester [9].

Ethiopia, like many other countries, is implementing the IFA supplementation program for pregnant women. The recommended dose, by the Ministry of Health, of iron and folic acid in pregnancy is 60 mg/day and 400 µg/day respectively for 180 days [25]. This applies for all pregnant women irrespective of their haemoglobin. But there is extremely low compliance to IFA supplementation among pregnant women in different parts of Ethiopia. Therefore, effectiveness of this program mainly depends on the compliance of pregnant to IFA supplementation [4]. How best to assist the women to adhere to a daily regimen of IFA supplement consumption is not fully understood.

According to the Demographic Health Survey of 2011, adherence to IFA supplements by pregnant women in Ethiopia is low. Nationally only <1% of the pregnant women takes IFA supplements for more than 90 days of the recommended 180 days. And 15% of them took for less than 60 days; and 83% of women did not take IFA during their pregnancy. In Addis Ababa 2.4% of the pregnant women, take IFA supplements for more than 90 days of the recommended 180 days. 7.6% pregnant women took between 60-80 days. 29.2% of them took for less than 60 days, and 60.8% of women did not take iron during their pregnancy [15].

Rational of the study

WHO and Ethiopian national nutrition program (NNP) advocates IFA supplementation as one of the strategies for anaemia control and prevention and to prevent neural tube defects. From the federal ministry of health to woreda level, it is always tried to do an awareness creation through media, and health education programs in different health institutions. But, as far as my knowledge is concerned, there is very limited information regarding adherence rate of IFA supplementation in most of the country.

Even though iron folic acid (IFA) Supplementation during pregnancy is among the effective methods in reducing maternal and neonatal mortality and other complications like anaemia and NTD, In Addis Ababa only 2.4% of pregnant mothers took iron supplement for recommended period during their last pregnancy

This underscores suggests the need to study the factors influencing adherence to IFA supplements to facilitate initiatives towards strengthening the IFA supplementation programs and reduce negative maternal birth outcomes associated with its deficiencies.

Due to limited information about adherence of pregnant women to iron supplementation and factors affecting the compliance to iron therapy among pregnant women in the study area, the results of this study will be useful for designing strategies to improve the adherence level to iron supplementation and reducing the burden of anaemia on pregnant women and the future generation.

This study was aimed at contributing towards the improvement of adherence to IFA supplementation in order to mitigate anaemia status of pregnant women and to prevent NTD.

It is believed that this study would provide information on the current situation on adherence to IFA supplementation to serve as a basis for improving the supplementation program for pregnant women. And knowing those factors would be very helpful for designing strategies aimed at improving the adherence level in the

study area to improve maternal and child health. It is assumed that the findings of this study would be of great input for policy makers, planners, administrators, nongovernmental organizations (NGO) and researchers to focus on such preventable but life threatening situation for designing and implementing appropriate intervention programs.

Objectives

General objective

To Assess Adherence and Associated Factors Of Prenatal Iron Folic Acid Supplementation Among Pregnant Women Who Attend Ante Natal Care In Health Facility At Mizan-Aman Town, Bench Maji Zone, Ethiopia, 2015.

Specific objective

To determine level of adherence to IFA supplementation among pregnant women attending ANC clinic in health facility.

To identify factors associated with adherence to IFA supplementation among pregnant mothers attending ANC clinic in health facility.

Methods

Study area and period

The study was conducted at public health centers in Mizan-Aman town, May 29, 2015-June 23, 2015.

Study design

A facility based cross-sectional quantitative study was done among pregnant women during their ANC visit at public health facilities. This study also complemented by qualitative data collected through in-depth interview of key informants including health workers, pregnant and lactating women.

Source and study population

Source population

The sources of the study population for the quantitative part were all pregnant women who were attending ANC service in Mizan-Aman health facilities, Ethiopia. And the source of population for the qualitative data was key informants (health care providers, Lactating women, pregnant women).

Study population

The study population for the quantitative data was all pregnant women who were visiting the selected health facilities at least for the second time during the study period. Whereas key informants of the respective health facility who were found to be voluntary in the time of data collection were the source of population for the qualitative study.

Sample size determination and sampling procedure

Sample size determination

Quantitative: The sample size was calculated by using single population proportion formula. A 2.4% adherence rate of IFA supplementation among pregnant women was used from EDHS 2011study [15], with 2% marginal error and 95% confidence interval (CI) of certainty (alpha=0.05). Based on above assumptions the sample size was calculated as

$$n=(Z\alpha/2)^2 \times P \times q(d)^2$$

n=224.96~225

Where

n=the desirable calculated sample size

Z=1.96 (95% confidence level)

p=2.4%

q=1-p

d=degree of accuracy desired (2%)

Considering 10% non-respondent rate sample size was adjusted to ~248.

Since the study was used a two stage sampling method, design effect of 2 was used which gives a final sample size of 496.

Qualitative for qualitative study, one ANC care provider conveniently chosen from each selected health centers by considering work experience on ANC unit. For pregnant and lactating women, regular follow up without interruption and recommendation by health professionals was used to select women for the in-depth interview from the selected health institutions. Women who were not selected for interview in quantitative study were included for qualitative part.

Sampling procedures

For this study, a total of 1 health center and 1 hospital were considered. As shown below the study participants were distributed to the selected health facility proportionally.

Qualitative sampling

An in-depth interview was conducted among those experienced and volunteer health professionals, who were working in the selected health centers, and pregnant and lactating women. In-depth interviews were under taken by using phenomenology qualitative study design in Amharic language.

Inclusion and exclusion criteria

Inclusion criteria

Pregnant women, in the selected health centers, who came at least for second visit and were taking IFA supplement for at least one week before the date of the study period, were included.

Exclusion criteria

Those pregnant women who were seriously ill like pre-eclampsia.

Study variables

Dependent variable

IFA supplement adherence.

Independent variable

- Socio-demographic and Economic factors.

- Age, educational status, marital status, religion, Income, occupation, husband's education and occupation.

- Obstetric history.

- Parity, Gravidity and Gestational age.

- Drug and medical condition related factors.

- Other drugs use, Medical illness, Availability, Adverse effect.

- Knowledge of pregnant women on anaemia and IFA .

- Providers counseling on IFA supplement.

Operational Definition

Adherence: Pregnant women were said to be adhered to IFA supplement if they took the supplement at least 4 days per week.

Anaemia: A condition where the haemoglobin (Hgb) level in the body is less than 11 g/dl which depicts decreased oxygen-carrying capacity for pregnant women.

IFA supplement: A tablet containing Iron and Folic Acid compound that prescribed to pregnant women

Satisfactory knowledge on anaemia: Pregnant women were said to have satisfactory knowledge on anaemia if they respond correctly ≥ 4 questions out of seven.

Satisfactory knowledge on IFA: Pregnant women said to have satisfactory knowledge on IFA supplement if they responds correctly ≥ 2 questions out of three.

Data collection procedures

Quantitative data

Data was collected using adopted and modified structured questionnaire from previous studies, which included questions of socio-economic and demographic, obstetric and medical history, health service related issues, mother's knowledge status on anaemia and IFA supplement and benefits of IFA tablets. The questionnaire was initially prepared in English after an extensive search and review of relevant studies done on the issue under caption and then it was translated into Amharic. The Amharic version was again translated back to English to check for consistency of meaning. The translated Amharic version questionnaire was pre-tested in similar areas outside of the study site prior to the actual data collection.

Eight data collectors (clinical nurses and midwives) and two supervisors (health officers) were recruited from outside the study facilities. The purpose of the study was explained to them to minimize bias during data collection. The supervisor and data collectors were trained for two days on basic principles of data collection, on the questionnaire and how to do other related procedures during data collection by the principal investigator. An additional training on data completeness, cross-checking and correction actions was given to the supervisor. Accordingly, the supervisor continuously followed and supervised data collectors. They collected and cross-checked the completeness of questionnaires received from data collectors and took corrective measures accordingly. And they reported and discussed with the principal investigator on a daily basis throughout the data collection period.

The principal investigator using semi-structured interview guide questions that contains important points to explore mainly the role of health providers, attitudes and opinions in counseling and utilization of IFA supplementation among pregnant women collected qualitative data.

Key informants were selected based on the assumption that they were more knowledgeable about the topic of interest and can speak about the general community beliefs and practices. Based on the purposive sampling method, sample sizes were determined based on theoretical saturation the point in data collection when new data no longer bring additional insights to the research questions. The interview process continued until that point was obtained.

Data Quality Assurance

To maintain data quality, data collectors were selected based on educational level and experience of data collection and they were adequately trained about data collection tool and purpose of the study for two days. The questionnaire was developed by the principal investigator based on questions used in previous peer reviewed published studies. Some questionnaire was adopted from similar studies that were previously conducted. There was a 5% of total sample size pre-test at Debrework Health Center different from the selected health centers to see for the accuracy of responses, language clarity, and appropriateness of the tools. The necessary amendments were done based on the findings of the pretest. The amended tool was used for actual data collection at the selected health centers. The collected data were reviewed and checked for mistakes, legibility of handwriting, completeness and consistency and any mistake or ambiguity was cleared by principal investigator and supervisor on daily basis during data collection.

Qualitative data: were collected by the principal investigator with the assistance of note taker. A semi structured questioner guide was developed by the principal investigator to conduct the in-depth interview. The interview was conducted in Amharic with eight health care providers, two lactating women and two pregnant women that were found in each health centers in a quiet and comfortable place. The interview was tape recorded, transcribed and then translated into English by officially known translators on the same day.

Data Management and Data Analysis

Quantitative data

The collected data was coded, manually checked and entered by using Epi-Info version 3.5.4. It was cleaned and edited by simple frequencies and cross tabulation before analysis. For analysis, the data was exported from Epi-Info to SPSS Version 20 and was checked for missing values before analysis. Descriptive statistics and numerical summary measures are presented using frequencies distribution tables and graphs (diagrams) to describe the study population in relation to relevant variables. Participants that had consumed greater than or equal to 4 days per week of IFA were defined as adhered and those that had less than 4 days per a week was defined as non-Adhered to IFA. The chi-square test and cross tabulation were used to compare women who adhered and not. A bivariate logistic regression analysis was employed to examine the relationship between the outcome variable

and independent variables. Those variables found to be statistically significant ($p<0.25$) in the binary logistic regression analyses were entered into multivariable binary logistic regression model by using adjusted odds ratio (AOR) and confidence intervals (CI) to identify important determinants by controlling possible confounding effect. A p value of <0.05 was considered statistically significant. Enter method was used to find predictors for Adherence of IFA supplements. Hosmer-Lemeshow goodness-of-fit test was used to assess the fit of final model [27-41].

Qualitative Data

For the qualitative study in-depth interview was being tape recorded. Then the tape recorded data was transcribed to Amharic and translated to English. Open code software was used to code and categorize qualitative data, and then content analysis was employed to analyze the qualitative data. The exported raw data in open code was read thoroughly text by text and codes were labeled. After that codes were categorized into three different categories. Then every category has been explained below to conceptualize the interpretations of the whole data using the raw data. Finally, a theme which fits all the categories was formulated.

Ethical Consideration

Ethical clearance was obtained from Ethical review Committee (ERC) of Mizan-Tepi University. Following the endorsement by the ERC, Bench Maji zone health bureau was informed about the objectives of the study through a support letter from Mizan-Tepi University and then written permission from Bench Maji zone health bureau was obtained and accordingly it was presented to respective health facilities. Informed verbal consent was obtained from each selected pregnant women to confirm willingness.

Results

Socio-demographic characteristic of the study subjects

Data were successfully gathered from a total of 462 mothers who attended ANC in health facilities of Mizan-Aman town, which made the response rate 93%. The mean age of the respondents was 26.3 (SD: ± 4.51) years with minimum age of 18 and a maximum of 39. Majority of the respondents were in the age group of 25-29 (38.3%) and 20-24 (31.8%). All respondents (100%) of the study participants resided in urban areas (Table 1).

Variable	Category	Frequency	Percentage
Age	<20 years	22	4.8
	20-24 years	147	31.8
	25-29	177	38.3
	30-34	90	19.5
	≥ 35	26	5.6
Religion	Orthodox	281	60.8
	Muslim	121	26.2
	Protestant	50	10.8
	Catholic	10	2.2
Marital status	Married	439	95
	Divorced	23	5
Highest educational level completed	Cannot read and write	38	8.2
	Can read and write	21	4.5
	Primary (Grade 1-8th)	128	27.7
	Secondary (Grade 9-12th)	179	38.7
	College and above	96	20.8
Current occupation	House wife	271	58.7
	Government employee	53	11.5
	Private employee	63	13.6
	NGO	12	2.6
	Student	18	3.9
	Self-employee	45	9.7

Husband's level of educational status	Can read and write	16	3.5
	Primary (Grade 1-8th)	98	21.2
	Secondary (Grade 9-12th)	173	37.4
	Tertiary	175	37.9
Husband's occupation	Government employee	103	22.3
	Private employee	112	24.2
	Daily laborer	51	11
	Self-employee	196	42.4
Income	Low income	203	43.9 51.1
	Lower middle income	236	5
	Upper middle income	23	

Table 1: Socio-demographic characteristics of women who attended ANC at Mizan-Aman health facilities (N=462).

Two hundred eighty one (60.8%) and 121 (26.2%) were Orthodox and Muslim followers respectively. Out of the 462 participants, 271 (58.7%) were housewives, 63 (13.6%) were private and 53 (11.5%) were government employees. Regarding to educational status, 179 (38.7%) of the respondents have completed secondary level education. One hundred five (37.9%) and 173 (37.4%) of respondent's husband were completed tertiary school and secondary educations respectively and more than 2/5th (42.4%) of the respondent's husband were self-employees (Table 2).

Variable	Category	Frequency	Percentage
Maternal parity	Null parous	234	50.6
	Primi parous	131	28.4
	Multi parous	97	21
Maternal current gravidity	Primi gravida	165	35.7
	Multi gravida	297	64.3
Maternal total No of visit	2	192	41.6
	3	186	40.3
	4+	84	18.2
Time of registration	Late registration	157	42.4
	Early registration	305	57.6
Current visit maternal GA	Second trimester	172	34
	Third trimester	324	66
Any medical illnesses other than anaemia	No	420	90.9
	yes	42	9.1
Kind medical illnesses	UTI	10	24
	STI	18	43
	HIV	14	33

Table 2: Obstetrics and medical history of women who attend ANC in Mizan-Aman health facilities.

Obstetric and health related characteristics of the study subjects

The mean gestational age of the pregnant women during the study time was 30.4 (SD=5.5) weeks and 324 (66%) of the pregnant women were in third trimester. The mean gestational age of the pregnant women during their first visit was 15.3 (SD ± 5.8) weeks and more than half women registered earlier (57.6%). From the study participants, half of the participants (50.6%) were null parous and 192 (41.6%) of them has visited the health center for the second time. Regarding history of medical problem during current pregnancy, Nine percent of women had some medical illnesses during their pregnancy time [42] (Table 3).

Variable	Category	Frequency	Percentage
Health center distance from home	1-30 min	380	82.3
(in min)	31-60 min	82	17.7
waiting time in the health facility (average in minutes)	0-60 min	412	89.2
	>60 min	50	10.8
History of anaemia	Anemic	12	2.6
	Not anemic	450	97.4
Hemoglobin level determined during this current visit	No	393	85.1
	Yes	69	14.9
Counseling on IFA Supplementation	No	48	10.4
	Yes	414	89.6
Counseling on advantage of IFA	No	52	11.3
	Yes	410	88.7
Obtain adequate IFA tablets	No	24	5.2
	Yes	438	94.8

Table 3: Health service related results in Mizan-Aman health facilities.

Health service related characteristics of the study subjects

According to this study, more than three fourth (82.3%) of women were found around the health centers and only reach to the health centers within 30 min. Most of the women (89.2%) have the service within 1 h (Figure 1).

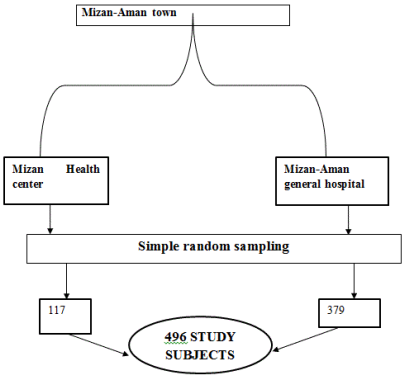

Figure 1: Schematic presentation of the sampling procedure was used in the study, Mizan-Aman, Ethiopia, 2016.

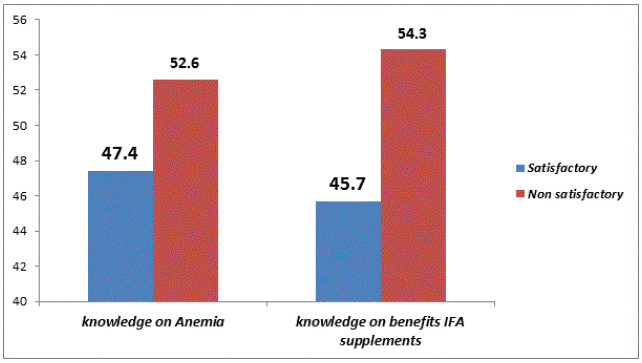

Figure 2: Counselling on advantage of IFA.

This study showed that 486 (97.4%) women had a haemoglobin level of greater than 11 mg/dl, which make only 2.6% of women have had history of anaemia during their first visit (follow up). But, only 15% (69) of the study subjects have had measured haemoglobin for the current visit and no one had anaemia. Around four hundred and fourteen (89.6%) of women have got counselling on IFA supplementation during their first visit but it is more than by four cases compared to counselling on advantage of IFA (Figure 2).

Most of the study subjects 94.8% have adequate IFA supplements during their first visit (Table 4).

No. of days per week	Frequency	Percent
1	19	3.8
2	60	12.1
3	72	14.5
4	20	4
5	15	3
6	16	3.2
7	294	59.3

Table 4: Frequency and percentage of IFA supplement that was taken by pregnant women in Mizan-Aman health facilities (N=496).

Participants knowledge status on anaemia and benefits of IFA supplementation

This study found that most of the study participants had no satisfactory knowledge on anaemia and benefits of IFA supplementation. Two hundred nineteen (47.4%) women had satisfactory knowledge on anaemia and 211(45.7%) study participants were had satisfactory knowledge on benefits of IFA supplementation (Figure 3).

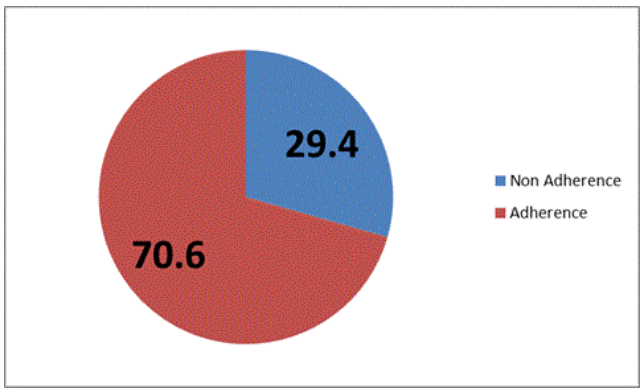

Figure 3: Percentage of knowledge on anaemia and benefits of IFA supplementation of pregnant women in Mizan-Aman health facilities.

Self-report adherence status of women on IFA supplementation

Among all respondents who were given IFA during the first visit, the level of adherence was assessed based on the reported number of doses taken in the preceding week. The mean of days per week was 5.4 and most of (59.3%) pregnant women took IFA supplement without interruption in a daily bases (Table 5).

Reasons for IFA supplement adherence	Frequency	Percentage
Free of charge	30	10.2
By using Reminder technique	12	4.1
having family support	32	10.9
fear of illness	53	18.1
clinician counselling	280	95.6
increasing blood volume	56	19.1

Table 5: Reasons for adherence of IFA supplementation among women who were attending ANC at health centers of Mizan-Aman health facilities, Ethiopia, 2015(N=293).

The overall adherence level (took IFA tablets for ≥ 4 days/week) were 70.6% (CI: 66.4-74.3) (Figure 4).

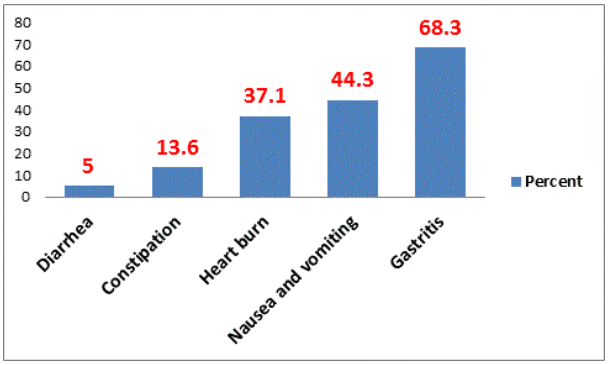

Figure 4: Side effects of IFA supplementation among pregnant women in Mizan-Aman, Ethiopia, 2015.

Reasons for compliance or noncompliance to IFA supplementation

Among all respondents who were given/prescribed iron supplements during the first visit, two hundred ninety three (63.4%) women had at least one reason for taking IFA supplement regularly, and the rest 169 (36.6%) had at least one cited reason for not taking IFA supplement during the preceding week of the study time. The most cited reasons for Adherence (to continue taking IFA supplements) were clinician counseling, adequate explanation about the tablets by providers, 280 (95.6%), adhered because they thought that the tablets would increase their blood volume 56 (19%) and fear of illness if missed one or more supplement 53 (18%) (Table 6).

Reasons for no Adherence of IFA supplement	Frequency	Percentage
Frustration from taking many drug	13	7.5
Forgetfulness	67	38.7

Not knowing the advantage of IFA	12	6.9
Tablet related issues like size, taste, color, coating...	31	17.9
Drug side effect	76	43.9
Insufficient tablets	46	26.6
Health problem other than anemia	11	6.4
Took enough tablets	27	15.6

Table 6: Reasons for no adherence of IFA supplementation among women who were attending ANC at health facilities of Mizan-Aman, Ethiopia, 2015 (N=169).

The most commonly mentioned reasons for no adherence where drug side effects 76 (43.9%), forgetfulness 67 (38.7%) and insufficient tablets prescribed by health professionals 46 (26.6%).

The most mentioned side effects are Gastritis (68.3%), Nausea and vomiting (44.3%) and heartburn (37.1%).

Factors associated with adherence to IFA supplements

Bivariate and multivariable binary logistic regression was done to identify factors associated with adherence of iron foliate supplementation. First all independent factors that showed association in chi square were analyzed by bivariate logistic analysis and nine predictors showed significant association with adherence. Then variables with P-value ≤ 0.25 in the bivariate logistic analysis were entered into multi variable binary logistic regression analysis. Among these, seven independent predictors were found significantly associated with IFA supplementation. The result of Hosmer-Lemeshow goodness-of-fit test was not significant (p=0.097, df=8). The multivariable binary logistic regression analysis indicated that pregnant women who registered early were 41% less likely adhered to IFA supplement compared with pregnant women who registered lately in ANC registration book (AOR: 0.590, 95% CI: 0.364-0.955). In this study, pregnant women who have any medical illness during pregnancy period were 51.6% less likely to adhered to IFA supplement compared to pregnant women who had no any medical illnesses (AOR: 0.484, 95% CI: 0.239-0.980). Pregnant women who had got strong advice on benefits of IFA supplementation during counseling period prior to start taking IFA supplement were 2.5 times more likely tend to adhere compared to women who had not got enough counseling on benefits of IFA supplement prior to start IFA supplement (AOR: 2.453, 95% CI: 1.122, 5.359) (Table 7).

			Adherence level (N=496)		
Variables	**Not Adhered**	**Adhered**	**COR (95%CI)**	**P-value**	**AOR (95% CI)**
Husband's education					
6	10	1.199 (0.404, 3.561)	0.673	1.310 (0.375,4.578)	
primary	50	125	1.798 (1.071, 3.020)	0.133	1.577 (0.870, 2.861)
Secondary	40	133	2.392 (0.1.401, 4.083)	0.63	1.141 (0.477, 2.891)
Tertiary	41	57	1		1
Time of registration					
38	158	1		1	
Early registration	99	167	0.406 (0.263, 0.625)	0.032*	0.590 (0.364, 0.955)
Any medical illnesses other than Anemia					
Yes	117	303	1		1
	20	22	0.425 (0.224, 0.807)	0.044*	0.484 (0.239, 0.980)
Counseling on IFA Supplementation					

Yes	26	22	1		1
	111	303	3.226 (1.756,5.925)	0.024*	2.453 (1.122, 5.359)
IFA given					
12	12			1	
Yes	125	313	2.504 (1.096, 5.723)	0.288	0.552 (0.185, 1.652)
Knowledge on Anemia					
91	152	1			
Satisfactory	46	173	2.252 (1.485, 3.414)	0.003*	2.083 (1.275, 3.404)
IFA taken last month					
33	17			1	
Yes	104	308	5.749 (3.074, 10.750)	0.005*	2.765 (1.353, 5.650)
Side effect					
55	186	1		1	
Yes	82	139	0.501 (0.334, 0.752)	0.000*	0.406 (0.253, 0.651)
Family support					
47	57	1		1	
Yes	90	268	2.455 (1.559, 3.866)	0.014	1.923 (1.142, 3.240)

Table 7: Factors associated with IFA supplement in pregnant women at Mizan-Aman health facilities, 2015.

Pregnant Women who had satisfactory knowledge on Anaemia during this pregnancy were 2 times more likely to be adhered compared to those pregnant women who had non-satisfactory knowledge on anaemia. (AOR: 2.083, 95% CI: 1.275, 3.404). Pregnant women who had taken the IFA supplementation on last month were 2.8 times more likely to be tend to adhere to IFA supplementation compared to pregnant women who take IFA supplementation in an irregular way for the last month(AOR: 2.765, 95% CI: 1.353, 5.650). Similarly, women who had better family encouragement to take IFA supplement were 92% more likely to adhere to IFA supplementation compared to pregnant women who had no any family member encouragement to take IFA supplementation. (AOR: 1.923, 95% CI: 1.142, 3.240). Those pregnant women who experienced side effect on taking IFA supplement during this pregnancy were 60% less likely to adhered to iron foliate supplementation compared to those pregnant women who had no side effect while they were taking IFA supplements (AOR: 0.406, 95% CI: 0.253, 0.651).

Qualitative results

Analysis of qualitative data

The table below showed the codes, categories and theme developed during the qualitative data analysis (Table 8).

Theme	**Availability, socio-behavioral, knowledge and side effect factors affecting adherence of IFA supplement during pregnancy**		
Categories	Availability of supply and guideline	Socio-behavioral, opinion and attitude of pregnant women and health care providers	Practice of women and side effect of IFA supplements
Codes	IFA provision Given as supplement Availability of supplement Availability of guideline Free of charge Have budget Have poster Prescribe Prenatal Prescribe heamup	Advantage of IFA Always active ANC visit Belief on Dr. Complain Disadvantage Dual purpose Educational status Face a challenge	Abortion Anomalies Brain development Complication during delivery Critical period Iron and folic acid combine Check Hgb. Congenital problem Disgusting smell

	Shortage of supply	Family support	Emergency incidence Experienced Anemia
	Store	Fluid replacement	Free from side effect
	PFSA	Good adherence	Food interaction
		Hgb. Below normal	Health education
		Integrated work	Gastritis
		Interrupt	Impact of side effect
		Quality of tablets	Iron rich food
		Lesser in side effect	Prevents side effect
		Medical illness	Lesser side effect
		Prevent bleeding	Referral
		Prioritize health	Negative Impact
		Computerized system	No problem
		Better counseling	Sacrification
		Better quality	Signs and symptoms
		better income	Spinal bifuda, NTD
		Memory lapses	Seriously ill
		Women attitude	Reuptake
		Recalling	Rethinking
			Tablet issues

Table 8: Theme, categories and codes identified from the qualitative data.

Availability, socio-behavioural, attitude, practice and side effect factors that contribute to adherence of IFA supplement during pregnancy

Availability of supplies and guidelines

The presence of both guidelines and IFA supplement in the facilities plays a great role in order to adhere with IFA supplements. Health professionals expect pregnant women to uptake the ordered/given supplement if there is strong counselling based on guideline. The practice is there but there is no availability of guidelines in facilities rather the health professionals gave the supplement by the help of their long memory and consulting their seniors. A 27 year midwife in in-depth interview said "No there is not. Actually, we took a half-day training last year that is mainly focused on the advantage of the tablet and starting time of the tablets. But as a nation or region wide there is no a guideline as a result we used last year's training and what we have learned as a combined reference."

Pregnant women were given IFA supplement during their first visit. It is also recommended in the guideline to give IFA supplement for pregnant women for 6 months, yet, it is not implemented. This statement was complemented by "…For Any woman who came here we give health education during their first visit and we give them IFA supplement at least for 3 months". As stated by a 26 year midwife.

A 27 year lactating mother also explains as "When I come here for follow up, I had got IFA supplement for three months that was to be taken on daily basis and definitely I took it. Since I had had a health problem, I started earlier than 3 months. And actually that was only for 3 consecutive months."

IFA is recommended to be given as a supplement for all pregnant women during the early weeks of pregnancy time in order to prevent congenital anomalies. Especially folic acid is very important if it is prescribed before 28 days of pregnancy in order to prevent NTD. Despite the references, explain it, the mean months which most of the pregnant mother start to use IFA is during their first visit of ANC, which was four months.

A 28 lactating mother said that "When I was like four months pregnant, I started follow up in this health center. Starting from that day my doctor prescribed me an iron tablet for three months".

Socio-behavioural, opinion and attitude of pregnant women and health care providers

IFA supplement should be given for all pregnant women with irrespective of their hemoglobin level. Despite Iron and folic acid combined tablet is also ordered for treatment of Anaemia, it is supplemented for all pregnant women. This statement is supported by a 37 year midwife as she described it "Unless the mother is anemic we always give the IFA supplement as a prophylaxis for all mothers in a daily basis as this is used to prevent from congenital abnormalities like spinal bifuda and Anaemia. If the mother is anemic we give it in BID base at least for one month and we will see whether there is an improvement or not."

The reason why this was done is "This is because it is totally important. Since something will happen at any time of pregnancy, especially bleeding, we have to take all the tablets and get the benefits of this tablet." As defined by a 30 year pregnant woman.

But, before giving the tablets pregnant women should be counseled on different aspects. In order to adhere to IFA supplement, pregnant woman must to take IFA tablets without interruption based on the guideline. Adherence gives much advantage to pregnant woman and the fetus as well. It includes especially on benefits of the supplement. This was best cited by a 26 year midwife as follows. "…Yeah. During their first visit, we tell them why the IFA will be given, for how long and the harms they will face if they don't take the medicine. That is we tell them as this protects Anaemia, congenital problem for the fetus

and for brain development, and also that it helps to prevent bleeding during birth if it occurs."

And a 30 year pregnant woman includes "Yes definitely. First of all it prevents bleeding during delivery, second it used for the health of fetus and myself during pregnancy. Since I am currently quite healthy, I thought it helps me to stay healthy."

Adherence of IFA supplement should be measured in a constant manner besides strong counseling methods and provision. But in practice, there are no any measurement methods more than self-reporting by pregnant women and trust by health professionals. A 37 year midwife says that "Since the adherence is measured by self-report it is very good. There are no any interruptions we observed since we gave them a strong counseling and ask them in every follow up."

A 27 year midwife adds on this as follows "We simply counsel and give them the tablets and we do not have a means to control weather they took all tablets or not unless they are anemic patients. For anemic patients we will see the improvement of Hgb. Level. If it is improved compared to the previous measurement we are convinced as they are taking it properly otherwise it is very difficult since hemoglobin level is only measured during first and fourth visit."

Practice of women and side effect of IFA supplements

Most of the time IFA supplement is given in combined form. This is very important to prevent pill burden and may be drug interactions. It is also easy for mothers who prefer to buy it in private pharmacies due to different reasons. A 26 year midwife has said "Sometimes both kinds are available but most of the time IFA combination is available. If it is only iron tablet, we will change the prescription to IFA combination and we will send them to buy in private pharmacy or in a nearby health center. But the scenario is occurring for only short period of time like 1 or 2 weeks. When we send them to private pharmacy, they always complain about cost. So, we always prefer to send them to nearby health center as it is considered like borrowing from them and it is free of charge as of it happen here."

Women's coping to challenges behavior and repeated practice after strong counseling by health professionals helps to rethink and reuptake the supplements. This statement is strengthened by a 26 year pregnant woman

"I started follow up while I was four months pregnant. Since that day I took the table only for two weeks and stop it due to drug side effect, gastritis, till I became seven month pregnant. After seven month, during the third visit, I was counseled again by my doctors and convinced to swallow it again. Since last three weeks, even though the side effect is appearing again, I am currently taking it by coping with it. Now I am taking it at night after dinner and put the medication near to my bed in order not to forget it."

Knowing about anaemia and IFA supplement leads the women to take the tablets and increases health-seeking behavior. A 27 year lactating mother saying on this was that

"It is a condition, commonly manifested by vertigo, dizziness and headache, in which the body blood volume decreases due to sharing with the fetus. It will be corrected by taking fluids like soft drinks and homemade beverages. When this is happen, we have to deal with the doctors about the condition. And also these tablets are mandatory to correct it."

In common sense it is very important to take IFA supplement without interruption. For this to happen the cited reasons should be known and factors for interruption are determined in day to day experiences. Most of the reasons for IFA interruptions are directly related with GI problems.

A 24 year midwife explains about side effects as "Most of them take it continuously but some would stop it due to afraid of its negative impact but when they came for check-up we advise them to continue and they take it accordingly. Mostly they mentioned gastritis, feeling of nausea and so on. So when they feel such things again and again they stopped taking the drug. They have no complained related with its color and size."

But a 27 year lactating woman experienced unwanted issues as she explains that "Since it has bad smell especially during vomiting time, may be one best reason is table related conditions. The other mostly mentioned reason that I heard from our friend's discussion was its side effect especially vomiting and gastric irritation. Especially vomiting, since I experienced, has very disgusting smell"

So integration from different bodies may be needed to avoid such unwanted IFA supplementation impacts. As a 27 year lactating mother said that:

"It should be an integrated work. Both the mothers and the doctors should integrate. For example, if the mother interrupts the tablet after doctors counseling, she may also advised by other mothers or those who already gave birth in the near months about the side effects and its importance. More over to get a healthy child, it's better to stick with doctor's advice."

On the other hand, since the provision of the supplement is totally managed by the government, it should be consistent and less in side effect. A 25 year midwife complements this statement as follows

"In my opinion, currently we are giving the supplement free of charge. This is a very nice thing. But, these tablets have side effects which may lead the woman to stop taking it. So, if possible, the government takes an assignment to change or to provide another kind of tablets like prenatal, which are a proven lesser side effect tablets compared to this supplement, either free of charge or in relatively cheap cost. In addition, despite the challenges, side effects they have, women sacrifice for all better and good out come and healthy baby. So, especially counselling should be strongly done before giving the tablets as we are doing now".

Discussion

The aim of this study was to determine the rates of adherence and identify factors associated with IFA supplementation among ANC attending pregnant women in Mizan-Aman health facilities, Ethiopia, 2015. This study found that the self-report adherence rate of the pregnant women in Mizan-Aman health facilities was 70.6% (95% CI=66.4-74.7).

The result is higher compared with most of other studies done in Ethiopia. It is greater than the studies done in Mecha district, western Amhara, 20.4% [47], North western zone of Tigray, 37.2% [43,44], Eight rural districts of Ethiopia, 3.5 [45] and Goba wereda, 18% [46]. The probable reason may be the difference in geographic locations and time gap between studies, differences in awareness of pregnant women about IFA supplementation and educational status and inaccessibility of health institutions. It is still greater than studies done abroad. The

study done in Pakistan, India, Cairo, Kenya [16,26,41,42] also showed us lower adherence level to IFA supplement compared to this study respectively. However the adherence rate among women in this study was lower compared to studies done in Khartoum, Sudan which was 92.1% [47-49]. And this difference may be due to ANC service delivery facilities and quality of professionals as the service was given in tertiary hospital and doctors for the first study as compared to health center and midwives/nurses in this study. In addition, low attention to adherence issue due to lack of information regarding the severity and magnitude of the problem and poor follow up of the program in this study area may be the other reason for this difference. For instance, no indicators that are used to assess compliance/adherence of iron foliate supplementation in the Ethiopian health service reporting system.

Adherence may be enhanced by a number of factors. In this study, three most mentioned factors shown to have a significant association with the Adherence was health care providers strong counseling about IFA supplementation (counseling on benefit of taking IFA supplements, How frequently and for how long shall the IFA supplement be taken, the side effects of IFA…), increasing blood volume of the pregnant mother if taken with regular bases and fear of illnesses if IFA supplement misses on a daily base.

This was supported by findings from the qualitative study as a 26 year midwife described. "…Yeah. During their first visit, we were able to tell them why the IFA will be given, for how long and the harms if they do not take the medicine."

In this study, women who mentioned health care provider counseling as their best reasons to adhere to IFA supplement accounts around 95%. This result is greater than studies done in Senegal, Kenya and Mecha district, Western Amhara which accounts 19%, 39% and 65.6% respectively [42,43,47]. This might be due to the gestational stage of study subjects. The previous studies were within one year after delivery compared to this study, which was conducted during women's ANC period. The second most mentioned reason for IFA supplement adherence was women thought IFA supplement would increase blood volumes which accounts 19 %. This result was greater than studies done in Senegal which accounts 14% and lesser than studies done in Kenya and Mecha district, Western Amhara which accounts 56.1% and 44.5%. The third most mentioned reason for adherence to IFA supplement was fear of illnesses if IFA supplement misses on daily base, which accounts 18%. This result was greater than studies done in Senegal and lesser than study done in Mecha district, western Amhara which accounts 11% and 57%, respectively [42,43,47].

In this study, women who had higher knowledge of anaemia were two times more likely to be adhered compared to those who had low knowledge of anaemia (AOR: 2.083 (95% CI: 1.275, 3.404). The probable reason could be knowledge helps women to have a good perception of benefits of taking IFA supplements. Similar results were reported in Mecha district, Western Amhara, in which women with good knowledge of anaemia were more likely to be more compliant (AOR: 3.64, 95% CI: 1.78-7.39) [46]. It is also consistent with a study done in eight rular districts of Ethiopia which show us women lacking comprehensive knowledge of anaemia is associated with low compliance of IFA supplementation (AOR=0.78 (95% CI: 0.57-0.97) [45].

This result is complemented by qualitative study, which was mentioned by 30 year pregnant mother. "I know about Anaemia a little bit. I was found an anemic during the first three four months. It means that I lacked some amount of blood since I shared it with the fetus. Its symptom was dizziness, headache and generalized weakness. It was prevented by taking fluids and iron folic acid tablets so, knowing this little information about anaemia leads me to take all tablets without interruption."

In this study, adherence rate was better observed among pregnant women who had family support during their pregnancy time as compared to those pregnant women who had not family support in which pregnant women who had family support during the first visit were about 92% higher to be adherent to IFA supplementation as compared to pregnant women who had not encouraged by family members (AOR: 1.923, (95% CI: 1.142, 3.240). The possible reason behind this is the fact that family encouragement to take IFA supplement is best described by reminding her when she is forgetting to take the supplement that is very useful to increase blood volume during pregnancy period since this two factors are best of the prominent reasons mentioned as the reasons of non-adherence and adherence, respectively.

"I am always getting a surplus encouragement from my family especially from my husband and my mother. Because of this and my eagerness to finish it, it is only two tablets to complete the full dose." As a 27 pregnant woman explained.

In the present study, adherence was better observed among pregnant women who were lately registered for antenatal care service as compared to early registered women in which pregnant women who were early registered for antenatal care service were about 41% times less likely to be adherent to IFA supplementation as compared to pregnant women who were lately registered for antenatal service (AOR: 0.590 (95% CI: 0.364, 0.955). This result were inconsistent with studies conducted in Northern zone of Tigray and Lucknow, India in which adherence was better observed among pregnant women who were early registered for antenatal care service as compared to late registered women in which pregnant women who were early registered for antenatal care service were about 1.7 times higher to be adherent to IFA supplementation as compared to pregnant women who were lately registered for antenatal service (AOR=1.778, 95% CI=1.076-2.936) and (AOR=1.745, 95% CI=1.122-2.714), respectively [4,41]. The reason behind this is that in early registered women the number of prescribed/given IFA acid supplements are finished as early before delivery compared to those women who start follow up on second and third trimester and extend the time of taking supplements even after delivery.

A number of factors may influence adherence. Two most cited factors that negatively influenced adherence to IFA supplement was forgetfulness and experiencing side effects. It was supported by a 30 year pregnant woman as she said "May be they forgot as I did. Or it may be due to lack of knowledge on the advantage of the tablet. I saw three pack of tablet in my friend's home and she said that I totally forgot it and it was never in my mind. And at the end of delivery she throws it. Definitely this was from lack of knowledge especially not understanding the advantages and disadvantages of the tablets."

In this study women mentioned majorly for non-adhered cause was side effect, which accounts 45%. This result was greater than studies done in Nigeria, Senegal and Goba woreda which accounts 41.7, 27 and 11.1 percent respectively [17,42,46]. But, it was lesser than studies done in eight rural districts in Ethiopia and Mecha distric, Western Amhara which accounts 63.3 and 54.4 percent [45,47]. The second most mentioned reason for non-adherence to IFA supplement was forgetfulness to take IFA supplement which accounts 28%. This result

is greater than studies done in Senegal, Nigeria, eight rural districts of Ethiopia and Goba woreda which accounts 17, 15, 16.7 and 13.8 percent [17,42,45,46].

In this study, adherence rate was lesser observed among pregnant women who had medical illnesses during their pregnancy time as compared to those pregnant women who had no medical illness in which pregnant women who had medical illness during the pregnancy period were about 51.6% less likely to be adherent to IFA supplementation as compared to pregnant women who had no medical illnesses (AOR=0.484 (95% CI: 0.239, 0.980). The probable reason for this is may be there had been a pill burden impact on those pregnant women who had any medical illnesses during pregnancy period compared to healthy pregnant women.

similarly, adherence rate was lesser observed among pregnant women who had IFA supplement side effects during their pregnancy period as compared to those pregnant women who had no IFA supplement side effects in which pregnant women who had IFA supplement side effect during their ANC follow up were about 60% less likely to be adherent to IFA supplementation as compared to pregnant women who had no IFA supplement side effects (AOR: 0.406(95% CI: 0.253, 0.651). This is may be due to the effect of side effects on Adherence may be explained in terms of physical, mental and social discomforts as it is explained by nausea and vomiting , gastritis, diarrhea, constipation and heart burn.

As a 27 year lactating woman experienced unwanted issues as she explains that "Since it has bad smell especially during vomiting time, may be one best reason is table related conditions. The other mostly mentioned reason that I heard from our friend's discussion was its side effect especially vomiting and gastric irritation. Especially vomiting, since I experienced, has very disgusting smell".

Strength and Limitation of the Study

Strengths of the study

Among the notable strengths of this study were that adequate sample size and better to avoid recall biased and more over this study has tried to complement the quantitative data by a qualitative method. So the implementation of mixed method could be the strong side of the study. In addition to this, pre-test of questionnaire done in health centers other than the study unit, training of data collectors and sampling techniques employed were also the strength of the study.

Limitations of the study

Among the limitations of the study is that information on adherence rate was from self-report of taking tablets. Therefore, we could not reject the possibility of reporting pregnant women who did not actually ingest the tablets.

Conclusion

Generally, adherence rate of IFA supplementation riches 70.6% which is much higher compared to 2011 EDHS report. Even though it is higher than other studies in different places of the country, still there is a need to progress a lot. This study also highlighted a number of important findings. Having satisfactory knowledge on Anaemia, having encouragement from family member, and strong counseling about benefits of IFA supplement were statistically significant independent positive predictors for maternal adherence to IFA supplementation. In other way, early registration for Anti Natal Care, experiencing medical illnesses during pregnancy period and experiencing side effects for IFA supplements were statistically significant independent negative predictors for maternal adherence to IFA supplementation. There were also important factors which play a great role for adherence of IFA supplement. Health care providers/ professionals strong counseling on importance of IFA supplementation, beliefs on IFA supplementation would increase blood volume and fear of illness if miss supplements in a daily base were positive reasons for adherence and experiencing side effects to IFA supplement and forgetfulness plays a negative role for adherence.

Recommendation

With respect to the findings and objectives of the study, some recommendations have been made at different levels.

Government level

The government plays a greater role on capacity building and provisions of IFA supplement. Training or refreshment short courses on benefits of IFA supplement and counseling methods are mandatory in order to bring a positive change towards women's attitude and practice of IFA supplement ingestion. Moreover, the provision of supplements should be proven lesser side effects in different forms. Especially syrups should be available in all health sectors to improve the uptake of IFA supplements.

Community level

For communities, at different level, awareness creation about IFA supplementation and media coverage should able to support the utilization of IFA supplement. Discussions with women who gave birth previously and families at home should be encouraged. Special attentions should be given for any techniques that help the women to remind on daily bases on full courses of the utilization period.

Facility level

Providers should counsel pregnant women on IFA supplement benefit, risks if they miss the tablet and for how long they utilize it. Professionals have a huge gap on IFA supplement especially on periods of start and for how long they provide it. This should be improved by referring the manuals and guidelines on micronutrient supplementation. Moreover, they should communicate with senior staffs and personnel who had a better experience on this area.

Researchers

Nationally representative study involving diversified communities in the country is recommended. Especially pill count study complemented with qualitative data would be helpful.

References

1. Nisar YB, Dibley MJ, Mir AM (2014) Factors associated with non-use of antenatal iron and folic acid supplements among Pakistani women: A cross sectional household survey. BMC Pregnancy Childbirth.
2. Steiner J, Ema F (2014) The language of medication taking. Ann Intern Med 132: 926-930.
3. Cfdca P (2007) Pregnancy risk assessment monitoring system (PRAMs) phase 5 standard questions. Int J Nutr Food Sci.

4. Gebre A MA, Etana B (2015) Comparative study: Assessment of factors associated with adherence to iron-folic acid supplementation among urban and rural pregnant women in north western zone of Tigray, Ethiopia. Int J Nutr Food Sci 4: 172.
5. WHO (1992) Major issues for nutrition strategies food and agriculture organization and WHO Theme paper. In FAO/WHO 6: 12-23.
6. Cusick MZ, Freedman DS, Looker AC, Ogden CL, Gunter E, et al. (2008) Unexplained decline in the prevalence of anaemia among US children and women between 1988-1994 and 1999-2002. Am J Clin Nutr 88: 1611.
7. UNICEF/ UNCsFMI (2004) Vitamin and mineral deficiency. A global progress report Ottawa p: 1.
8. Umeta M, Haidar J, Demissie T, Akalu G, Ayana G (2008) Iron deficiency anaemia among women of reproductive age in nine administrative regions of Ethiopia. Ethiop J Health Dev 22: 3.
9. Sushila G, Ritu H, Smiti N, Sonika M (2013) To study compliance of antenatal women in relation to iron supplement in routine anti-natal clinic at a tertiary health care center. J Drug Delivery Ther 3: 71-75.
10. WHO (2012) Daily iron and folic acid supplementation in pregnant women. Geneva, World Health Organization.
11. DeMaeyer EATM (1985) The prevalence of anaemia in the world. BMC Blood Disord 38: 302-316.
12. Kapil U, Sachdev H, Kotecha P, Mittal S, Ramachandran P, et al. (2013) Guidelines for control of iron deficiency anaemia national iron+ initative. National Rural Health Mission.
13. Dohahs U (2005) WHO: Worldwide prevalence of anaemia.
14. Benoist BD, McLean E, Egli I, Cogswell M (2008) Worldwide prevalence of anaemia 1993-2005. World Health Organization 6: 7.
15. Central Statistical Agency Addis Ababa (2011) Ethiopia demographic and health survey ICF International Calverton, Maryland, USA.
16. Ibrahim ZM, Hamid SA, Mikhail H, Khattab MS (2011) Assessment of adherence to iron and folic acid supplementation and prevalence of anaemia in pregnant women. Med J Cairo Uni 79: 115-121.
17. Ugwu EO (2014) Determinants of compliance to iron supplementation among pregnant women in Enugu, South-eastern Nigeria. Nigerian J Clin Pract, p: 17.
18. Ajoke IO (2005) Anaemia in pregnancy: A survey of pregnant women in Abeokuta, Nigeria. Afr Health Sci 5: 4.
19. Udipi S, Ghugre P, Gokhale C (2004) Iron, oxidative stress and health department of food science and nutrition.
20. Cunningham FJ, Bloom SL, Hauth JC, GilstraPLC, Wenstrom KD, et al. (2005) Maternal physiology, antepartum, prenatal care. William's Obstetrics 22nd ed: 3,5,8.
21. Kim HJ, Cho YJ, Ahn HK, Kim JO, Ryu HM, et al. (2009) Public health nutrition. Cambridge, pp: 468-471.
22. America US (2009) Pregnancy and nutrition - Women's Health and Education Center.
23. Stoltzfus RJ, Dreyfuss ML (2009) Guidelines for the use of iron supplements to prevent and treat iron deficiency anaemia international nutritional anaemia consultative group.
24. Organization WH (2006) Standards for maternal and neonatal care: Iron and folate supplementation. World Health Organization.
25. Ethiopia FMoHFo (2004) National guideline for control and prevention of micronutrient deficiencies. FMOH.
26. Organization WHO (2005) Worldwide prevalence of anaemia. Department of health and human service USA.
27. Koury MJ (2004) New insights into erythropoiesis: The roles of folate, vitamine B12 and iron.
28. Wilson RD (2004) The use of folic acid in combination with a multivitamin supplement for the prevention of neural tube defects and other congenital anomalies. J Obstet Gynaecol Can 29: 1003-1026.
29. Rieder MJ (1994) Prevention of neural tube defect with periconceptional folic acid. Medline 21: 483-503.
30. La CSA (2001) Prevalence and causes of nutritional anaemia. CRS press LLC, USA 7: 12.
31. Charles CV (2012) Iron deficiency anaemia: A public health problem of global proportions university of Guelph, Canada.
32. (2003) Global health and development strategies a division of social and scientific systems i, implement the project. Anaemia prevention and control: What works part i program guidance.
33. Mithra P (2014) Compliance with iron-folic acid (IFA) therapy among pregnant women in an urban area of south India. Afr Health Sci 14: 1.
34. Stoltzfus RJ, Black RE (2004) Iron deficiency anaemia. WHO press 1: 163-209.
35. Bilimale A, Anjum J, Sangolli HN, Mallapur M (2010) Improving adherence to oral iron supplementation during pregnancy. Aust Med J 3: 281-290.
36. Nisar YB, Alam A, Aurangzeb B, Dibley MJ (2014) Perceptions of antenatal iron-folic acid supplements in urban and rural Pakistan: A qualitative study. BMC Pregnancy Childbirth 14: 344.
37. Group IAC (1977) Guidelines for the eradication of iron deficiency anaemia. The Nutrition Foundation, pp: 1-29.
38. TH B (2000) Iron requirements in pregnancy and strategies to meet them. Amj Clin Nutr 72: 257-264.
39. Yekta Z, Pourali R (2008) Predicting factors in iron supplement intake among pregnant women in urban care setting. J Res Health Sci 8: 39-45.
40. Ethiopia GotFDRo (2015) National nutrition programme 2008-2015.
41. Roy MU, Singh SK, Singh VK, Srivastava AK (2013) Socio-economic determinants of adherence to iron and folic acid tablets among rural antenatal mothers in Lucknow, India. Natl J Community Med 4: 386-391.
42. Seck JR (2008) Determinants of compliance with iron supplementation among pregnant women in Senegal. Public Health Nutr 11: 596-605.
43. Dinga L (2013) Factors associated with adherence to iron/folate supplementation among pregnant women attending antenatal clinic at Tika district hospital in Kiambu county, Kenya. College of agriculture and veterinary sciences (CAVS).2183.
44. Gebre A, Mulugeta A, Etana B (2015) Assessment of factors associated with adherence to iron-folic acid supplementation among urban and rural pregnant women in north western zone of tigray, Ethiopia: Comparative study. Int J Nutr Food Sci 4: 2.
45. Gebremedhin S, Samuel A, Mamo G, Moges T, Assefa T (2014) Coverage, compliance and factors associated with utilization of iron supplementation during pregnancy in eight rural districts of Ethiopia: A cross-sectional study. BMC Public Health.
46. Mekonnen (2014) Adherence to prenatal iron/folic acid supplement and associated factors among ANC attendant mothers of Goba Woreda, South East Ethiopia.
47. Taye B, Abeje G, Mekonen A (2015) Factors associated with compliance of prenatal iron folate supplementation among women in Mecha district, Western Amhara: A cross-sectional study. Pan Afr Med J.
48. Ae A (2014) Antenatal iron and folic acid supplementation use by pregnant women in Khartoum, Sudan. BMC Res Notes 7: 498.
49. Central Statistical Agency Addis Ababa (2007) The 2007 population and housing censes of Ethiopia.