# Adherence to Iron-Folic Acid among Pregnant Women Attending Antenatal Care at Wolaita Zone Public Primary Hospitals in Southern Ethiopia, 2022

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# Abstract

**Background**: Among the micronutrient deficiencies, iron and folic acid are the most common and frequently occur in pregnant women. So, the objective of this study was to assess the adherence to iron and folic acid among pregnant women booking antenatal services in the study area.

**Methods and materials**

A facility-based cross-sectional study design was employed from January – April 2022. A structured questionnaire was used for data collection using systematic sampling techniques to approach 327 pregnant women. Data was entered and analyzed using SPSS version 20 software. Descriptive analysis was performed. Adjusted odd ratios, along with corresponding 95% confidence intervals, were used and the level of statistical significance was declared at a p-value of <0.05 with a corresponding 95% CI.

**Result**: In this study, 339 (99%) pregnant women participated. The respondents' average age was 28.04 SD 5.3 years. The prevalence of adherence to iron and folic acid supplementation among pregnant women was 68.1% (95% CI: 63.1–72.9). Mothers whose age less than 19 [AOR = 0.025; CI 95% (0.003, 0.218)], daily laborers [AOR = 0.127; CI 95% (0.028, 0.568)], and who had no history of abortion [AOR=0.276; CI 95% (0.086, 0.891)] were associated with adherence to iron-folic acid supplementation.

**Conclusion**: In this study, adherence to IFA supplementation among pregnant women in the study area is relatively high. Appropriate counseling, and health education should be given to pregnant women to enhance their adherence.

# 1. Introduction

Deficiencies in micronutrients negatively impair the health of mothers by affecting the outcomes of pregnancy and growth and development of their children [1]. Among those micronutrients, deficiencies of iron and folic acid (IFA) are the most common that affect the mother's health [2]. Deficiency of iron adversely impairs productivity and cognition in the general population, and is the most common cause of anemia during the pregnancy period [1]–[3]. On the other hand, deficiency of folic acid causes neural tube defects in the fetus and negatively affects the outcome of pregnancy. Thus, supplementation of both micronutrients for pregnant women is the key strategy to prevent health impacts on women and their offspring related to its deficiency [3].

According to the World Health Organization (WHO), early and appropriate folic acid (400 g) and iron (30–60 mg) supplementation during antenatal care can reduce perinatal, neonatal, and maternal mortality by preventing low birth weight, maternal anemia, spinal bifida, and encephalitis [4]. The WHO estimates that around 58% and 50% of maternal mortality is related to anemia in developing and developed countries respectively [4]. To tackle these problems, ministries of health in different countries, including Ethiopia, designed the policy to give IFA to pregnant women in a single or combined form as a tablet [1]–[5].

Only provision of these micronutrients for women cannot end up with successful outcomes, but the effectiveness and success of this intervention always relies on the adherence of women with the iron and folic acid tablets provided by health care professionals. In a medical context, compliance refers to a degree to which a client/patient appropriately follows medical information provided by health care providers. Evidences suggest that non-compliance with iron can significantly impact the success and supplementation of national program in different countries [1], [2], [5].

Adherence to iron and folic acid is an important approach to enhance the implementation of the national program and prevent neonatal birth defects and pregnancy related anemia [6]. Adherence to micronutrients (IFA) is referred to as the intake of tablets reported at each antenatal care visit by the clients [6]. The overall adherence status deals with a woman contacting an antenatal care clinic and taking IFA tablets for greater than or equal to four days per week for the last one-month preceding the survey or for more than or equal to ninety days in the 3rd trimester [6]–[8]. IFA supplementation is the main strategy to prevent and control IFA deficiency-related health impacts, and its effectiveness depends on the adequate adherence status of women to the folic and iron tablets offered [4].

Literature showed that overall adherence status to IFA varied from country to country: 38% in Pakistan [9], 51.14% in Iran [10], 51% in Senegal [11], 65% in Sudan [12], and 41.4% of pregnant women in Ethiopia adhered to IFA [13]. This indicates that across the world there is a great challenge related to an adequate adherence to IFA. Assessing the adherence status of pregnant women to IFA supplementation and its associated factors is mandatory for all responsible bodies. In Ethiopia, overall adherence status remains very low, below fifty percent, and varies from region to region [13]. In addition, no previous study was conducted in the current study area. So, the study was aimed to assess the adherence to IFA among pregnant women booking antenatal services in the study area.

# 2. Methodology

# 2.1. Study area, design and period

A cross-sectional study was conducted in Wolaita zone public primary hospitals from January – April 2022. Wolaita zone is one of the South nation nationality people regions. The zone is 356 km distant from Addis Ababa, the capital city of Ethiopia. Based on the 2020 Central Statistical Agency (CSA) report, the population of the Wolaita zone was projected to be 5,385,782. From these, 2,687,021 populations are accounted for by males and 2,698,261 populations are females. The zone has 8 primary public hospitals, such as Tebela primary hospitals (PH), Bodit PH, Bombe PH, Halale PH, Bitana PH, Gasuba PH, Bale PH, and Gasuba PH. All institutions were included in the study. These public hospitals have been providing health service for all the Wolaita zone population and for other surrounding zones.

# 2.2. Population and eligibility criteria

Selected pregnant women who were taking IFA supplementation during data collection in all institutions were the study population and all pregnant women who had used IFA tablets for at least three months were included in the study. Those women who were unable to speak/hear, critically ill, and refused to participate in the study were excluded from the study.

## 2.3. Sample size determination and its procedures

A total of 342 sample sizes was calculated and used by considering the 71.8% adherence rate in the previous study[14], 95% significant level, 5% margin of error, and 10% non-response rate. For each hospital, the average monthly patient flow to delivery service for the 1st and 2nd quarters of 2021 was determined. Then the final sample size is proportional allocated to these service centers by considering their monthly client flows. Eventually, the subject was taken by systematic random sampling, and every other client who came to each hospital was recruited as a study unit till the total sample size for the study was obtained.

## 2.4. Operational definition

### Adherence to IFA

IFA adherence requires that pregnant women take 4 IFA tablets at least once per week in the previous month of IFA supplementation [7].

### Non-adherence

A pregnant women takes less than 4 IFA tablets per week in the previous month of IFA supplementation [7].

### Good knowledge

Pregnant women who scored the mean value and above in knowledge related questions were considered to have good knowledge about IFA [6].

### Poor knowledge

Pregnant women who scored less than mean value on knowledge related questions were considered to have good knowledge about IFA [6].

## 2.5. Data collection and its analysis

A structured questionnaire was adapted from the previous studies [5]–[7], which consists of socio-demographic factors of the respondents, obstetric related factors, and health system related factors. Data was collected through face-to-face interviews. Based on communication skills with the client, 8 BSc nurses were selected for data collection. 4 health officers were recruited as supervisors. 1 day of training was provided to the data collector and supervisor regarding the objective, data collection tool, procedure,

and interview methods that were supposed to be applied during the collection period. The selected participants were informed by the data collectors. From the selected participants, consent was obtained and the data was collected.

The questionnaire was prepared in English and then translated into the Amharic language by experts and again translated back to English to increase consistency. To maintain completeness and consistency, data collectors were closely supervised before and during the data collection process. The supervisors followed the correct implementation of the procedure and checked the completeness and logical consistency after data collection.

The completeness and consistency of the data was checked. Then, it was coded and entered onto Epi Data 3.1. For further analysis, data was exported to SPSS 25.0. Descriptive statistics of different variables were presented by frequency and percentage using tables and pie charts. A binary logistic regression test was used to compute COR with its 95% interval to test the associations between dependent and independent variables. The variables found to be $P < 0.25$ in the bivariate analysis were taken as a candidate for multivariate analysis. Finally, Multivariate analysis with AOR was used to control possible confounders and to determine predictors of adherence status to IFA supplementation among the study participants. A P- Value of $< 0.05$ was considered as the criterion for statistical significance.

# 3. Result

## 3.1. Socio-demographic characteristics

A total of 339 (99%) of study participants fully responded to the interview. The mean age of the respondents was 28.04 with a standard deviation of 5.3 years and the majority of mothers were within the age range of 25–39 years. 99 (29.2%), 324(95.6%), and 94 (27.7%) of respondents were government employees, married, and educate diploma and above, respectively (Table 1). Majority of study participants were Wolaita in ethnic group. Regarding family size, 165(48.7%) of participants have one up to three alive children (Table 1).

Table 1
Socio-demographic characteristic of the respondents in Wolaita zone public primary hospitals, 2022(n = 339)

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Age in years | <=19 | 15 | 4.4 |
| | 20−24 | 55 | 16.2 |
| | 25−29 | 157 | 46.3 |
| | 30−34 | 80 | 23.6 |
| | >=35 | 32 | 9.4 |
| | Total | 339 | 100.0 |
| Marital status | Married | 324 | 95.6 |
| | Single | 7 | 2.1 |
| | Others[a] | 8 | 2.4 |
| Monthly income | <=3934 | 204 | 60.2 |
| | 3935−9055 | 129 | 38.1 |
| | >=9056 | 6 | 1.8 |
| Educational status of mothers | No formal education | 23 | 6.8 |
| | Primary (1−8) | 72 | 21.2 |
| | Secondary (9−12) | 150 | 44.2 |
| | Diploma and above | 94 | 27.7 |
| Occupation status of mothers | Gov't employee | 99 | 29.2 |
| | Non-governmental | 12 | 3.5 |
| | Self-employed | 53 | 15.6 |
| | Merchant | 70 | 20.6 |
| | House wife | 75 | 22.1 |
| | Others[b] | 30 | 8.8 |
| Husband education | No formal education | 22 | 6.5 |
| | Primary (1−8) | 43 | 12.7 |
| | Secondary (9−12) | 137 | 40.4 |

a-divorced, widowed; b-student, daily laborer, car driver farmer; c-sidama, gurage, hadiya

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| | Diploma and above | 137 | 40.4 |
| Husband occupation | Gov't employee | 124 | 36.6 |
| | NGO employee | 13 | 3.8 |
| | Self-employed | 34 | 10.0 |
| | Merchant | 113 | 33.3 |
| | Others[b] | 55 | 16.2 |
| Religion | Protestant | 162 | 47.8 |
| | Orthodox | 125 | 36.9 |
| | Muslim | 36 | 10.6 |
| | Catholic | 16 | 4.7 |
| Ethnicity | Wolaita | 177 | 52.2 |
| | Oromo | 42 | 12.4 |
| | Kembata | 53 | 15.6 |
| | Amara | 39 | 11.5 |
| | Others[c] | 28 | 8.3 |
| Family size | 1−3 | 165 | 48.7 |
| | 4 and above | 174 | 51.3 |

a-divorced, widowed; b-student, daily laborer, car driver farmer; c-sidama, gurage, hadiya

## 3.2. Obstetric-related factors of the respondents

In this study, 132(38.9%), 213(62.8%), 207(61.1%), and 263(77.6%) of study participants were multiparas, Skipped IFA, attended antenatal care (ANC) two times, and had planned last pregnancy (Table 2).

## Table 2
### Obstetric health related factors among respondents in Wolaita zone public primary hospitals,2022(n = 339)

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Current visit trimester | 2nd trimester | 168 | 49.6 |
| | Third trimester | 171 | 50.4 |
| Planned pregnancy | no | 76 | 22.4 |
| | yes | 263 | 77.6 |
| Previous Place of ANC follow up | Hospital | 259 | 76.4 |
| | health center | 71 | 20.9 |
| | privet clinic | 9 | 2.7 |
| The first registration for ANC | <=4month | 265 | 78.2 |
| | >=5 month | 74 | 21.8 |
| Number of ANC visits | Two times | 207 | 61.1 |
| | three times | 96 | 28.3 |
| | >=4 times | 36 | 10.6 |
| Skipped IFAS | no | 126 | 37.2 |
| | yes | 213 | 62.8 |
| Reason of skip | forgetfulness | 73 | 34.3 |
| | Travel | 9 | 4.2 |
| | Constipation | 16 | 7.5 |
| | Gastritis | 93 | 43.7 |
| | Vomiting | 16 | 4.7 |
| | Absence in health facility | 6 | 2.8 |
| Gravidity | Primi-gravida | 99 | 29.2 |
| | Multigravida | 240 | 70.8 |
| Parity | Nulliparous | 105 | 31.0 |
| | Primiparas | 102 | 30.1 |
| | Multipara | 132 | 38.9 |
| History of abortion | no | 280 | 82.6 |

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| | yes | 59 | 17.4 |
| History of still birth | no | 329 | 97.1 |
| | yes | 10 | 2.9 |

## 3.3. Health system related factors

249 (73.5%), 219 (64.6%), 212 (62.5%), 213(62.8%), and 196 (57.8%) of women of the respondents spent 30 minutes and above waiting to get service, counseled on the benefit of IFAS, were not counseled how long to take IFAS, were not counseled on managing side effects, and were counseled about anemia respectively (Table 3).

Table 3
Health system related conditions of respondents in in Wolaita zone public primary hospitals, 2022(n = 339)

| Variables | Categories | Frequency | Percentage |
|---|---|---|---|
| Facility distance | < 30 minute | 148 | 43.7 |
| | >=30 minute | 191 | 56.3 |
| Waiting time | < 30 minute | 90 | 26.5 |
| | >=30 minute | 249 | 73.5 |
| Shortage of IFA | no | 262 | 77.3 |
| | yes | 77 | 22.7 |
| Counselled on benefit of IFAS | no | 120 | 35.4 |
| | yes | 219 | 64.6 |
| Counselled how often to take IFAS | no | 187 | 55.2 |
| | yes | 152 | 44.8 |
| Counselled how long to take IFAS | no | 212 | 62.5 |
| | yes | 127 | 37.5 |
| Counselled possible side effects | no | 210 | 61.9 |
| | yes | 129 | 38.1 |
| Counselled on managing side effects | no | 213 | 62.8 |
| | yes | 126 | 37.2 |
| Counselled about anemia | no | 143 | 42.2 |
| | yes | 196 | 57.8 |

Table 4
Factors associated with IFA adherence in Wolaita zone public primary hospitals, 2022(n = 339).

| Variables | Categories | COR | AOR | P-value |
|---|---|---|---|---|
| Age in years | <=19 | 0.028(0.005,0.167) | 0.025(0.003, 0.218)* | 0.001 |
| | 20−24 | 0.278(.093,.831) | 0.745(0.193, 2.876) | 0.670 |
| | 25−29 | 0.461(.167,1.272) | 0.986(0.292, 3.331) | 0.982 |
| | 30−34 | 0.459(.157,1.338) | 0.384(0.108, 1.369) | 0.140 |
| | >=35 | 1 | 1 | |
| Occupation status of mothers | Gov't employee | 1 | 1 | |
| | Non-gov't | 1.068(.268,4.252) | 2.205 (0.364, 13.360) | 0.390 |
| | Self-employee | .502(.248,1.017) | 0.984(0.413, 2.344) | 0.971 |
| | Merchant | .956(.479,1.908) | 1.507(0.635, 3.577) | 0.352 |
| | House wife | .671(.349, 1.290) | 0.631(0.268, 1.485) | 0.291 |
| | Daily laborer | .277(.094, 0.819) | 0.127(0.028,0.568)* | 0.007 |
| | student | 1.306(.338,5.052) | 6.462(0.755, 55.282) | 0.088 |
| History of abortion | no | .282(.129, .619) | 0.276(0.086,0.891)* | 0.031 |
| | yes | 1 | 1 | |
| Knowledge on IFA | Good | 3.3(0.89−7.1) | 5.56(1.23−8.34) | 0.020 |
| | Poor | 1 | 1 | |

## 3.4. Respondents' knowledge on IFAS

More than half, 189 (55.8%) had good knowledge on anemia and IFAS and 150 (44.2%) had poor knowledge on anemia and IFAS (Fig. 1)

## 3.5. Prevalence of adherence to IFAS

From a total of 339 participants included in this study, 68.1% of the participants adhered to iron-folic acid supplementation and 31.9% of them non-adhered to IFA (Fig. 2).

## 3.6. Factors associated with IFA adherence

The variables which significantly predict adherence to folic acid supplementation include the age, occupation of a mother, Knowledge on IFA, and history of abortion. In multivariate logistic regression analysis, those whose age less than 19[AOR = 0.025; CI 95% (0.003, 0.218) p = 0.001]; pregnant women daily laborer [AOR = 0.127; CI 95% (0.028, 0.568) p = 0.007]; history of abortion [AOR = 0.276; CI 95% (0.086, 0.891)) p = 0.031], and Knowledge on IFA [AOR = 5.56, CI 95%(1.23–8.34) p = 0.020] were identified as associated factors.

## 4. Discussion

Findings from this study revealed that the overall prevalence of adherence to IFA among study participants in the study area was 68.1%. This finding was in line with studies done in different parts of Ethiopia, such as Dire Dawa (71.8%) [14], Tikur anbessa (63.6%) [15],, and Sidama (67.6%) [16]. The possible reason for this agreement might be similarity in socio-economic status, similar study setting, and designs. However, this finding was lower than studies conducted in Mozambique (79%) [6], and northern Ethiopia( 76.9%) [17]. This discrepancy could be rooted in the geographical location, time interval of the study, sample size, and perception of the women.

Being a daily labourer negatively and significantly affects the adherence to IFA. This study revealed that mothers who were daily labourer were 87.3% less likely to adhere to IFA supplementation compared to the other group. The possible reason might be that daily labourer have a low probability of getting adequate information, are mostly less educated, and have low economic status, which inhibits them from visiting health facilities easily.

Having adequate knowledge about IFA supplementation would positively and significantly affect the adherence status among women [13], [18]–[20]. Those mothers who had good knowledge about IFA were 5.56 times more likely to adhere to IFA compared to their counterparts. This might be related with a mother who had adequate knowledge and could comply with the health care providers' recommendation adheres to IFA supplementation.

History of abortion was identified as an explanatory variable significantly related with adherence to iron folic acid supplementation. The probability of adherence to IFAs was 73% likely lower among study participants who had no history of abortion compared with their opposite group. This finding was supported by a systematic review conducted in Ethiopia [19]. This might be because pregnant women who have a history of abortion may have a high perceived fear that abortion could happen again. As a result, this may encourage them to give emphasis to their ANC and adherence to IFA supplementation.

Age of respondents significantly associated with adherence to IFA [21]. Those pregnant mothers whose age less than 19 were 99.5% less likely to adhere to IFAS compared with those whose age greater than 35. This finding was supported by a study finding in India [5] and Pakistan [9]. The possible reason for this

would be the increasing age of mothers becoming pregnant, more than ones where there are ANC visits for each pregnancy, which will increase awareness on IFAS. Limitation of the study includes; (1) cross-sectional study, which could not assess cause-effect effect; (2) there might be recalling bias, which might affect validity of the study.

## 5. Conclussion

In this study, adherence to IFA supplementation among pregnant women in the study area was relatively high. Age, occupation of the mother, Knowledge on Iron and folic acid and history of abortion were associated with adherence to iron folic acid supplementation. So, we recommend that appropriate counseling and health education should be given to pregnant women to enhance their adherence. In addition, health care providers and the top hospital managers should focus on the factors identified.

## Abbreviations

ANC- Antenatal care

AOR- Adjusted Odd Ratio

CI-Confidence Interval

 IFA-Iron Folic Acid

PH- Primary Hospital

WHO-World Health Organization

## Declarations

**Ethical Approval:** Wolaita Sodo University, College of Health Science Institutional review board approved all experimental protocols and issued ethical clearance with reference the number of WSU/IRB/1280/2022. Informed consent was obtained from all participants after the nature of the study was fully explained to them in their local languages. A thumbprint or signature was used on the consent form. Only those who signed written consent participated in the study and confidentiality of response was maintained throughout the research process by giving codes for the participants. The entire study participants were informed that data was kept private and confidential and used only for research purposes. The participants were assured that they have the right to refuse or withdraw if they are not comfortable at any time. All methods throughout a study were carried out in accordance with relevant guidelines and regulations.

**Consent for publication** is not applicable

## Author's Contributions

TG: Conceive data and designed the study, supervised the data collection, performed the analysis and interpretation of data, drafted the manuscript, and finally approved the revision for publication. TG had full access to all of the data in the study and takes responsibility for the integrity of data and the accuracy of data analysis. AA and CT assisted in designing the study and data interpretation and critically reviewed the manuscript. All authors read and approved the final manuscript.

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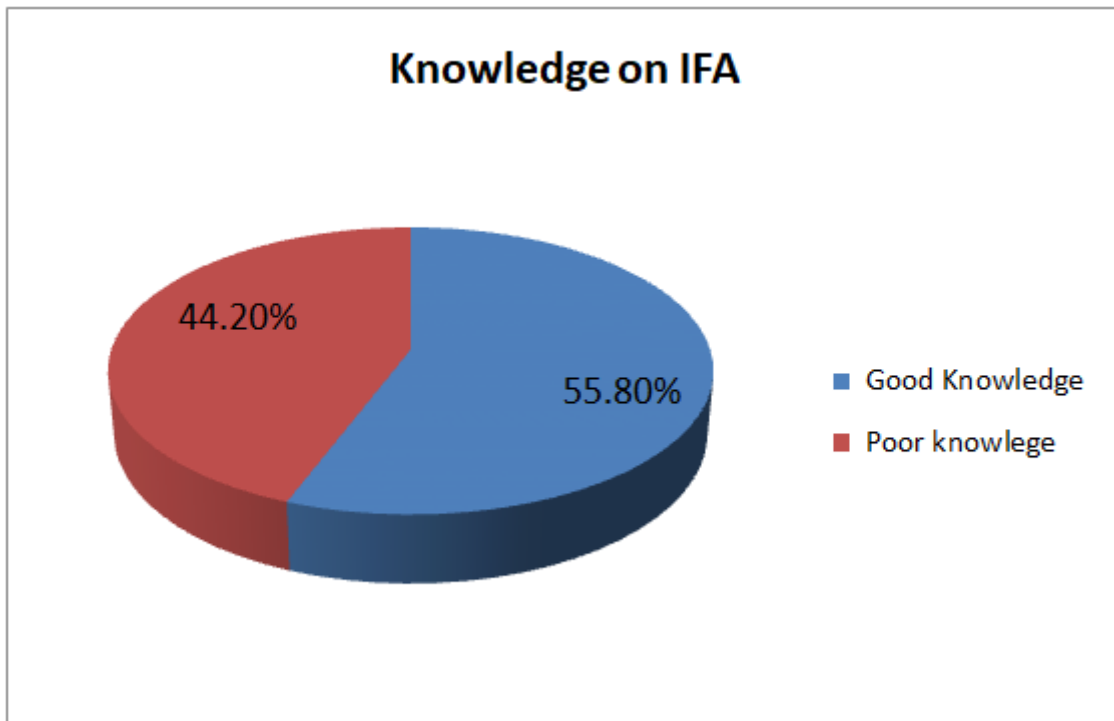
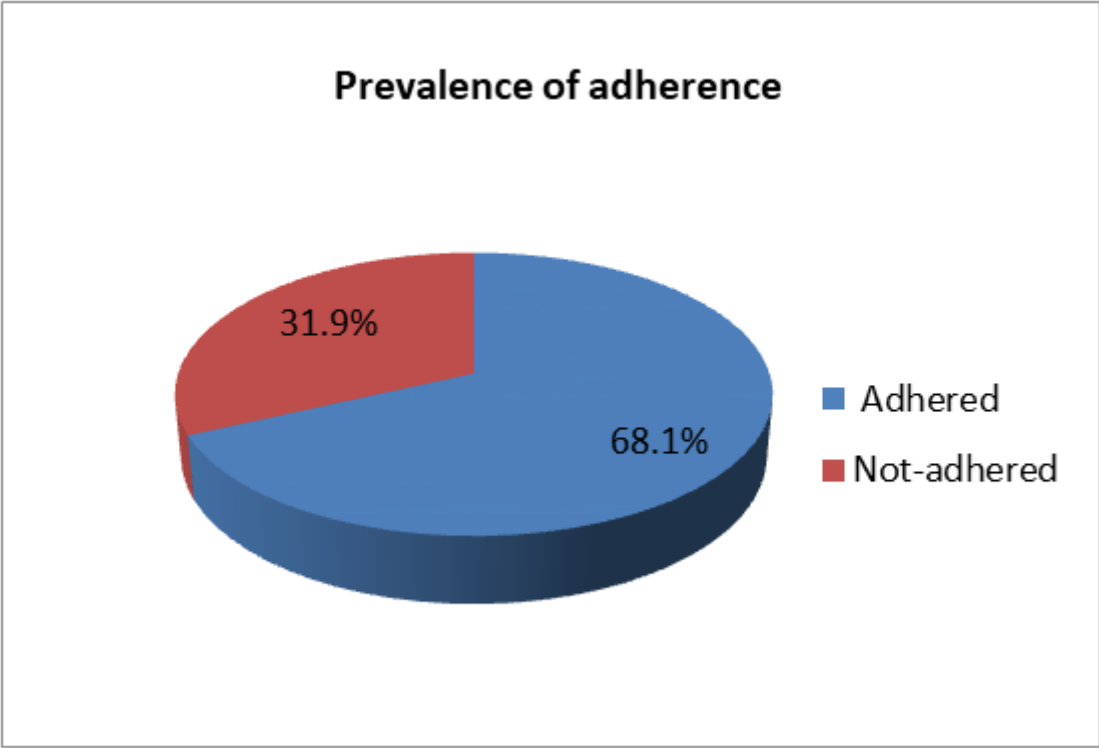# Figures



Figure 1

Knowledge on IFAS of the respondents

Figure 2

Prevalence of adherence to iron folic acid supplementation of respondents