

**COMPLIANCE WITH IRON-FOLATE SUPPLEMENT AND ASSOCIATED FACTORS AMONG ANTENATAL CARE ATTENDANT MOTHERS IN MISHA WOREDA, SOUTH ETHIOPIA: COMMUNITY BASED CROSS SECTIONAL STUDY.**

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**A RESEARCH THESIS TO BE SUBMITTED TO THE DEPARTMENT OF HEALTH EDUCATION AND BEHAVIORAL SCIENCE, COLLEGE OF HEALTH SCIENCE, JIMMA UNIVERSITY, IN PARTIAL FULLFILMENT FOR THE REQUIREMENTS OF DEGREE IN MASTERS OF PUBLIC HEALTH IN HEALTH EDUCATION AND PROMOTION.**

**JUNE, 2015**

**JIMMA, ETHIOPIA**

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## **Abstract**

**Background:** Despite the efforts to reduce iron deficiency anemia during pregnancy, information on the level of compliance with iron-folate supplement and associated factors is lacking. The major problem with iron-folate supplementation in pregnancy is compliance, and this may be a potential driver to the persistent high prevalence of anemia in pregnant mothers.

**Objective:** To assess compliance with iron-folate supplement and associated factors among antenatal care attendant mothers in Misha Woreda, South Ethiopia, 2015.

**Method:** Community based cross-sectional study triangulated with in-depth interview method was conducted in Misha Woreda from March 1 to 30/ 2015. The data were collected from 296 respondents selected by simple random sampling technique after allocating the total sample to each kebele proportionally. As part of qualitative method 13 in-depth interview were conducted. Descriptive statistics, bivariate analysis and multivariable logistic regression analysis were employed to identify factors associated with compliance with iron-folate supplement.

**Results:** Three hundred three pregnant mothers were estimated for the study and from this 296 mothers were participated in the study yielding response rate of 97.6%. The compliance rate was 39.2%. Age of mothers ( $\geq 25$  years) [AOR =2.985, p-value = 0.037, 95% CI = (1.069, 8.340)], knowledge of anemia [AOR = 4.451, p-value = 0.001, 95% CI = (2.027, 9.777)], knowledge of iron-folate supplement [AOR = 3.509, p-value = 0.006, 95% CI = (1.442, 8.537)], counseling on iron-folate supplement [AOR = 4.093, p-value = 0.001, 95% CI = (2.002, 8.368)] and frequency of ANC visits [AOR = 3.558, p-value = 0.023, 95% CI = (1.189, 10.653)] were significantly associated with compliance with iron-folate supplement.

**Conclusion:** Compliance rate of iron-folate supplementation during pregnancy remains very low in the Misha Woreda. Compliance with iron-folate supplementation can be increased by providing women with clear instructions about iron-folate tablet intake and educating them about anemia and health benefits of the iron-folate-tablets. Also promoting mothers to visit ANC at least four times can improve their status of compliance with iron-folate supplementation.

**Key words:** Compliance, iron-folate supplementation, pregnancy, Ethiopia

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## **Acronyms & Abbreviations**

**ANC:** Antenatal Care

**CBOs:** Community Based Organizations

**CHMIS:** community health management information system

**EDHS:** Ethiopian demography health survey

**FMOH:** Federal ministry of health

**Hb:** Hemoglobin

**HMIS:** health information management system

**IFA:** Iron folic acid

**KII:** Key Informant Interview

**LBW:** Low Birth Weight

**SPSS:** Statistical Package for Social Sciences

**WHO:** World Health Organization

**WrHO:** Woreda health office

**ZHD:** Zonal health department

## **Chapter one**

### **1. Introduction**

#### **1.1. Background**

Anemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development. It occurs at all stages of the life cycle, but it is more prevalent in pregnant women and young children. Iron deficiency anemia (IDA) was considered to be among the most important contributing factors to the global burden of disease [1]. Nutrition related iron deficiency is the main cause of anemia throughout the world. It is especially common in women of reproductive age and particularly during pregnancy. The need for iron increases about six to seven times from early pregnancy to the late pregnancy [2]. Pregnant women are particularly at high risk for iron deficiency and iron-deficiency anemia because of increased iron needs during pregnancy. Anemia is defined as a condition where there is less than 11g/dl hemoglobin (Hb) level in the pregnant women body, which decreases oxygen-carrying capacity with levels for the pregnant women at  $Hb < 11 \text{ g/dL}$ . Severe anemia is defined as having  $Hb < 7.0 \text{ g/dL}$  [3].

The World Health Organization estimates the number of anemic people worldwide to be very high (2 billion) and that approximately 50% of all anemia can be attributed to iron deficiency [3]. Currently the global prevalence of anemia is estimated to be 30.2% in non-pregnant women rising to 41.8% during pregnancy. Anemia prevalence among pregnant women 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% [4, 5, 6].

Seventeen percent of Ethiopian women age 15-49 are anemic, with 13% having mild anemia, 3% having moderate anemia, and 1% having severe anemia. A higher proportion of pregnant women are anemic (22%) than women who are breastfeeding (19%) [7]. Recent study in Addis Ababa among pregnant mothers showed that the overall prevalence of anemia using a cut off level of hemoglobin  $< 11 \text{ g/dl}$  ( $< 33\%$  hematocrit) was 21.3% and the majority of them were of the mild type (hemoglobin: 10-10.9 g/dl) [8]. Another study in Ethiopia showed that about 18.6% and

17.5% pregnant mothers who did not take iron-folate as nutritional therapy, respectively, were anemic [9]. Anemia in pregnancy is usually associated with a negative outcome for both the woman and the neonate. Anemic women were at four times increased risk of preterm delivery. The risk of Low Birth Weight (LBW) in the anemic population was 1.9 times higher than non-anemic pregnant mothers [4, 6, 10].

## **1.2 Problem Statement**

Though anemia has multifaceted causes, half of its burden is attributed to Iron Deficiency (ID) [11]. According to the World Health Organization (WHO), 12.8% and 3.7% of maternal mortality in Asia and Africa respectively is directly attribute-able to anemia [12]. The prevalence of anemia in pregnancy has remained unacceptably high worldwide despite the fact that routine iron supplementation during pregnancy has been almost universally recommended to prevent maternal anemia especially in developing countries over the past three decades [3]. No doubt, iron and folic acid deficiency anemia are the most common causes of anemia in pregnancy and is responsible for 95% of anemia during pregnancy reflecting the increased demands for iron in pregnancy [3]. Iron deficiency anemia during pregnancy increases the risk of maternal mortality, fetal morbidity and mortality, preterm delivery and low birth weight [13]. In children, it may lead to slow growth and development, frequent infections, and some behavioral problems [13]. On the other hand folic acid deficiency can lead to adverse consequences such as hematological consequences, pregnancy complications and congenital malformations [14].

In view of this fact, iron-folic acid supplementation in pregnancy is currently the most common strategy for the control of iron and folic acid deficiency anemia during pregnancy especially in developing countries where traditional diets provide inadequate iron and where malaria and other infections causing increased losses are endemic [3]. WHO has recommended a 6-month regimen of a daily supplement containing 60 mg of elemental iron along with 400 µg of folic acid for all pregnant mothers. In areas with a higher prevalence of anemia, it is recommended that supplementation continue for three months postpartum [3]. Accordingly, in Ethiopia in confirmation of the WHO recommendation [15], the national guideline for control and prevention of micronutrient deficiencies highlights the need of daily iron supplementation for at least 6 months during pregnancy and 3 months postpartum [16]. The National Nutrition Strategy

(NNS) also set a key target of increasing the proportion of mothers who get iron supplementation for more than 90 days during pregnancy and the postpartum period to 50% by 2015. Despite of this program, in Ethiopia < 1 % took iron supplement for recommended period (90 days or more) during their last pregnancy [7].

Therefore, the major problem with iron-folate supplementation in pregnancy is compliance, as women often fail to take the supplements regularly as supplemented by their health workers due to varying factors [17,18] and this is thought to be a potential driver to the persistent high prevalence of anemia in pregnant mothers. This emphasizes the need to study the factors influencing compliance with iron-folate supplements to facilitate initiatives towards strengthening the iron/folate supplementation programs and reduce negative maternal birth outcomes associated with iron-folate deficiencies.

## **Chapter Two: Literature Review**

### **2.1 Compliance with iron-folate supplementation**

Compliance with iron-folate supplementation by pregnant mothers was found to differ across studies and setups. According to the findings of studies conducted among pregnant mothers in United State, Philippines, Nigeria and Senegal [19, 20, 18, 21] compliance with iron-folate supplementation was found 74%, 85%, 65% and 69% respectively. Another studies in Ethiopia showed that 74.9% and 20.4% of pregnant mothers were compliant with iron-folate supplementation [22, 23].

### **2.2 Reasons of missing doses of iron-folate supplement**

#### **Side effects**

A study in Bangladesh confirmed that side effects of iron tablets had very limited influence on adherence and recommended that efforts to reduce side effects may not be a successful strategy for improving adherence [24]. A study in Nigeria revealed that the reasons for non-compliance given by the 60 respondents included gastrointestinal side effects of iron supplements (41.7%) [18]. Similarly another study in Ethiopia found, a relatively higher proportion of women with low compliance (63.3%) reported side-effect as the reason for missing doses of iron [22].

#### **Shortage of iron-folate supplement at health facility**

Studies in Vietnam and review of the literature showed that inadequate and sporadic supplies of iron tablets emerge as reason to non-compliance with iron-folate supplement [25, 26].

#### **Fear of having big fetus/baby**

Beliefs about health and treatment may also interfere the compliance of iron-folate supplementation. Some women in Thailand decided not to take supplements because they thought iron caused bigger babies and difficult deliveries [27]. A cross-sectional study done in Vientiane showed that reason for low compliance with iron supplementation was fear of having big fetus [28]. Also this finding is consistent with the study conducted in Amhara region of Ethiopia [23].

## **Forgetfulness**

An institutional cross-sectional study that was done in India showed that the main reason for skipping the dose was forgetfulness (48.8%) [29]. Another cross-sectional study in Vientiane found that the reason of skipping doses of iron tablets among pregnant women was forgetfulness (47.9 %) [28]. A cross-sectional study in Ethiopia showed that amongst pregnant mothers who skipped the doses of iron, the leading underlying reason was forgetfulness [22].

## **2.3 Factors associated with compliance with iron-folate supplement**

### **2. 3.1 Socio-demographic and economic variables**

The cross-sectional study results in India showed that the compliance was higher among the subjects from lower socioeconomic class, with increasing age and birth [29] and also this finding is consistent with the study done in Ethiopia [23].

The cross-sectional study conducted in Nigeria showed that tertiary education (58%) was identified as a strong determinant of compliance to iron supplementation in pregnancy. Also this study explained that the higher compliance rate (57%) among the women of higher social class than the women of lower social class [18]. Another study has shown that education beyond high school is positively associated with adherence [29]. An institution based cross-sectional study done in Nigeria showed that single and teenage mothers and those aged 35 years and above were less likely to be compliant and married women, those in urban location, and those aged 20-29 years were more compliant with iron supplementation [30].

### **2. 3.2 Supplement related variable**

#### **Taste of iron-folate tablet**

A cross sectional study in Philippine revealed that dislike of taste of iron tablet was negatively associated with the percentage of tablets that were consumed [20].

### **2.3.3 Pregnancy and experiences related variables**

A cross-sectional study done in India showed that 68% of respondents who had second and above order of pregnancy were compliant with iron-folate supplementation during their pregnancy [29]. Pregnant women with pregnancy complications due to antenatal causes and medical causes were slightly less compliant with iron-folate supplementation than routinely antenatal care pregnant women 78.5% vs 80% [31]. Another cross-sectional study done in India revealed that multipara pregnant women were less likely to consume sufficient iron-folate tablets [32]. Pregnant mothers with history of anemia during pregnancy were compliant with iron-folate supplementation [23]. A cross-sectional study done in Cambodia revealed that number of antenatal care visits were considered to be significantly associated with compliance with iron-folate supplementation [17]. Another cross-sectional study done in Philippines showed that fewer prenatal visits per month were associated with a lower percentage of iron pills consumed [20].

### **2. 3.4 Facility related variables**

#### **Counseling on iron-folate supplement**

A cross-sectional study in Haryana state of India revealed that those pregnant women who received advice from health workers were more compliant with iron supplementation (80.47%) [34]. The finding indicates that enhancing the awareness of mothers on iron-supplement can substantially improve the utilization of iron supplementation [22]. Previous studies conducted in Cambodia [17] and Sweden [34] also came up with parallel findings. Another study in Senegal showed that the quality of counseling during the prenatal visit is a very important determinant of compliance with iron-folate supplementation [21]. Community based cross-sectional study in Ethiopia showed that only 38.4% of the respondents were informed about the significance of iron supplementation during the pregnancy and this variable was strong predictor of iron supplement utilization [22].



## **2. 3.5 Personal variables**

### **Knowledge of anemia and importance of iron-folate supplementation**

Knowledge of anemia and its prevention has also been identified as an important factor for taking iron-folate supplements [17]. When the level of knowledge about anemia and its prevention among pregnant women is very low then there is less compliance to the supplement.

The study found that there was a significant association between knowledge on anemia and compliance of pregnant women regarding iron supplementation [34]. A cross-sectional study in Nigeria revealed that women with good knowledge of iron supplementation in pregnancy were six times more likely to comply with iron supplementation than those with poor knowledge [18]. A cross-sectional study in Ethiopia showed that Limited proportion of the women (51.4%) had comprehensive knowledge of anemia [22].

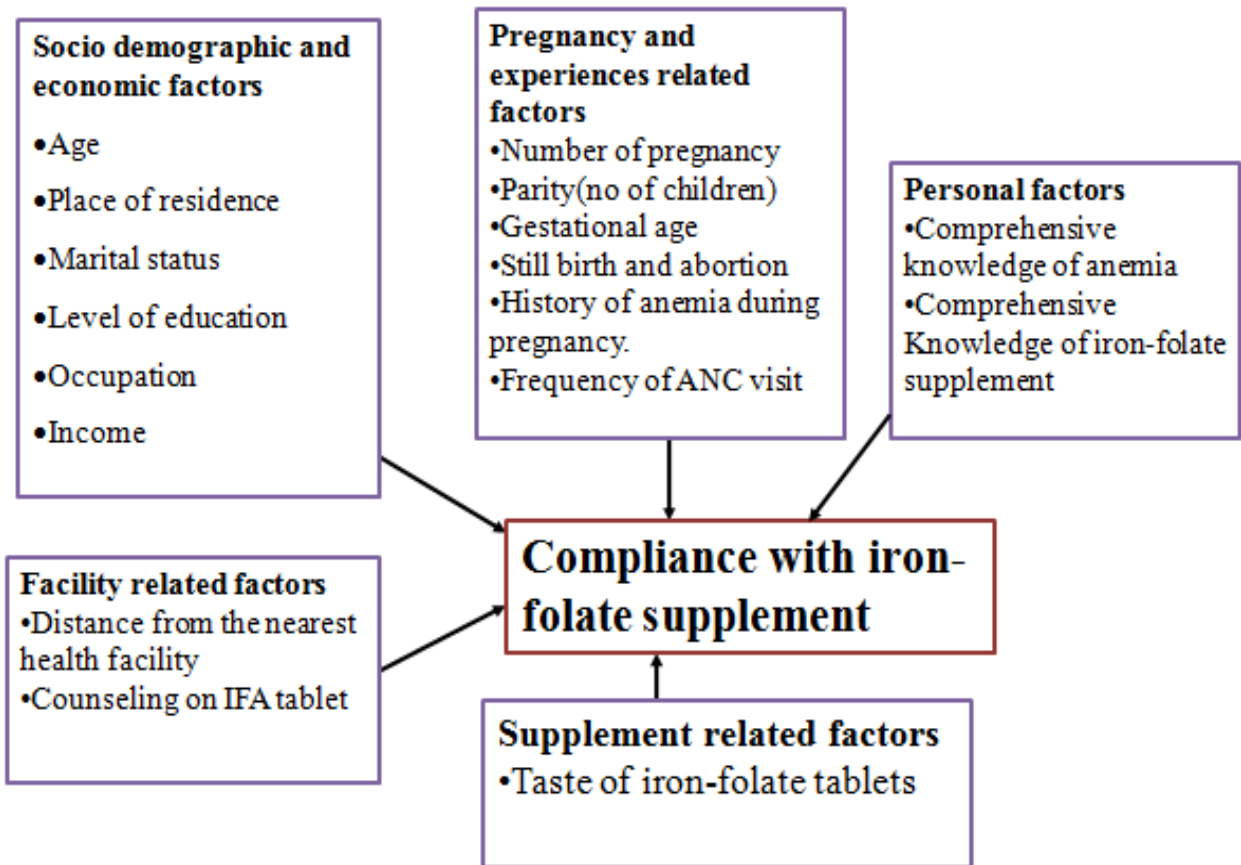


Figure 1: Conceptual frame work developed by investigator based on literature review.

## **2.4 Significance of the study**

Iron supplementation has been a major strategy to reduce iron deficiency anemia in pregnancy. However, issues of compliance with iron-folate supplementation remain unresolved. The strategies used for control of nutrition problems need regular review to maintain and improve their effectiveness.

This study will contribute towards the improvement of compliance with iron-folate supplementation in order to mitigate anemia status of pregnant women.

Also this study will provide information on the current situation for policy makers, program managers and advocators on compliance with iron-folate supplementation to serve as a basis for improving the supplementation program for pregnant mothers.

## **Chapter Three: Objectives**

### **3.1 General objective**

- To assess compliance with iron-folate supplement and associated factors among antenatal care attendant mothers in Misha Woreda, South Ethiopia, 2015.

### **3.2 Specific objectives**

- To determine status of compliance with iron-folate supplement among ANC attendant mothers.
- To identify factors affecting compliance with iron-folate supplement among ANC attendant mothers.

## **Chapter 4: Methods and materials**

### **4.1 Study area and period**

The study was conducted in Misha woreda, from March 1 to 10/2015. Misha woreda is one of the districts in Hadiya Zone, SNNPR, Ethiopia. It is located 230km away from Addis Ababa, capital city and 194km from the regional capital town, Hawassa.

The study area has 37 kebeles with a total population of **160029** (Males = 77891; Females = 82138). Estimated number of pregnant women in the woreda is 5537. It is bounded by Gibe in the West, Lemo woreda in the East, Gurage Zone in the North and Gomboro woreda in the South. The Woreda has both dega (45% of the area) and woinedega (55% of the area). More than 95% of the population is engaged in agriculture. There are 20 primary schools (1-8) and three high schools. In addition to this, the woreda has 42 health institutions (35 health posts and 7 health center). The proportion of pregnant women constitutes 3.46% of the total population.

### **4.2. Study Design**

A community based cross sectional study triangulated with in-depth interview method.

### **4.3 Population**

#### **4.3.1 Source population;**

The source population of this study was all pregnant mothers in Misha Woreda, attending ANC service and being supplied with Iron-Folate supplement.

#### **4.3.2 Study population**

Sampled pregnant mothers in Misha Woreda who were using ANC and iron-folate supplement had been given. Pregnant mothers who were not participants in quantitative study and health extension workers were study population for qualitative study.

#### 4.4 Inclusion and exclusion criteria

Pregnant mothers who had attended Antenatal Care for at least two months preceding the study period and had received iron-folate supplementation were included in the current study. But those who were unable to respond or very sick were excluded.

#### 4.5 Sample size determination and sampling technique

##### 4.5.1 Sample size determination

The sample size was determined using single population proportion formula with the degrees of accuracy set at 0.05.

$$n = Z(\alpha/2)^2 pq/d^2$$

Where:

**n**- Estimated sample size

**Z**-z value for the chosen confidence interval (usually 0.95  $\alpha=0.05=1.96$ )

**p**- Level of compliance with iron-folate supplementation in Ethiopia 74.9% [22]

**q**- 1-p

**d**-the precision required for the estimate (0.05 used)

$$\text{Hence } n = (1.96^2 * 0.749 * 0.251) / 0.05^2 = 289$$

Since the number of estimated pregnant women in the woreda i.e. source population (N = 5537) is less than 10,000, correction was needed as follow

$$nf = \frac{n}{1 + \frac{n}{N}} = \frac{289}{1 + \frac{289}{5537}} = \frac{289 * 5537}{5826} = 275$$

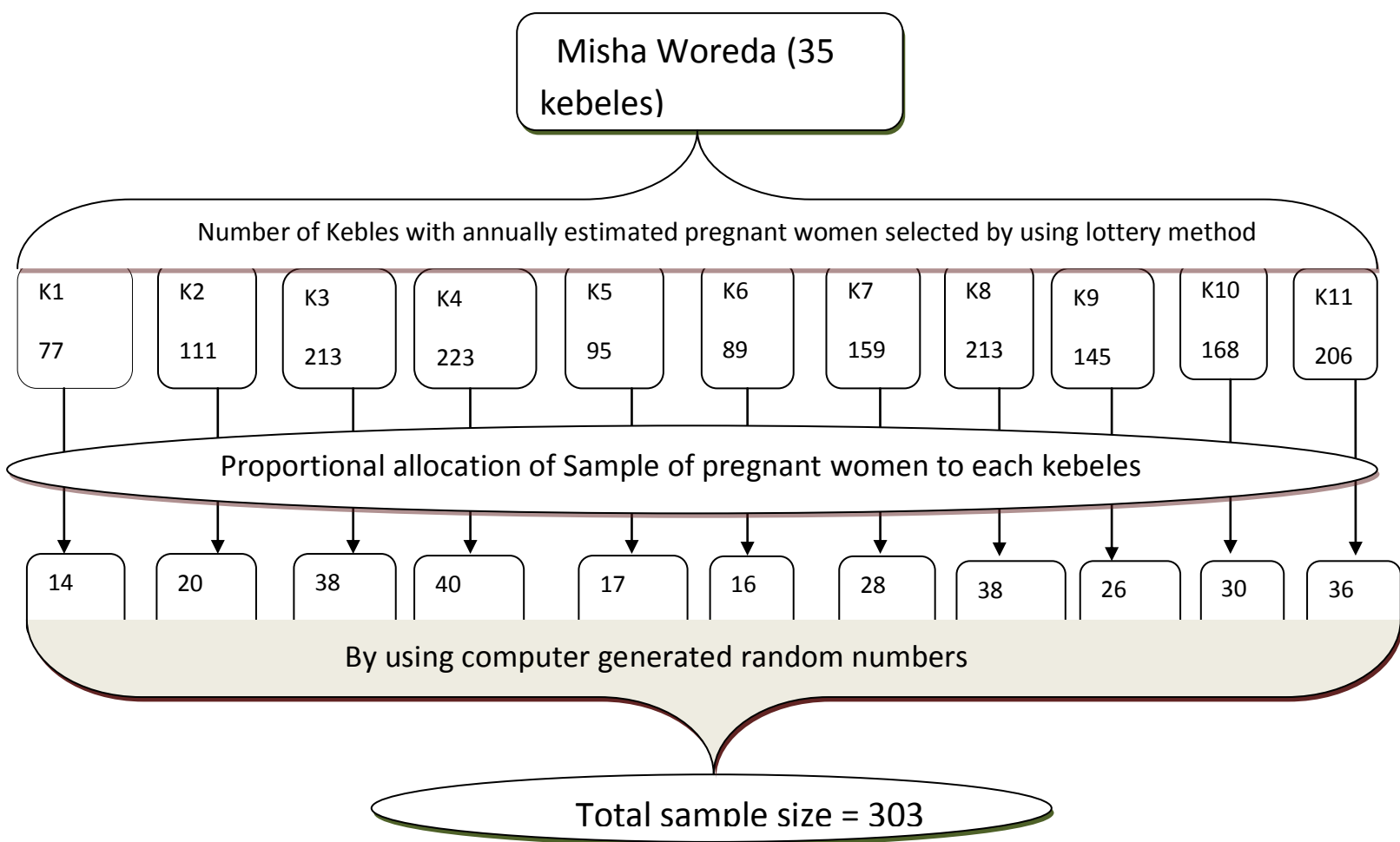
When a 10% non response rate was considered, the total sample size was 303 pregnant women. The study participants were selected based on the inclusion and exclusion criteria by using simple random sampling method.

**For qualitative study:** in-depth interview method was utilized to explore inherent views of the participants and further build-up and supplement the results of quantitative study. A total of 13

participants including 8 pregnant mothers who were not involved in quantitative study and 5 health extension workers were participated in in-depth interview.

#### **4.5.2 Sampling technique**

**For quantitative study:** There were 35 kebeles in the Misha Woreda. From these, 11 kebeles were selected by using lottery method. According to data obtained from misha woreda health office the annual pregnant women in the selected kebeles were estimated to be 5537. Sample size was determined proportionately to each kebeles. Simple random sampling technique was employed to select study subjects from the kebeles. Prior to the actual data collection, the list of Study subjects was identified by using community health management information system (CHMIS) folder in the health posts and health management information system (HMIS) in the health centers. Then those household numbers were picked up based on the existing house number in the CHMIS folder. Finally the study participants were selected by using random number generated by computer program. The name and address of pregnant mothers were specified and location was identified in collaboration with the Keble's health extension workers and leaders. The identified pregnant mothers were interviewed in each Keble till the number of sampled populations was completed. Selected study subject who refused to participate in this study were considered as non-respondent.



**Figure 2:** Schematic presentation of sampling procedure



**For qualitative study:** Criterion purposive sampling technique was used to select pregnant mothers and health extension workers.

## **4.6 Variables**

### **4.6.1 Dependent variable**

Compliance with iron–folate supplement

### **4.6.2 Independent Variables**

- **Socio-demographic and economic factors**
  - ✓ Maternal age
  - ✓ occupation
  - ✓ educational status
  - ✓ marital status
  - ✓ place of residence
  - ✓ monthly income
- **Pregnancy and experiences related factors**
  - ✓ Number of pregnancy
  - ✓ gestational age
  - ✓ parity,
  - ✓ Still birth and abortion
  - ✓ History of anemia during pregnancy
  - ✓ Frequency of ANC visit
- **Supplement related factors**
  - ✓ Taste of iron-folate supplement
- **Facility related factors**
  - ✓ Distance from the nearest health facility
  - ✓ Counseling on IFA supplement

➤ **Personal factors**

- ✓ knowledge of anemia
- ✓ Knowledge on importance of iron-folate supplement

#### **4.7 Instrument and measurements**

**For quantitative part of study:** Pretested and structured questionnaire was used as an instrument for quantitative study. The questionnaire was prepared in English and it was translated in to hadiyisa language by an individual who have good ability of both languages and again was translated back to English language by different individuals who were blind to the original version of the questionnaire (English version) in order to facilitate reliable responses to underline questions and keep the original meaning of the instrument.

Data was collected through interview using standard structured questionnaire which was adapted from previously done similar studies. The questionnaire has six parts which assess socio demographic and economic characteristics (6 items). The personal factors (knowledge of anemia consists of (18 items) that focus mainly on sign, causes, consequences and treatment of anemia. The level of knowledge of anemia was categorized as poor and good level of knowledge based on the median score. Knowledge of iron-folate supplementation consists (8 items) that focus mainly on reasons for iron-folate supplementation during pregnancy and possible effects of iron-folate deficiency. The level of knowledge of importance of iron-folate supplementation was categorized as poor and good level of knowledge based on the median score). Assessment of compliance with iron-folate supplementation was based on previous week of the survey recall. Pregnant mothers were considered to be compliant with iron-folate supplement if they took at least 70% of the expected dose of the iron folate tablets based on one tablet per day in seven days of the previous week of the study and this is equivalent to consuming at least five iron-folate tablets per week [22]. Supplement related factors (1 item), facility related factors (2 items) and pregnancy and experiences related factors (6 items). Before the actual data collection, the questionnaire was pre-tested on 5% of the total sample size in misha Woreda outside of the study area. Pre-test was done to ensure that respondents were able to understand the questions and to check the wording, logic and skip order of the questions in a sensible way to the respondents. Amendments were made accordingly after pre-testing.

**For qualitative part of the study:** Pregnant women who were not included in quantitative part of study and health extension workers were included in in-depth interview. Guides for in-depth interview were prepared. In in-depth interview; reasons for not taking iron-folate supplement as prescribed by their health providers and cultural beliefs concerning iron-folate supplementation during pregnancy were explored.

#### **4.8 Data collection procedure**

**For quantitative part of study:** The data was collected for from March 1-30/2015 from selected kebeles. Data was collected through face to face interview of pregnant women using hadiyisa language version instrument. Data collectors were 7 diploma nurses. They conducted the interview at the women's house of those who were eligible.

Data collection was supervised at each study kebeles by 2 health officers. For both data collectors and supervisors one day orientation was given on data collection instrument, interview technique and importance of taking informed consent before data collection starts. Each day data was checked for completeness and consistency.

**For qualitative part of study:** In-depth interview was conducted with purposely selected pregnant mothers and key informants (health extension workers) by the principal investigator. And it was held in quit and comfortable place. Note was taken during each and every interview session.

#### **4.9 Operational definitions**

**Compliance:** it involves whether the antenatal client follows recommendations made by the provider with respect to timing, dosage, and frequency of iron-folate tablet taking.

**Compliant:** pregnant mothers were considered to be compliant with iron-folate supplement if they took at least 70% of the expected dose of the iron folate tablets based on one tablet per day in seven days of the previous week of the study, which is equivalent to consuming at least five tablets per week [22].

**Knowledge of anemia:** what the individual knows about anemia and its signs, causes, consequences and treatment. Respondents' overall knowledge was computed by summing up (18 items) all correct answers as "1" and incorrect/misconceptions as "0".

**Knowledge of importance of iron-folate supplementation:** what the individual knows about importance of iron-folate supplementation during pregnancy, reasons for iron-folate supplementation during pregnancy and possible effects of iron-folate deficiency. Respondents' overall knowledge was computed by summing up (8 items) all correct answers as "1" and incorrect/misconceptions as "0".

**Good knowledge:** those respondents whose level of knowledge was above median value.

#### **4.10 Data processing & analysis**

**For quantitative part of study:** After data collection, each questionnaire was checked for completeness and code was given during data collection. Collected data was edited, coded and entered to Epi data version 3.1 and then it was exported to SPSS version 16 for analysis. Descriptive statistics like frequency tables, graphs and descriptive summaries were used to describe the study variables.

Bivariate analysis, binary logistic regression test was performed to see the existence of association between dependent and independent variables. First all factors was analyzed by bivariate analysis. Then variables with P-value  $\leq 0.25$  in the bivariate analysis were entered into multivariable logistic regression analysis. 95% CI and p-value less than 0.05 was used as cut of point to see presence of statistical significance.

To control the effect of confounding variables and to identify determinants of compliance with iron-folate, multivariable logistic regression analysis was used. Different models were fitted for the different groups of explanatory variables. While fitting the different groups of variables in different models, variables which show significant association with the outcome variable were reported at every step, model one to the final model. Finally all groups of explanatory variables were fitted to a single model. Goodness-of-fit model was checked by the Hosmer-Lemeshow

statistic. Variables with p-value  $<0.05$  were reported in this single model as determinants of compliance of iron-folic acid using both p-values and adjusted odds ratios (AORs).

**For qualitative study:** after the interview data was transcribed word by word into the hadiyisa language and then translated into English language. Then similar responses were grouped and summarized based on thematic area or the key variables of the study and results were analyzed according to their thematic area descriptively. Finally results of the qualitative study were triangulated with the quantitative results.

#### **4.11 Data quality management**

Data collectors were selected based on ability to speak the local language and previous experience of data collection. Orientation was provided to selected data collectors for one day about the objective and process of data collection. Vague points and other problems encountered about the questionnaire were given explanations and clarifications. Closer supervision was undertaken during data collection. Every questionnaire was crosschecked daily by the supervisors and the principal investigator. Problems faced were discussed over night with data collectors and the supervisors. Pre-testing was done in 15 pregnant mothers in misha woreda outside the study area in order to prevent information contamination. Chronbach's alpha coefficient was used to estimate the reliability of questionnaire. Credibility of qualitative study was enhanced by prolonged contact between investigator and study subjects (by avoiding premature closing).

#### **4.12 Ethical consideration**

The study was obtained ethical clearance from ethical committee of Jimma University, college of health science. Permission paper was obtained from Administration of misha woreda head office. Similarly after clear discussion about the actual study or explaining of purpose of the study, verbal informed consent was obtained from each study participants while the study subjects right to refuse was respected.

### **4.13 Dissemination plan**

The final result of this study will be presented to Jimma University, College of Health science, Hadiya zone health department, Misha woreda health office and other organizations working on related area. The findings may also be presented in different seminars, meetings and workshops and Efforts will be made to publish it in a journal.

## **Chapter 5 Result**

### **5.1 Socio-demographic and economic Characteristics of respondents**

From a total of 303 pregnant mothers, 296 were involved in the study, yielding a response rate of 97.6%. The mean age of the study participants was 29.07 (SD± 6.0) years. A majority, 222 (75%) were 20-34 years old. About quarter 71(24%) of them were in the age range of 35-49 years While only 3(1%) of subjects were under 20 years old. By their marital status, 2(0.7%) were single, 291(98.3%) were married and 3(1%) were widowed. Forty three (14.5%) were illiterate, 137(46.3%) were grade 1-8 and 116(39.2%) were secondary (9-12) and above level of education.

Most of the respondents, 270(91.2%) were from rural area while 26(8.8%) were from urban area. Greater part of respondents 261(88.2%) were housewife, 25(8.4%) were government employed and 10(3.4%) were self employed and students. Ninety five (32.1%), 100(33.8%) and 101 (34.1%) respondents had low ( $\leq 500$  Birr), medium (500-900 Birr) and high ( $\geq 900$  Birr) monthly income respectively (Table1).

**Table 1: Socio-demographic and economic characteristics of respondents in misha woreda, southern Ethiopia, May 2015**

Back ground variables	Categories	Frequency	Percent
Residence of the mother	urban	26	8.8
	rural	270	91.2
Women's educational status	illiterate	43	14.5
	primary (1-8)	137	46.3
	secondary (9-12) and above	116	39.2
Marital status	single	2	.7
	married	291	98.3
	widowed	3	1.0
Women's occupation	house wife	261	88.2
	government	25	8.4
	Others*	10	3.4
Age of women	15-19	3	1.0
	20-34	222	75.0
	35-49	71	24.0
Monthly income	Low (<=500 Birr)	95	32.1
	Medium (500-900 Birr)	100	33.8
	High (>=900 Birr)	101	34.1

\* others include :( students and self employed)



## **5.2 Personal variables**

### ***Comprehensive knowledge of anemia among respondents***

Comprehensive knowledge of anemia was computed from summing up all relevant 18 knowledge items (4 items on sign and symptoms of anemia; 6 items for anemia causes; 6 items for consequences of anemia during pregnancy, 2 items on prevention and treatment of anemia during pregnancy. A correct answer for each item scored as “1” and incorrect answer was scored as “0”. Then items were summed up and converted to 100 %. Accordingly, the median score was 61.1, mode 72.2 and the mean was 61.9 (SD=17.4).

About 56.1% of the respondents scored above the median value, therefore they had good knowledge of anemia and the remaining were scored below the median value.

### ***Comprehensive knowledge of iron-folate supplement among respondents***

Comprehensive knowledge of iron-folate supplement was computed from summing up all relevant 8 items (3 items on benefits of iron-folate supplementation and 5 items on possible effects of iron deficiency anemia during pregnancy). A correct answer for each item scored as “1” and incorrect answer was scored as “0”. Then items were summed up and converted to 100 %. Accordingly, the median score was 62.5, mode 75 and the mean was 63.8 (SD=21.9).

About 61.5% of the respondents scored above the median value and the remaining were scored below the median value.

## **5.3 Pregnancy and experiences related variables**

From total respondents 261(88.2%) of mothers were multigravida and 35(11.8%) were primigravida. A high percentage of the pregnant mothers interviewed were in their third trimester 239(80.7%) while 57(19.3%) were in their second trimester. Concerning the parity of the respondents 191(64.5%) of mothers were multipara and 66(22.3%) and 39(13.2%) of respondents were primipara and nullpara respectively. When the respondents were asked if they had any history of birth pregnancy related complications such as abortions and still births, 6(2%) confirmed they had a history while 256(86.5%) did not have. When the respondents were asked if they had any history of anemia during pregnancy confirmed by clinical health workers,

55(18.6%) confirmed they had a history while 241(81.4%) did not have. Concerning the utilization of antenatal care, 261(88.2%) of respondents visited ANC for less than four times and 35(11.8%) of respondents visited ANC for greater than or equal to four times.

#### **5.4 Supplement related variable**

As part of supplement related variable, only 5(1.6%) respondents reported the disliking of taste of iron-folate supplement.

#### **5.5 Facility related variables**

From the total respondents 232(78.4%) said that it took them 30 minutes or less to reach the nearest health institution from their residence, 62(20.9%) of pregnant mothers said that it took 30-60 minutes to reach the institution and 2(0.7%) mothers reported it took greater than 60 minutes to reach the nearest health institution.

One hundred fifty four (52%) of respondents got counseling on IFA tablets and 48% of respondents didn't get counseling on IFA tablets.

#### **5.6 Compliance with iron-folate supplementation**

Among 296 mothers who were given/prescribed iron-folate supplements during the pregnancy, the level of compliance was assessed based on the reported number of doses taken in the preceding 7 days of the survey. One hundred eighty (60.8%) respondents took <70% of expected dose of the IFA supplements i.e. for less than five days in a week and 116(39.2%) respondents took greater than or equal to 70% of expected doses of the IFA supplement in a week i.e. for greater than or equal to five days in a week (figure 3).

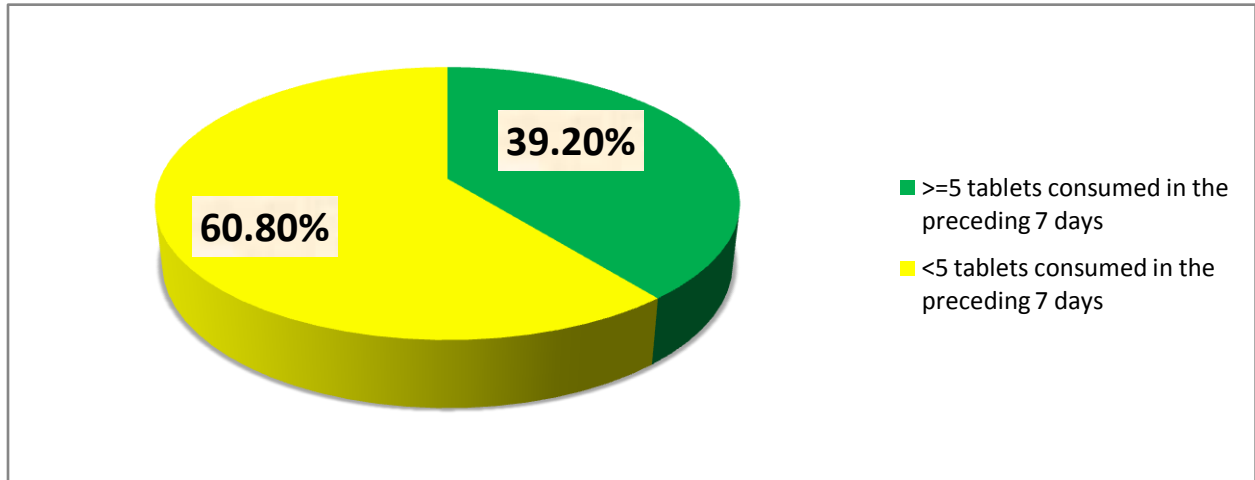


Figure 3 status of compliance with iron-folate supplementation among pregnant mothers

### 5.7 Reasons for missing the doses of iron-folate supplement among respondents

Amongst women who missed the doses of IFA supplement, the leading underlying reason was side-effects 125(50.6%). From those respondents who reported missing of IFA doses due to side effects, 96(76.8%) respondent reported heart burn, 19(15.2%) respondents reported nausea and vomiting and 10(8%) respondents reported stomach cramping. The other reasons of skipping doses of IFA supplement were forgetfulness 104(42.1%), perceived shortage of iron-folate supplements in health facility 13(5.3%) and not liking the taste of IFA supplement 5(2%).

Supportive result in qualitative revealed most pregnant mothers from in-depth interview reported that main reason of missing dose of iron-folate supplement was fear of side effects of iron-folate tablet.

*“.....I feel nausea and heartburn as soon as I took the tablets. So, I stopped to take iron-folate tablets.” [Pregnant mothers, age 32]”*

From the key informant interview most of the participants argued that the main reason of missing the dose of iron-folate supplement was gastrointestinal side effect of the iron-folate tablets *“heartburn”*.

*“....Some pregnant mothers reported the missing of doses of iron-folate tablets during their ANC visits the reason they told me that they felt the heartburn(gastric problem) when they took the tablets.” [Health extension worker, age 25]*

Another qualitative finding revealed that the second main reason forwarded by the in-depth interview participants was forgetfulness.

*“.....I want to take the iron-folate tablet as prescribed but I forget to take the tablet regularly.” [Pregnant mothers, age 26]*

In this study it was assessed about cultural beliefs related with intake of iron-folate supplement during pregnancy quantitatively but none of the respondent reported missing of iron-folate supplement due to cultural beliefs (example, fear of having big fetus/baby).

Also qualitative result depicted that non-of the in-depth interview and key informant interview participants reported the fear of having big baby/fetus and beliefs of any other bad effects due to consuming of iron-tablet during pregnancy.

*“.....I haven't any fear of bad effects because of consuming iron-folate tablet during my pregnancy and as far as I know there is no this type of belief in our community.”[Pregnant mother, age 29]*

*“.....As far as I know there are no cultural or personal beliefs related with intake of iron-folate tablet during pregnancy in our community.”[Health extension worker, age 28]*

Supportive results in qualitative revealed that there were rare times in which iron-folate supplement was not available adequately in the health posts. Some of the key informants (health extension workers) argued that there was fluctuation of supply of iron-folate supplement.

*“.....the supply of iron-folate supplement is sometimes imperfect in our health post and during this time pregnant mothers would be supplied by iron-folate supplement inadequately.”[Health extension worker, age 27]*

## 5.8 Proportion of compliance with iron-folate supplement by selected characteristics of respondents

### Maternal age

By mothers age group , proportion of mothers who were compliant with iron-folate supplement were found higher among mothers with age 35-49 and 20-34 years 40.8% and 38.75% respectively compared to age groups 15-19 years (33%). Figure 4

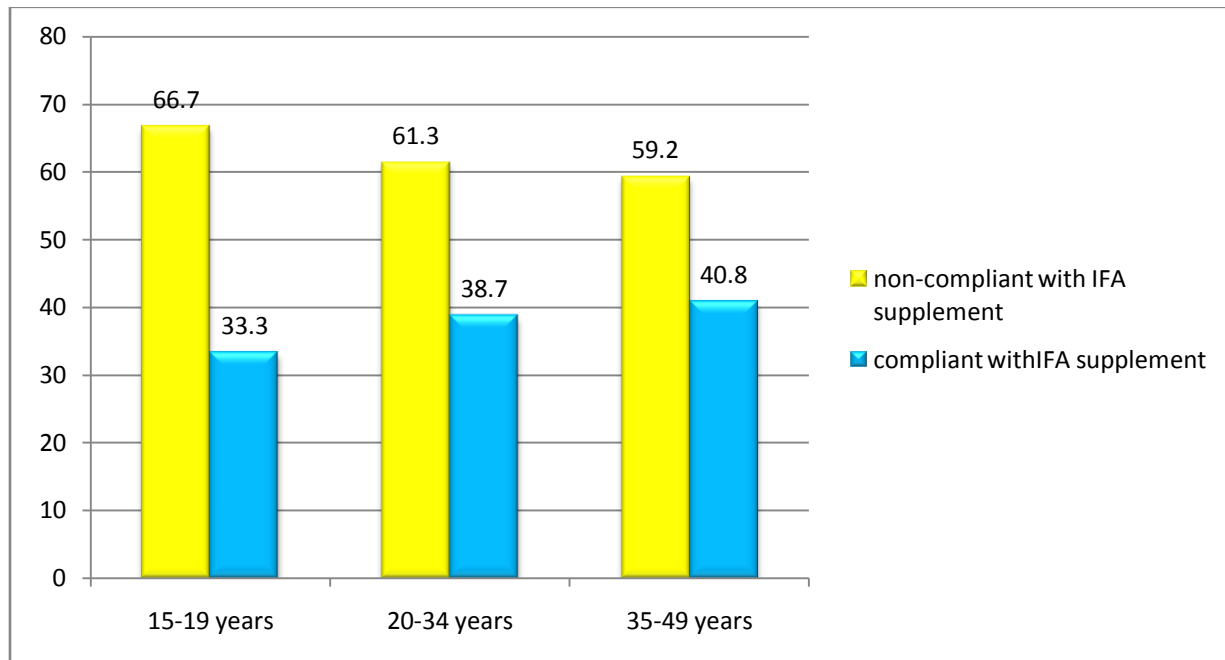


Figure 4 Distribution of compliance with IFA supplement among pregnant mothers disaggregated by age, misha woreda, southern, Ethiopia, May 2015

## Maternal education

Proportions of compliance with iron-folate were found increasing across educational levels of pregnant mothers. Prevalence of compliance with iron-folate supplement increases from 23.3% in pregnant mothers with no education to 28.5% among mothers with primary education and to 57.8% among pregnant mothers with secondary or higher education (Fig 5).

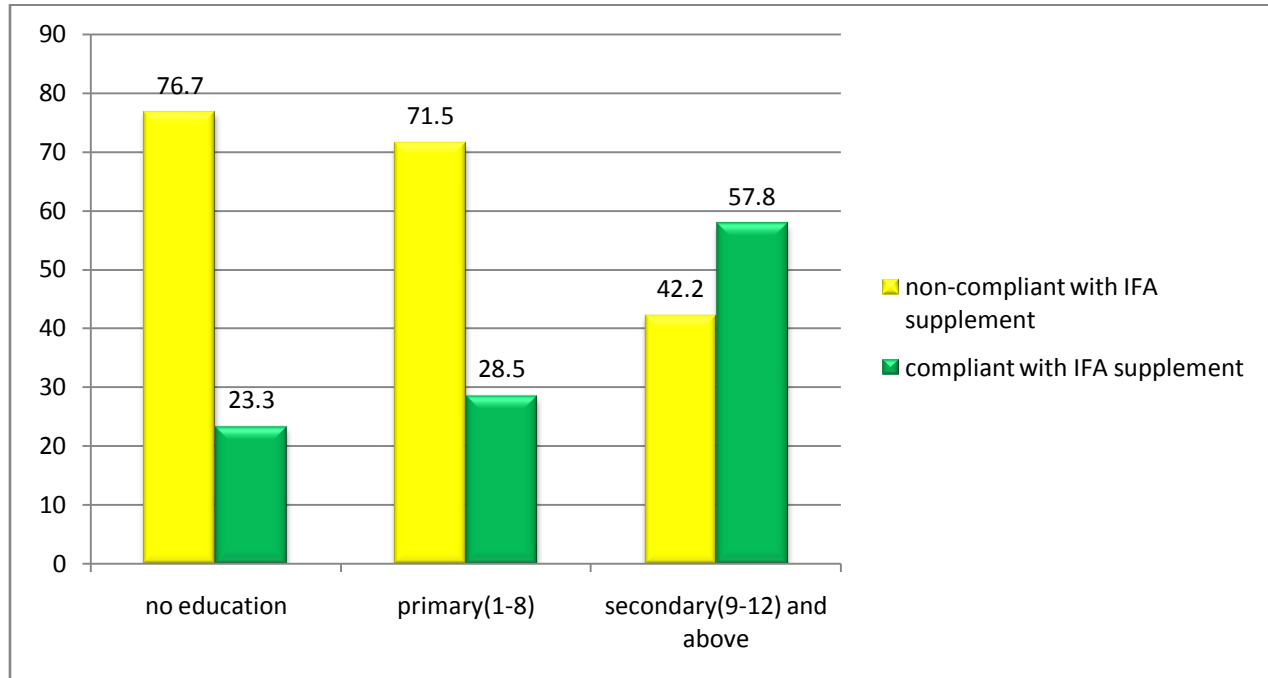


Figure 5 Distribution of compliance with IFA supplement among pregnant mothers by their educational status, misha woreda, southern, Ethiopia, may 2015.

### Frequency of ANC visit

Proportion of mothers who were compliant with iron-folate supplement (74.3%) were found higher among mothers who visited antenatal care for greater or equal to four times compared to mothers who visited ANC for less than four times. Figure 6

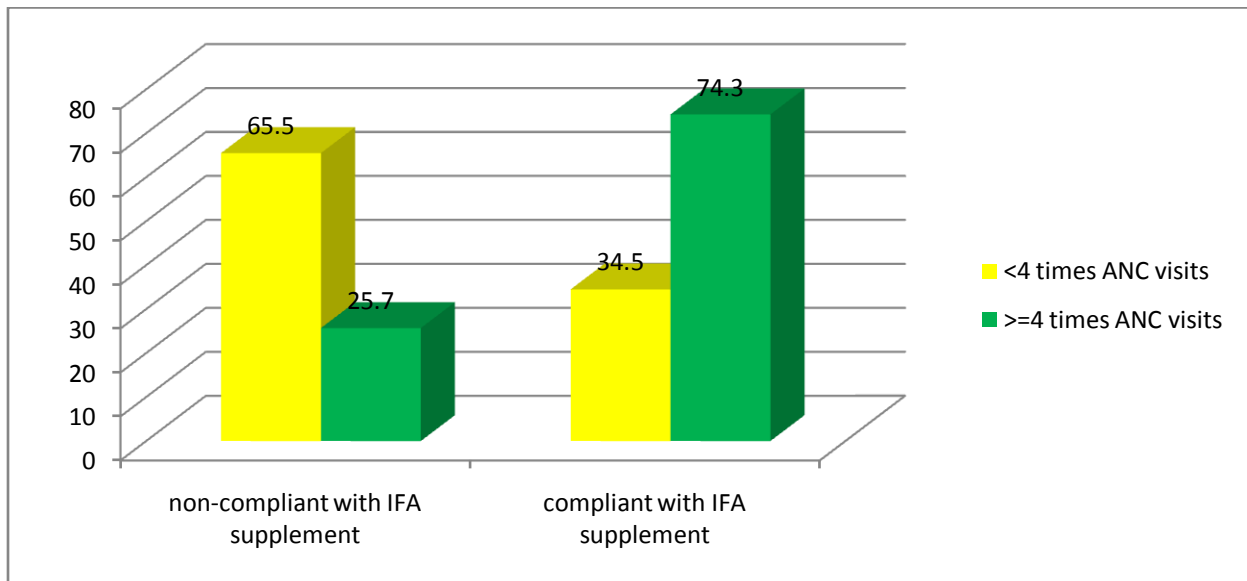


Figure 6 Distribution of compliance with IFA supplement among pregnant mothers by their frequency of ANC visit, misha woreda, southern, Ethiopia, may 2015.

## Knowledge of anemia

Proportion of mothers who were compliant with iron-folate supplement were found higher among mothers who had good knowledge about anemia 59.0% compared to mothers who had poor knowledge about anemia 13.8%. Figure 7

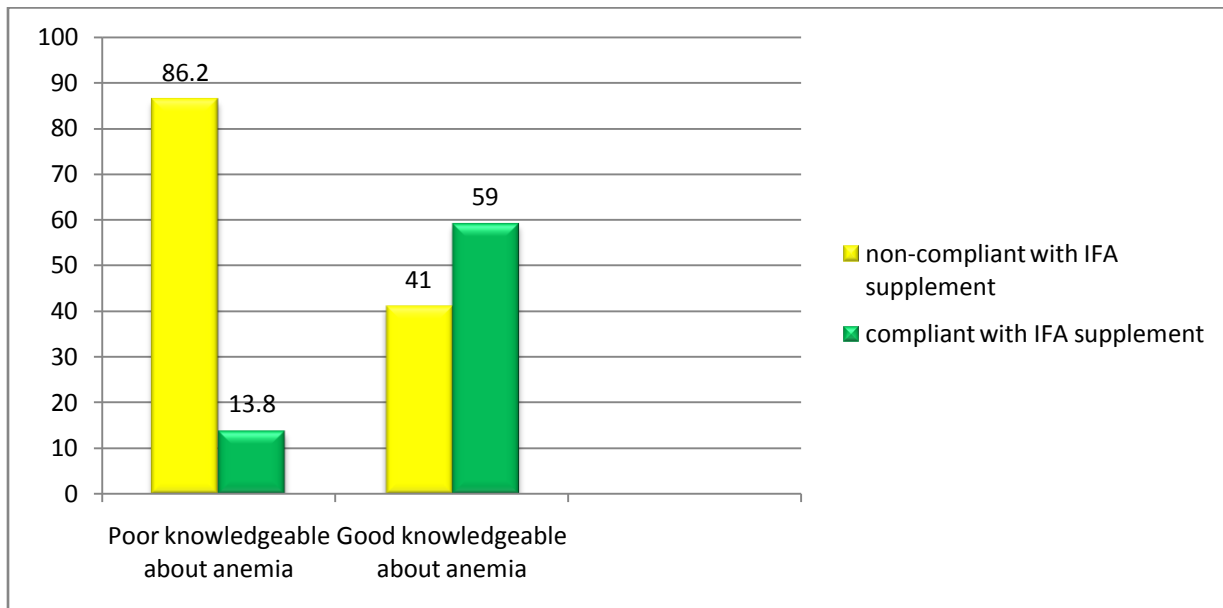


Figure 7 Distribution of compliance with IFA supplement among pregnant mothers by knowledge of anemia, misha woreda, southern, Ethiopia, may 2015.



## **Factors affecting compliance with iron-folate supplement**

Compliance with iron-folate supplement was assessed for its association with selected variables. First all factors were analyzed by bivariate analysis. Then variables with P-value  $\leq 0.25$  in the bivariate analysis were entered into multivariable logistic regression analysis. Multivariable analysis in the multivariable logistic regression model showed that age of pregnant mothers, counseling on iron-folate supplement, knowledge of IFA supplement, knowledge of anemia, and frequency of ANC visits were significantly associated with compliance with iron-folate supplement during pregnancy. In this study the result showed that pregnant mothers whose ages were  $\geq 25$  years 2.9 times more likely complied with iron-folate supplement than those pregnant mothers  $< 25$  years old (AOR = 2.985, p-value = 0.037, 95% CI = (1.069, 8.340)). In this study pregnant mothers who had good knowledge of iron folate supplement were 3.5 times more likely to be compliant with iron-folate supplement compared to those who had poor knowledge about iron-folate supplement (AOR = 3.509, p-value = 0.006, 95% CI = (1.442, 8.537)). Pregnant mothers who had good knowledge of anemia were 4.4 times more likely to be compliant with iron-folate supplementation during pregnancy compared to those who had poor knowledge (AOR = 4.451, p-value = 0.001, 95% CI = (2.027, 9.777)). Similarly visiting ANC four and above times was considered to have significant effects on compliance with iron-folate supplement. Mothers who had visited ANC for four and above 3.5 times more likely to be complied with IFA supplement compared to mothers who visited ANC for less than four times (AOR = 3.558, p-value = 0.023, 95% CI (1.189, 10.653)). In this study pregnant mothers who were counseled on iron-folate supplement during pregnancy, 4 times more likely complied than those who were not counseled on intake of IFA supplement (AOR = 4.093, p-value = 0.001, 95% CI = (2.002, 8.368)).

**Table 2: Multivariable logistic regression result of compliance with IFA supplement with independent variables in Misha Woreda, South Ethiopia, May 2015.**

variables	compliance with IFA supplement		COR (95% CI)	AOR(95% CI)
	non-compliant	compliant		
age of mothers				
<25	15(23.4)	49(76.6)		1
>=25	101(43.5)	13(56.5)	2.519(1.336, 4.747)	<b>2.985(1.069, 8.340)*</b>
educational status of mothers				
no education	33(76.7)	10(23.3)		1
primary(1-8)	98(71.5)	39(28.5)	1.313(0.591, 2.920)	1.227(0.425, 3.547)
secondary(9-12) and above	49(42.2)	67(57.8)	4.512(2.032, 10.019)	2.382(0.838, 6.768)
occupation				
housewife	173(65.3)	92(34.7)		1
Others	7(22.6)	24(77.4)	6.447(2.677, 15.529)	2.989(0.773, 11.558)
counseling on IFA				
Yes	66(42.9)	88(57.1)	5.429(3.220, 9.152)	<b>4.093(2.002, 8.368)*</b>
No	114(80.3)	28(19.7)		1
knowledge of anemia				
poor knowledgeable	112(86.2)	18(13.8)		1
good knowledgeable	68(41.0)	98(59.0)	8.967(4.991,16.112)	<b>4.451(2.027, 9.777)*</b>
knowledge of IFA supplement				
poor knowledgeable	99(86.8)	15(13.2)		1
good knowledgeable	81(44.5)	101(55.5)	8.230(4.442, 15.248)	<b>3.509 (1.442, 8.537)*</b>

frequency ANC visits				
<4 times	171(65.5)	10(34.5)		1
>=4times	9(25.7)	26(74.3)	5.489(2.467, 12.214)	<b>3.558(1.189, 10.653)*</b>
gravidity				
primigravida	23(65.7)	12(34.3)		1
multigravida	157(60.1)	104(39.9)	1.545(0.862, 2.766)	1.243(0.566, 2.729)
gestational age				
2nd trimester	45(78.9)	12(21.1)		1
3rd trimester	135(56.5)	104(43.5)	2.889(1.455, 5.738)	1.432(0.560, 3.662)
previous anemia				
Yes	22(40.0)	33(60.0)	2.855(1.565, 5.210)	2.373(0.982, 5.738)
No	158(65.6)	83(34.4)		1
Monthly income				
Low	63(66.3)	32(33.7)		1
Medium	61(61)	39(39)	0.632(0.354, 1.128)	0.757(0.295, 1.940)
High	56(55.4)	45(44.6)	0.796(0.454, 1.395)	0.900(0.364, 2.225)

\* Statistically significant at  $p < 0.05$  after adjusted for other variables, 1= reference

**Note:** Hosmer and Lemeshow Test = 0.948 therefore the model adequately fits the data.

## Chapter 6 Discussion

Compliance with iron-folate supplementation plays a major role in the prevention and treatment of iron deficiency and iron deficiency anemia particularly among pregnant women whose iron requirement starts at the second trimester and progresses until the third trimester. Thus, this study tried to investigate factors associated with compliance with iron-folate supplement. The result revealed that 39.2% of pregnant mothers were compliant (took at least 70% of the expected dose of the iron folate tablets in seven days of the previous week of the study) to the supplement, which is much lower compared with the study done in four regions of Ethiopia which was 74.9% [22] and higher than study done in Amhara regions of Ethiopia that was 20.4% [23]. The probable reason may be the difference in geographic locations, time gap between studies and study subjects.

Eventhough the compliance rate is low compared with other country; it is much higher than 0.4% founded by EDHS 2011 [7]. This could be due to differences in level of study (national and woreda level), time gap between the present study and EDHS 2011. The compliance rate among pregnant mothers in this study was still lower compared to studies done in other countries like: United State, Philippines, Nigeria and Senegal [19, 20, 18, 21]. This difference may be due to differences in awareness of pregnant mothers about iron folate supplementation and study design.

Side-effect is repeatedly considered as a major problem to compliance. According to studies conducted in Philippines [20], Senegal [21] and India [29], it was reported as a reason for missing doses of iron-folate supplementation among pregnant mothers by 20.2%, 27.0% and 27.6% respectively. Studies conducted in Vientiane [28] also concluded likewise. In this study, it was observed that from those mothers who missed the doses of IFA supplement, 50.6% was because of fear of side effects. Another studies done in Amhara region of Ethiopia and eight districts of four regions of Ethiopia revealed that 54.4% and 63.3% of respondents respectively missed the dose of iron-folate supplement due to fear of side effects[23, 22]. One probable rationalization for the high figure of side effects in this study can be lack of information about potential side-effects of iron-folate supplement in advance. Appropriate counseling is known to

increase the psychological tolerance of pregnant mothers to side-effects of iron-folate supplement [26].

In this study 42.1% of pregnant mothers skipped doses of iron-folate supplement because of forgetfulness and this finding is parallel with the findings in India and Vientiane by 48.8% and 47.9% respectively [19, 28], but it is much higher than the finding in Ethiopia that was 16.7% [22]. The discrepancy may be due to inadequate counseling of mothers to remember to take their tablet in current study. This problem could be addressed through better counseling during the ANC visit by suggesting to women strategies to remember to take their tablets; for example, placing the tablets in a spot that they see every day.

Fear of having big fetus because of consuming iron-folate tablet was obstacle to compliance with iron-folate supplement in previous study which were done in Thailand [27]. One study in Ethiopia also showed that 28.45% of women believed that continuous taking of iron folate supplementation leads to over- weight babies [23]. But, in this study none of the respondents reported stopping of taking iron-folate supplement because of fear of having big fetus/baby. This could be due to differences in setting of study subjects.

After adjusting for other factors in the regression analysis, one factor showed to have a significant association with the compliance was the participants' age. Women who were  $\geq 25$  years old were 2.9 times more likely to be compliant to iron folate supplementation than women with younger ages ( $< 25$  years). The reason for this is that older women may be more concerned about their health and pregnancy outcomes and had better experiences in prevention and treatment of iron deficiency anemia. This finding was in line with a study in India that elderly and middle women were slightly more compliant than younger women [29] and also this finding is consistent with the study done in Ethiopia [23]. Similarly visiting ANC four and more times was considered to have significant effects on compliance with iron-folate supplement. Mothers who had visited ANC for four and more times, 3.5 times more likely to be compliant with iron-folate supplement compared to mothers who visited ANC for less than four times. This finding is consistent with finding in Philippines [31]. The possible reason of this is health providers may help mothers during their ANC visits by discussing about compliance with iron-folate

supplement, encouraging them to take the tablet as prescribed, educating on health benefit taking IFA supplement and these help mothers to be compliant with iron-folate supplement.

In this study, pregnant mothers who had good knowledge of anemia were 4.4 times more likely to be compliant with iron-folate supplement during pregnancy compared to those who had poor knowledge. This finding was consistent in Nigeria, Vientiane and Amhara region of Ethiopia [18, 28, 23]. Pregnant mothers who had good knowledge of iron folate supplement during pregnancy were 3.5 times more likely to be compliant with iron-folate supplement during pregnancy compared to those who had poor knowledge about iron-folate supplement. Similar finding was found in Nigeria and Amhara region of Ethiopia [18, 23]. The reason could be knowledge helps women to have a good perception of prevention and treatment of anemia during pregnancy by taking iron-folate supplement during pregnancy.

Pregnant mothers who were counseled on iron-folate supplement during pregnancy 4 times more likely complied than those who were not counseled on IFA supplement. This finding is consistent with the study done in India (Haryana state), Sweden, Cambodia and Senegal [33, 34, 17, 21].

### **Limitation of the study**

Limitations need to be considered when interpreting the results of this research. Reports by the pregnant mothers may under/overestimate compliance rate since the data was collected by self report.

## **Chapter 7 Conclusions and Recommendations**

### **Conclusions**

Compliance rate of iron-folate supplementation during pregnancy remains very low in the Misha Woreda. This indicates that the WHO and FMOH recommendations was no met even though there was usefulness of iron-folate supplementation program during pregnancy to prevent iron deficiency and iron deficiency anemia during pregnancy.

In this study explanatory variable like ages of the mothers, counseling on iron-folate supplement, knowledge of anemia, knowledge of iron folate supplement and frequency of ANC visits were found to be significantly associated factors of compliance with iron-folate supplementation during pregnancy. Furthermore, fear of side effects of iron-folate supplement, forgetfulness, perceived shortage of iron-folate supplement in the health facility were commonly mentioned reasons for missing the doses of iron folate supplement. Therefore, Compliance with iron-folate supplementation can be increased by providing women with clear instructions about iron-folate tablet intake and educating them about anemia and health benefits of the iron-folate-tablets. Also promoting mothers to visit ANC at least four times can improve their status of compliance with iron-folate supplementation.

### **Recommendations**

#### **For ministry of Health and Regional health Bureau**

- ✓ Should give high attention to compliance of iron-folate supplementation

#### **For Zonal health department and woreda health office**

- ✓ The ZHD and WrHO have to critically look at the gap between the actual and desired compliance with iron-folate supplementation among pregnant mothers in the area and should develop strategies to improve pregnant mothers' status of compliance with iron-folate supplementation.

**ANC providers should focus on**

- ✓ Providing pregnant mothers with clear instructions about iron-folate tablet intake.
- ✓ Educating them about anemia during pregnancy and its consequences and health benefits of the iron-folate-tablets.
- ✓ Promoting mothers to visit ANC at least four times.

**For researchers**

- ✓ Further research is recommended on compliance with iron-folate supplement using pill count method to overcome the limitation of this study.



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## Annexes

### Annex 1. Questionnaire: English version

**Informed Consent** for House to House Survey on determinants of compliance with iron-folate supplement in pregnant mothers who were using antenatal care services in Misha Woreda South, Ethiopia, 2015.

Dear Sir;

Hello, my name is \_\_\_\_\_ I am working in a research team of Jimma University. This questionnaire is prepared to conduct a study on Determinants of compliance with iron/folic acid supplement in pregnant women who are using antenatal care services in this area. You are selected and included in the study as part of the sample population to complete the questionnaire designed by the researcher.

Thus this interview is prepared for this purpose to get appropriate information on the study we are conducting. The information that I will obtain using this interview will be used only for research purpose and none of your answers will be available to anyone. Your response will be kept confidential. For this purpose your name will not be written here and there will be no way of linking your individual responses to the final result of the study findings. The study has no risk to you and your family members except mild time consuming .Therefore I politely request your cooperation to participate in this interview. You do have the right not to respond at all or to withdraw in the meantime, but your input has great value for the success of my objective.

Do you agree to participate in this study? Yes, ----- continue No-----, thank you!

Name of the data collector\_\_\_\_\_ Sign\_\_\_\_\_Date \_\_\_\_\_

Questionnaire code\_\_\_\_\_

Enumerator's ID number \_\_\_\_\_ House number \_\_\_\_\_.

**PART ONE: SOCIO ECONOMIC AND DEMOGRAPHIC INFORMATION**

S.N	QUESTIONS	RESPONSE	CODE
101	Age in years	_____	
102	Marital status	1- Single 2- Married 3- Divorced 4- widowed	
103	Family size	_____	
104	Educational status	1. illiterate 2. can read and write 3. primary cycle(5-8) 4. high school(9-12) 5. diploma and above	

105	Occupation	<ol style="list-style-type: none"> <li>1. Government</li> <li>2. Merchant</li> <li>3. Student</li> <li>4. House wife</li> <li>5. Other (specify).....</li> </ol>	
106	What is your monthly income?	.....Ethio.Birr	
107	Place of residence	<ol style="list-style-type: none"> <li>1. Urban</li> <li>2. Rural</li> </ol>	
<b>PART TWO: PERSONAL FACTORS</b>			
<b>KNOWLEDGE OF ANEMIA</b>			
<b>201</b>	Do you know about anemia?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If no skip to Q 202
If yes, I am going to read out some statements about anemia. For each statement, please tell me whether you think it is correct or not			
201(1)	Inadequate food intake can cause anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(2)	Illness can cause anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(3)	Bleeding can cause anemia	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	

201(4)	Malaria can cause anemia?	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(5)	Worm infestations can cause anemia	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(6)	Hiv/aids can cause anemia?	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(7)	Paleness around gums is sign of anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(8)	Dizziness is a symptom of anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(9)	General fatigue is symptom of anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(10)	Anorexia is sign of anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
201(11)	Pregnant Women might die due to anemia	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> </ol>	



		3. I don't know	
201(12)	Pregnant women loss their weight due to anemia	1. Correct 2. Incorrect 3. I don't know	
201(13)	Anemia can cause fetal death during pregnancy	1. Correct 2. Incorrect 3. I don't know	
201(14)	Anemia can cause low birth weight of the baby	1. Correct 2. Incorrect 3. I don't know	
201(15)	Anemia during pregnancy can be consequences for premature baby	1. Correct 2. Incorrect 3. I don't know	
201(16)	Anemia during pregnancy can be consequences for still birth and abortion.	1. Correct 2. Incorrect 3. I don't know	
201(17)	Taking iron-folate supplement during pregnancy can treat and prevent anemia.	1. Correct 2. Incorrect 3. I don't know	
201(18)	Receiving blood can treat anemia.	1. Correct 2. Incorrect 3. I don't know	

### **KNOWLEDGE OF IRON-FOLATE SUPPLEMENTATION DURING PREGNANCY**

I am going to read out some statements about iron-folate supplement. For each statement, please tell me whether you think it is correct or not.

202(1)	Iron-folate supplementation during pregnancy is important in order to give birth to a healthy baby	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(2)	Iron-folate supplementation during pregnancy is important to protect pregnant women from anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(3)	Iron-folate supplementation during pregnancy is important to improve general health during pregnancy.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(4)	Iron-folate deficiency during pregnancy can cause anemia.	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(5)	Iron-folate deficiency during pregnancy can be consequences for maternal morbidity and mortality	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(6)	IFA deficiency during pregnancy can be consequence for infant mortality	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(7)	Iron-folate deficiency during pregnancy can be consequences for Low birth weight	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	
202(8)	Iron-folate deficiency during pregnancy can be consequences for Preterm delivery	<ol style="list-style-type: none"> <li>1. Correct</li> <li>2. Incorrect</li> <li>3. I don't know</li> </ol>	

203	Did you forget to take iron-folate supplement as prescribed by the health care providers?	1. Yes 2. No	
204	Did you stop taking iron-folate supplement due to fear of having big fetus/baby?	1. Yes 2. No	
205	How many times have you attended ANC during this pregnancy?	_____	
<b>PART THREE: SUPPLEMENT RELATED FACTORS</b>			
301	Have you ever stopped taking IFA tablets because of any side effects?	1. Yes 2. No	If yes skip to Q 302
302	If yes? what	1. Nausea 2. Vomiting 3. Diarrhea 4. Heart burn 5. Stomach cramps	Don't read choices. It should be the most one
303	Do you like the taste of iron-folate supplement?	1. Yes 2. No	
304	Did you stop taking iron-folate supplement because of not liking its taste?	1. Yes 2. No	
<b>PART FOUR: FACILITY RELATED FACTORS</b>			
401	Did the health provider explain the instruction or advice for the intake of iron-folate supplement?	1. Yes 2. No	<b>If yes, Q402</b>

402	If yes, on what you got advice?	<ol style="list-style-type: none"> <li>1. On daily and timely taking of IFA pills</li> <li>2. On IFA pills side effects</li> <li>3. On benefits of taking IFA pills</li> <li>4. On prevention and treatment of anemia during pregnancy.</li> <li>5. On effects of iron-deficiency during pregnancy</li> </ol>	<p>Don't read the choices, combined answers are possible</p> <p>Write "1" if she list at least two, otherwise "0"</p>
403	Have you ever stopped taking iron-folate supplement due to its shortage in the health facility?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
404	How far is your place of residence from the nearest health facility in minutes?	_____	
<b>PART FIVE: LEVEL OF COMPLIANCE WITH IRON-FOLATE SUPPLEMENT</b>			
501	In the past seven days how many iron-folate pills did you take?	___ IFA pills	
502	How many days did you take your IFA pills over the last 7 days	___ days	

**PART SIX: PREGNANCY AND EXPERIENCES RELATED FACTORS**

601	How many months pregnant are you? (record number of completed Months)	-----	
602	How many pregnancies have you had before this one?	_____	
603	Have you ever had a pregnancy that miscarried; was aborted or ended in still birth?	1. Yes 2. No	
604	Have you ever been told you have little or no blood since you became pregnant?	1. Yes 2. No	
605	How many children do you have currently?	-----	

## **Annex 2 In-depth Interview Guide for pregnant mothers**

Name of respondent \_\_\_\_\_ Date \_\_\_\_\_

Occupation \_\_\_\_\_

Question guideline:

1. How did you get iron/folate tablets during pregnancy?
2. What do you think about these tablets? What do you like or dislike about the size, smell, and taste of the tablets? how is your trend of compliance with iron-folate supplement because of these characteristics of tablet
3. How do you feel when you take the tablets? What you experienced when you took these tablets? What benefits have you experienced? How is your trend of compliance with iron-folate supplement because of these experiences?
4. Did you faithfully take the given tablets as health provider recommendation? Why can you elaborate? What facilitates/hinder you to take iron-folate as prescribed by your health providers
5. Are there any cultural or personal beliefs that hinder you to take iron-folate supplement as prescribed by health providers? What are they? Can you elaborate? Or do you think that taking iron-folate supplement during pregnancy can harm your baby? How?
6. What are the reasons for stopping for those who take the tablets? Why? Can you elaborate?
7. Have you ever heard of other women's opinion regarding the iron/folate tablets? Would you give me an example?
8. In your opinion is it important for a pregnant woman to take the iron/folate tablets throughout pregnancy? What is the benefit of taking iron-folate supplement during pregnancy?

### **Annex 3 Key Informant Interview Guide for HEWs**

Name of respondent \_\_\_\_\_ Date \_\_\_\_\_

Job title \_\_\_\_\_

1. What do you say or think the importance of iron/folate tablets for pregnant mothers? how? why?
2. Is the supply flow perfect? If not what are the challenges? Did pregnant mothers fail take iron-folate supplement due to its shortage in your health post? Why?
3. How is compliance and acceptability of the tablets like in pregnant mothers? Do the pregnant mothers take iron-folate supplement as prescribed by health providers? How? Can you elaborate?
4. Can you elaborate what facilitates the pregnant mothers to take iron-folate supplement as prescribed by their health providers?
5. Can you elaborate what hinders the pregnant mothers to take iron-folate supplement as prescribed by their health providers? (Probe on color, size, taste, side effects)
6. Are there any cultural or personal beliefs that hinder pregnant mothers to take iron-folate as prescribed by their health providers? What are they? In what way the pregnant mothers think about iron-folate supplement?

#### **Annex 4. Questionnaire: Hadiyisa version**

**Jimmi yuniverisitee** minaadabina fayyaa'ooma egeechchi losa'ni minenne la'mi digiree maassi kitaaba gudisimina wiixa'aakami naqaasha wixxaachina eeyyii'xi sagara uwoo manna sidimina gudaakkoo gudusha

Lophphitaattoo ayyiche;

Summi iiki \_\_\_\_\_ yamaamookko. Ku xa'mmichi siiraakkoo amo'i areni-fooleeti kiniina ittimi oogoraa, ixenne amaxaamoo luwwaanne yookki naqaasha wixaa'imina guudakkoo xaa'micha. Ebikina ka horoori woshane gudiki xaa'micha dabarimine naqaasha uwwiito'sina ati dao'llaantaatto.

Ka xaa'michchuwika hundami ihukko kolidabacha dabarima urrimi xaansiisoothane ihukarrem ati ka xaa'michina uwwitoo naqaashi danaami misha ebimina araaqa awwaadohane ihookko.

Xaa'michcha dabarimina iitaantoo?

Eeyya, asheere

aa'ee, galaaxxoommo!

Naqaasha wixaa'anchi summa \_\_\_\_\_ furmma'a \_\_\_\_\_ ayyaamo \_\_\_\_\_



**BAXXANCHI MATO: MINAADAPHI HEECHI OGORAA GATI QANQUUWWA**

xigo	Xa'mmichha	dabachcha	Bikko'o
101	Umuri hiinchonne	_____	
102	Mine issimmi duhaa;i	<ol style="list-style-type: none"> <li>1. Mine issuumoyyo</li> <li>2. Mine issaammo</li> <li>3. Annaani ihaammo</li> <li>4. Manchi lehakko</li> </ol>	
103	Abaroosi xigi mee'o?	_____	
104	Losan duhaa'i	<ol style="list-style-type: none"> <li>1. Horeem losuummoyyo</li> <li>2. lu'xxi gabala(5-8)</li> <li>3. laa'mi gabala(9-12)</li> <li>4. diplommaa ehanninsi haanannette</li> </ol>	
105	Baxi	<ol style="list-style-type: none"> <li>1. adi'li baxaanchotte</li> <li>2. dadaraanchotte</li> <li>3. abullanchotte</li> <li>4. mi'n amatte</li> <li>5. muuleki yolas kure.....</li> </ol>	
106	Mat agaananne hinkaa;nmi aago'i hee'oo?	.....Ethio.Biraa	
107	Heechi beyyi	<ol style="list-style-type: none"> <li>1. beero'o</li> <li>2. haxi uulla</li> </ol>	

**BAXXANCHI LAMO: GAGINNE AMAXAAMOO LUWWA****Xiigi hofee’ni lachcha**

201	Xiigi hofee’ni bikina laqoo?	1. eeyya 2. aa’ee	Aa’ee yiitoolas xaa’mmiche hi 202
Eeyya yitilas awoono xa’mmichchuwina hanqa qophphano yittuuyi dabare			
	1. hurbaa’xi hoofee’ni xiigi hoofee’nna ebookko.	1. hanqa 2. qophphano 3. la’omooyyo	
	2. xissi xiigi hofee’nna ebookko.	1. hanqa 2. qophphano 3. la’omooyyo	
	3. xiigi dunaanchi xiigi hofee’ni ebookko.	1. hanqa 2. qophphano 3. la’omooyyo	
	4. kachchisi jabbi xiigi hofee’na ebookko.	1. hanqa 2. qophphano 3. la’omooyyo	
	5. goodaa’phi daquuluw xiigi hofee’na ebookko.	1. hanqa 2. qophphano 3. la’omooyyo	
	6. hiv/eedisi xiigi hofee’na ebookko	1. hanqa 2. qophphano 3. la’omooyyo	

	7. inqi maari qadaalimi xiigi hofee'ni amane mo'aamo luwwa.	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	8. kuulula'immi xiigi hofee'ni amane mo'aamo luwwa. .	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	9. hoogiisiimm xiigi hofee'ni amane mo'aamo luwwa. .	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	10. hurbaat iitimma hoogimmi xiigi hofee'ni amane mo'aamo luwwa. .	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	11. xiigi hofee'niinee siiru amo'i lehena xanoocko	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	12. xiigi hofee'niinee siiru amo'kki gurat hofee'ookko	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	13. xiigi hofee'ni goodaa'phi woronne ciilichi lehimma eebeena xanoocko	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> <li>3. la'omooyyo</li> </ol>	
	14. xiigi hofee'ni qaraamoo ciilichika guraato hoofiisokko	<ol style="list-style-type: none"> <li>1. hanqa</li> <li>2. qophphano</li> </ol>	

		3. la'omooyyo	
	15. xiigi hofee'ni siirrimi amane qoxxube'I ciilichi qaraam'isina mashika'I iheena xanoocko	1. hanqa 2. qophphano 3. la'omooyyo	
	16. xiigi hofee'ni karo qariimmina lehu ciilichi qaraamo'isina mashika'I iheena xanoocko.	1. hanqa 2. qophphano 3. la'omooyyo	
	17. areni-fooleeti kiniina itimmi xiigi hofee'ni hawwo egeedena fayyiiseena xanoocko.	1. hanqa 2. qophphano 3. la'omooyyo	
	18. xiiga a'llimmi xiiga hofee'na fayiseena xanoocko.	1. hanqa 2. qophphano 3. la'omooyyo	
<p><b>Areni-fooleeti kiniina siirrimi amane uwwimi lacha</b></p> <p>awoono xa'mmichchuwina hanqa qophphano yittuuyi dabare</p>			
202	1. areni-fooleeti kiniina siiriimi amane ittimmi qaraamo ciilichina fayya'ooma uwoocko.	1. hanqa 2. qophphano 3. la'omooyyo	
	2. areni-fooleeti kiniina siiriimi amane ittimmi amo'oo xiigi hofee'nii gatisookko.	1. hanqa 2. qophphano 3. la'omooyyo	
	3. areni-fooleeti kiniina siiriimi amane ittimmi amo'na ciilichchina fayya'ooma uwoocko.	1. hanqa 2. qophphano 3. la'omooyyo	

	4. areeni-fooleeti hofee'ni siiriimi amane xiigi hofee'na ebookko .	1. hanqa 2. qophphano 3. la'omooyyo	
	5. areeni-fooleeti hofee'ni siiriimi amane amo'onne lehoo xisoo ebookko	1. hanqa 2. qophphano 3. la'omooyyo	
	6. areeni-fooleeti hofee'ni siiriimi amane ciilluwi leho ebookko	1. hanqa 2. qophphano 3. la'omooyyo	
	7. areeni-fooleeti hofee'ni siiriimi amane ciilichika guraato hofiisookko	1. hanqa 2. qophphano 3. la'omooyyo	
	8. areeni-fooleeti hofee'ni siiriimi amane qoxxube'I ciilichi qaraamoo'sa isookko	1. hanqa 2. qophphano 3. la'omooyyo	
203	Areeni-fooleeti kiniina xadaa itoo'ni higgs amani yoo?	1. eeyyaa 2. aa'ee	
204	Areeni-fooleeti kiniini ciilichoonne geejimmi hawo afiisookko yitaa ittimma uulisaa laqoo?	1. Eeyya 2. Aa'ee	
205	Mee'i kore siiriimi faaya'omma awwonimma awwoonntaa ??	_____	
<b>BAXXANCHI SASO: KINIININNE AMAXAAMOO LUWWA</b>			
301	Areeni-fooleetikiniina afisu hwai bikina ittimma uulissaa laqoo?	1. Eeyya 2. Aa'ee	Eeyya, xaa'mich 302

302	Eyaa yitilas maha?	<ol style="list-style-type: none"> <li>1. Lafilafaa'imma</li> <li>2. gooxaansimma</li> <li>3. aadiissimma</li> </ol>	
303	Areeni-fooleeti kiniiniki xee'ni makkoo?	<ol style="list-style-type: none"> <li>1. Eeyya</li> <li>2. Aa'ee</li> </ol>	
304	Areeni-fooleeti kiniina guduukisi shigiiga'ukkaa ittimma uulisa laqoo?	<ol style="list-style-type: none"> <li>1. Eeyya</li> <li>2. Aa'ee</li> </ol>	
<b>Baxxanchi sooro: fayya'ooma eegechchi miniinne amaaxaamoo luwwa</b>			
401	Aren-fooleeti bikina fayyaa'oomi baxaani sogitano uwoo?	<ol style="list-style-type: none"> <li>1. Eeyya</li> <li>2. Aa'ee</li> </ol>	
402	Eeya yitilasi mahi bikina sogiitano siixiitto?	<ol style="list-style-type: none"> <li>1. kiniina kuraakko'isanne egeerakka'a ittimmi bikina</li> <li>2. kiniina afisoo hawooji bikina</li> <li>3. kiniini uwoo awwaadi bikina</li> <li>4. Xiigi hofee'nna egerimi bikina</li> <li>5. Kinnii'ni hofee'ni afisoo hawi bikina</li> </ol>	
403	Areeni-fooleeti kiniina fayya'oomi eegechi minenne bee'u/hoofo'u bikina ittimma uulisaa laqoo?	<ol style="list-style-type: none"> <li>1. Eeyya</li> <li>2. Aa'ee</li> </ol>	
404	Ati hee'llo beyyiinsi fayya'oomi eegechi minii hinkaa'nna qe'lloo? Daqiiqa/sata kure.	_____	

**BAXXANCHI ONTO: ARENI-FOOLEETA ITTIIMMA**

501	Higu santanne aren-fooleeta kiniina mee'i balla ititto?	balla_____	
502	Higu saantane mee'iareeni-fooleeti kiniina ititto?	Kiniina_____	

**BAXXANCHI LOHO: SIIRRIIMMAA SIIRRIIMMI GOOLLO’OO**

601	Ku siiriimi mee’i aganaa ihaa?	-----	
602	Kannii illageen mee’i kore siittaa?	_____	
603	Kannii illageni godabo aphixiitaa te’im lehaakkoo ciili qaraamaa laqoo?	1. eeyya 2. aa’ee	
604	Kannii illageeni xiigi hoofee’ni keeseenne yookko yakka’a laqoo?	1. eeyya 2. aa’ee	
605	Hinkaa’ni ciiluwi kiina hee’aa?	-----	



## Annex 5 In-depth Interview Guide for pregnant mothers Hadiyisa version

summi \_\_\_\_\_ balla \_\_\_\_\_

Baxi \_\_\_\_\_

Xa'mmicha ogora:

1. Areni-fooleti kinina hinkidi siiditida'ee kuuttoo? hanoonne
2. Ka kiniina uwaakami amane kinii'ni bikina sogitano sixitaa hee'llitonihe? Ka sogita'ni bikina hinkidi sawiitoo?
3. Ka kinii'ni bikina hinkidi saawitoo? Kiiini baxamukisi makkoo?
4. Ka kiniina itoo amane mahi macesamo? Mahi erooma sixiito?
5. Ka kiniina hundi amanemi faayya'oomi eegechi baxaani kuraamukkisanne egeettaa ittoo? Mahina hino'o caakisha uwwe.
6. Muli amo'i mahina ka kiniina itimma uuliisooda'e kuttoo? Mahina cakissoo?
7. Ki sawiitenne ka kiniina sirimmi amane ittimi awaadookko yitaa sawitoo? mahina? Ka areni-fooleeti hofee'ni siirrimi amane eboo hawwo laqoo? Hino'o caakisha uwwe.
8. Muli amo'i ka areni-fooleeti kinii'ni quuxoonne hinkido'I ama'nnati hee'ooda'e caakisoo?

## Annex 6 Key Informant Interview Guide for HEWs Hadiyisa Version

Summi \_\_\_\_\_ balla \_\_\_\_\_

1. Siiriimi amane amo'na areni-fooleeti kiniina ee'sami uwwimi awwaadoo'ko yita sawwitoo? Hinkidi caakisha uwwi
2. Ku kiniini siiru amo'ina uwwaamokkoki qaraaroomaninnanii hurabaata haraa'mmatina?
3. Amo'i ka kiniina siixoo amane kiniini'ni bikina sogitani uwwaamoo? Mahanne caakiise
4. Ku kiniini hundi amanemi sidaamoo? Mahi hawwi hee'oo?
5. Ka kiniina amo'i hundaamanem eegeraamo'sanne iittimi duhaa'i maha laboo? Caakisha uwwi.
6. Ka kiniina amo'i? hundaamanem eegeraamo'sanne itaamena mahi hoorooda'e caakkisoo?