

T.C.

YEDITEPE UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

**ADHERENCE TO IRON AND FOLIC ACID(IFA)
SUPPLEMENTATION AND ASSOCIATED FACTORS
AMONG PREGNANT MOTHERS ATTENDING
ANTENATAL CARE AT SOS HOSPITAL MOGADISHU,
SOMALIA.**

MASTER OF PUBLIC HEALTH THESIS

KHADIJA OSMAN MOHAMUD

Istanbul-2022

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SUPERVISOR

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Istanbul-2022

THESIS APPROVAL FORM

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This study have approved as a Master Thesis in regard to content and quality by the Jury.

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APPROVAL

This thesis has been deemed by the jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examinations Regulation and has been approved by Administrative Board of Institute with decision dated and numbered

Prof. Dr. Bayram YILMAZ
Director of Institute of Health Sciences

DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.



DEDICATION

This thesis is dedicated to my mother, my siblings and SOS Hospital in Mogadishu, Somalia.



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With all the effort made and attention paid, this thesis work has been such a devotion to me and my dedicated supervisor MD, Assist. Prof. Ayşe Arzu Akalin. She has been sincerely giving and always there whenever I needed her. For the most part, it is a great honor to be her MPH student, and I am willing to take our scientific relationship forward.

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TABLE OF CONTNENT

Table of Contents

THESIS APPROVAL FORM.....	i
DECLARATION	ii
DEDICATION.....	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTNENT	v
LIST OF SYMBOLS AND ABBREVIATIONS	ix
ABSTRACT.....	x
ÖZET	xi
2. INTRODUCTION	1
2.1 Introduction and Purpose	1
2.2 Background of the Study	1
2.3 Aim of the Study.....	2
2.4 Research Objectives.....	2
2.4.1 General Objective.....	2
2.4.2 Specific Objectives.....	2
2.5 Research Questions.....	3
2.6 Significance of the Study	3
2.7 Conceptual Framework.....	4
3. GENERAL INFORMATION AND LITERATURE REVIEW	5
3.1 INTRODUCTION	5
3.2 Compliance Level that Affects Adherence to IFA Supplementation	6
3.3 Socio-demographic Factors Affecting Adherence to IFA Supplementation.	7
3.4 Knowledge About the Tablet Intake of IFA Supplementation	9

3.5	Healthcare factors towards IFA Supplementation among mothers.	9
4.	MATERIAL AND METHODS	10
4.1	Introduction.....	10
4.2	Study Site.....	10
4.3	Study Design.....	10
4.4	Study Population.....	11
4.5	Sample Size.....	11
4.6	Study Variables Dependent variables	12
4.6.1	Dependent Variable: Adherence to iron and folic acid supplementation.....	12
4.6.2	Independent Variables.....	12
4.7	Inclusion Criteria	13
4.8	Exclusion Criteria	13
4.9	Source of Data.....	13
4.10	Data Collection Methods and Tools	14
4.11	Data Analysis	14
4.12	Ethical Considerations	15
4.13	Limitations of the Study.....	15
5.	RESULTS	16
5.1	Socio-demographic factors affecting pregnant women attending antenatal care service at SOS Hospital in Mogadishu, Somalia	16
5.2	Awareness factors affecting pregnant women attending antenatal care service at SOS Hospital in Mogadishu, Somalia.....	21
5.3	Healthcare related factors affecting pregnant women attending antenatal care service at SOS Hospital in Mogadishu, Somalia.....	24
5.4	The level of adherence to IFA supplementation	27
5.5	Multivariate analysis.....	30

5.6	Healthcare Givers View on Adherence to IFA Supplementation.....	31
6.	DISCUSSION and CONCLUSION	33
6.1	DISCUSSION	33
6.1.1	Level of Compliance Towards IFA Supplementation.....	33
6.1.2	Socio-demographic Factors Affecting IFA Supplementation.....	33
6.1.3	Knowledge Factors Affecting IFA Supplementation.....	34
6.1.4	Healthcare Factors Affecting IFA Supplementation.....	35
6.1.5	Healthcare Givers View on Adherence to IFA Supplementation	36
6.2	CONCLUSION.....	37
6.3	RECOMMENDATION	38
7.	REFERENCE.....	39
8.	APPENDICES	42
8.1	Acceptance Letter of the SOS Hospital, Mogadishu.	42
8.2	Ethical Approval	43
8.3	Informed Consent Forms	45
8.4	Data Collection Tools	49
8.5	Curriculum Vitae	61
8.6	THESIS CHECKLIST	63

LIST OF TABLES

Table 1:	Socio-demographic factors of the expecting women.....	16
Table 2:	Socio-demographic factors affecting adherence to IFA supplementation.....	18
Table 3:	Awareness factors of the expecting mothers	21
Table 4:	Awareness factors affecting adherence to IFA supplementation	22
Table 5:	Healthcare related factors of the expecting mothers.....	24
Table 6:	Health care related factors affecting adherence to IFA supplementation.....	27
Table 7:	Factors affecting adherence to IFA supplementation	30

LIST OF FIGURES

Figure 1: Conceptual Framework	4
Figure 2: Level of adherence to iron and folic acid supplementation.....	27



LIST OF SYMBOLS AND ABBREVIATIONS

ANC	Antenatal Care
DNA	Deoxyribonucleic Acid
HB	Hemoglobin
ID	Iron Deficiency
IFA	Iron and Folic Acid
IFAS	Iron and Folic Acid supplementation
MND	Micronutrient Deficiencies
MOH	Ministry of Health
NTD	Neural Tube Defect
RBC	Red Blood Cells
SES	Socio-Economic Status
WHO	World Health Organization

ABSTRACT

Khadija Osman Mohamud. ((2022). ADHERENCE TO IRON AND FOLIC ACID (IFA) SUPPLEMENTATION AND ASSOCIATED FACTORS AMONG PREGNANT MOTHERS ATTENDING ANTENATAL CARE AT SOS HOSPITAL SOMALIA. Yeditepe University, Institute of Health Science, Department of Public Health. MPH Thesis, Istanbul.

This study was conducted to assess the level of adherence to Iron and Folic Acid (IFA) supplementation and associated factors among pregnant mothers attending Antenatal care at SOS Hospital in Mogadishu, Somalia. In our study, to assess the level of adherence to iron and folic acid supplementation, descriptive self-reported adherence was recorded, and the associated factors using the regression model were used for statistical analysis with $p < 0.05$ taken as significant. The level of adherence to IFA supplementation was 62.7%.

The independent factors significantly associated with adherence were being born in the city and using the bus as a means of transport to the health facility. In addition, knowing that IFA supplementation should be taken for more than 6 months, and having health care provider as the primary source of information about iron/folate tablets ($P < 0.05$). In conclusion, increased health education, guidelines, and counseling services will contribute to improve adherence to folic acid and iron supplementation.

Keywords: Adherence, iron and folic acid (IFA) supplementation, pregnant women, anemia

Project Support

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ÖZET

Khadija Osman Mohamud. ((2022). SOS SOMALİ HASTANESİNDE DOĞUM ÖNCESİ BAKIM GÖREN GEBELERDE DEMİR VE FOLİK ASİT (DFA) TAKVİYESİNE UYUM VE İLİŞKİLİ FAKTÖRLER Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Halk Sağlığı Anabilim Dalı MPH Tezi, İstanbul.

Bu çalışma, Somali, Mogadişu'daki SOS Hastanesi'nde doğum öncesi bakıma başvuran hamile anneler arasında Demir ve Folik Asit (DFA) takviyesine uyum düzeyini ve ilişkili faktörleri değerlendirmek için yapılmıştır. Çalışmamızda, demir ve folik asit desteğine uyum düzeyini değerlendirmek için, tanımlayıcı özbildirimli uyum kaydedildi ve regresyon modeli kullanılarak ilişkili faktörler istatistiksel analiz için kullanıldı, $p<0,05$ anlamlı kabul edildi. IFA takviyesine uyum düzeyi %62,7 idi.

Uyumla istatistiksel olarak anlamlı ilişki saptanan bağımsız faktörler; şehirde doğmuş olmak ve sağlık kuruluşuna ulaşım aracı olarak otobüs kullanmak, DFA takviyesinin 6 aydan uzun süre alınması gerektiğini bilmek ve demir/folat tabletleri hakkında birincil bilgi kaynağının sağlık kuruluşu olmasıydı ($p<0.05$). Sonuç olarak, sağlık eğitimi, konuyla ilgili rehberler ve danışmanlık hizmetlerinin artırılması, folik asit ve demir desteğine uyumu artırmaya katkıda bulunacaktır.

Anahtar Kelimeler: Uyum, demir ve folik asit (DFA) takviyesi, gebe kadın, anemi

Proje Desteği Bu çalışma Somali Mogadişu'daki SOS Hastanesi tarafından desteklenmiştir.

1 INTRODUCTION

1.1 Introduction and Purpose

Iron and folic acid deficiency is a global public health issue that primarily affects women and children in developing countries. The proportion of iron needed by the body during pregnancy multiplies because the body requires more iron to produce extra blood to supply oxygen to the baby. Therefore, taking between 30 to 60 mg of iron daily and 400 g of folic acid supplementation during pregnancy is universally recommended (1). Folic acid, on the other hand, protects against neural tube defects and other congenital disabilities that emerge during the first trimester of pregnancy. Furthermore, pregnant women should take 400 mcg of folic acid every day for 30 days before conception and the first months of the pregnancy (2).

1.2 Background of the Study

A lack of iron Condition affects millions of people worldwide, especially women and children. All women are at risk due to blood loss during menstruation. Nutritional supplements seem to be the key to curing nutritional deficiencies that are impossible to manage with a diet alone. Anemia currently has a worldwide incidence of 29.6% in women who are not pregnant aged 15-49 years and an incidence of 36.6% in pregnant women (3). Anemia in Somalia is triggered by various variables, including a lack of iron-rich nutritional foods, untreated infectious diseases, and a failure to provide adequate infant feeding.

On the other hand, folic acid prevents neural tube defects and congenital disabilities of the baby's brain, which occur early in pregnancy. In developing countries, more than 300,000 neural tube defects emerge each year. Therefore, Enhancing the intake of folic acid supplements among women may lessen and prevent 150,000 to 210,000 neural tube defects (NTD) scenarios (4).

In Somalia, anemia prevalence among women who are not pregnant is 42.4%, and for pregnant women, it is 48.7% (5). The neonatal mortality is 36.78 per 1000 live birth of newborns who die before they complete the 28th day. Meanwhile, the infant mortality rate is 72.718 per 1,000 live births that die before one year (6) from asphyxia, diarrhea, neonatal disorders, or either during

delivery or after birth. Furthermore, one in every twenty pregnant women aged 15 to 49 dies during pregnancy and childbirth. Non-adherence is still a significant issue with IFA supplementation in pregnancy (7).

1.3 Aim of the Study

This study aims to assess factors affecting adherence to IFA supplementation among pregnant mothers attending antenatal care at SOS Hospital in Mogadishu, Somalia.

1.4 Research Objectives

1.4.1 General Objective

To assess the level of adherence to IFA supplementation and associated factors among pregnant mothers attending antenatal care (ANC) at SOS Hospital in Mogadishu, Somalia.

1.4.2 Specific Objectives

1. To find out the level of adherence to IFA supplementation among pregnant women attending antenatal care at SOS Hospital.
2. To determine socio-demographic factors affecting adherence to IFA supplements among pregnant women attending ANC at SOS Hospital.
3. To determine knowledge factors affecting adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital.
4. To determine healthcare factors affecting adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital.

The hypothesis of this thesis are as follows:

1. There is a significant effect of socio-demographic and other individual factors on adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital.
2. There is a significant effect of knowledge on adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital.
3. There is a significant effect of healthcare factors on adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital.

1.5 Research Questions

1. What is the level of adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital?
2. What socio-demographic and individual factors affect adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital?
3. What knowledge factors affect adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital?
4. What healthcare factors affect adherence to IFA supplementation among pregnant women attending ANC at SOS Hospital?

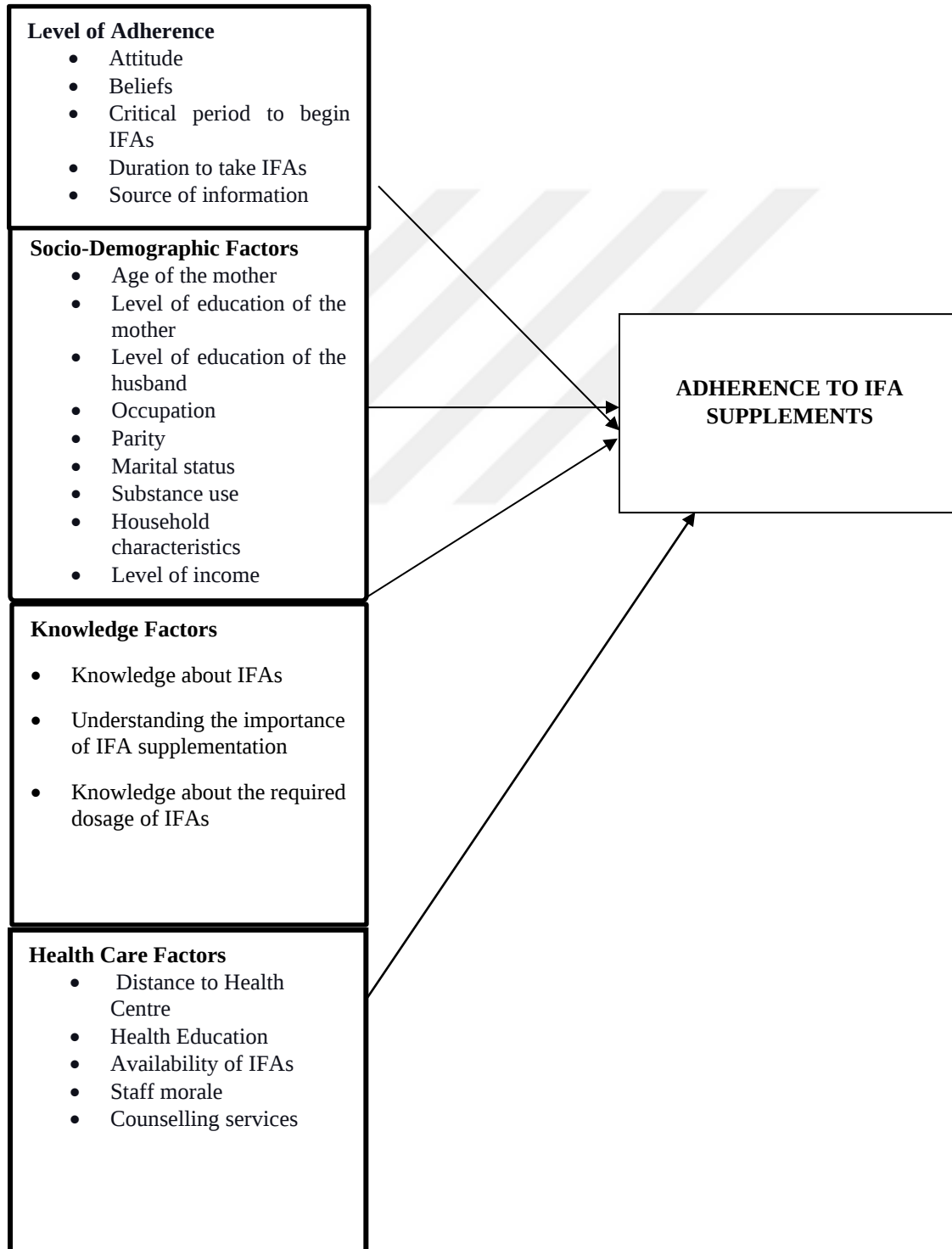
1.6 Significance of the Study

The poor adherence to IFA supplements and other micronutrients in Somalia, especially in women and children, is due to the lack of a healthcare system. The country is still recovering from the civil wars. Although some studies have been conducted in Somalia about anemia which is one of the major health problems, no study has been conducted on adherence to IFA supplements among pregnant women in Somalia; hence we found the need to conduct one. However, the results from this study will raise awareness and contribute to activities to increase adherence and compliance to IFA supplementation.

Conceptual Framework

The conceptual framework shows the relationships between adherence toward IFA supplementation and associated factors.

Figure 1: Conceptual Framework



2 GENERAL INFORMATION AND LITERATURE REVIEW

2.1 INTRODUCTION

Iron and folic acid are essential elements for the human body; our body systems cannot produce iron and folic acid, so iron and folic acid have to be taken from external sources. In addition, throughout pregnancy and after giving birth, the amount of iron and folic acid required increases as the mother and embryo consume much more than the usual daily intake required to develop the fetal nervous system and prevent anemia in the mother.

Folic acid deficiency causes neural tube defects which are congenital malformations in the nervous system and vertebral column during fetal development. NTDs emerge when the neural tube does not close properly. Spina bifida and anencephaly are two common types of NTDs. Spina bifida is a congenital disability and the most severe neural tube defect with an opening in the spinal column. There are three kinds of spina bifida, two have small openings with fluid in the baby's spinal column and the other does not have an opening or fluid. The seriousness can vary and end up causing nerve damage that may lead the baby to have severe disability and even death (8). Meanwhile, anencephaly is a situation in which some of the brain, brain stem, and spinal cord parts do not develop. As a result, babies born with anencephaly die right after birth (9).

Some studies report that neural defects affect 0.9 out of each 1000 live births, which indicates a high number (10). Women who have had previous pregnancies with congenital disabilities should take a higher daily dose of 1000 μg to 4 mg of folic acid starting one month before conception (8). Unfortunately, despite knowing the benefits of folic acid supplements, only half of the women take folic acid supplementation periconceptionally (10).

Iron deficiency anemia is a state in which the hemoglobin amount is little. Hemoglobin is a component in the red blood cells (RBC) that transport oxygen to the tissues of the body. Iron supplementation boosts hemoglobin (Hb) levels and improves maternal iron stores during pregnancy. Given this fact, iron and folic acid supplementation have been proven to help manage iron deficiency anemia and other defects during pregnancy. Iron deficiency anemia during pregnancy increases the risk of miscarriage, maternal mortality, neonatal morbidity and mortality, early delivery, and low birth weight. At the same time, in children, it may lead to growth

retardation, frequent infections, and some behavioral problems. In Somalia, the prevalence of anemia in women aged 15-49 is 43.1%, and 51.8% of children under five are anemic (5).

The global prevalence of iron deficiency anemia among pregnant women is estimated to be 36.6% (3). However, in Somalia iron deficiency anemia tends to affect 48.7% of pregnant women (5). Iron deficiency anemia during pregnancy increases morbidity and mortality (11). According to previous studies, the highest maternal death in developing countries was 462 for every 100,000 live births compared to developed countries which was 11 for every 100,000 live births in 2017 (12). Furthermore, for every maternal death, 100 women suffer from severe maternal morbidities such as blood loss during delivery (13).

2.2 Compliance Level that Affects Adherence to IFA Supplementation

Studies have been undertaken on iron supplementation compliance and its implications in preventing anemia in pregnant women. Iron and folic acid use during pregnancy are complicated: they can both cause anemia and congenital disabilities in both the fetus and the mother. These deficiencies can lead to poor cognitive development and abnormalities, preterm delivery, preeclampsia, irregular heartbeat, and postpartum depression. However, providing advice and guidance during antenatal visits, particularly when picking up IFA supplements, and spreading awareness encourage pregnant women to visit the hospital for checkups (14).

Studies considered that the first step is to increase awareness of IFAs, sufficient health counseling and community education among pregnant women has improved compliance (15).

Previous studies claim that poor compliance with iron supplements was more prevalent among adolescents, primarily single mothers and teenage mothers. Nevertheless, they could be unaware of their hemoglobin status (14).

During this study in South Ethiopia, compliance to iron and folic acid supplementation is that women stop taking the tablets prescribed to them by healthcare due to not remembering, not liking the taste of the pills, and shortage of the supplements in the health facility, some pregnant women noted the side effects of the tablets might cause heartburn, stomach cramping, and vomiting (15).

A Kenyan study found that those who need the supplement most are the ones who do not comply. In this view, many factors affect IFAs compliance, including age, literacy, economic status, beliefs against taking the supplement during pregnancy, not visiting the hospital for antenatal checkups, stockout, lack of efficient counseling, and fear of taking the supplement may cause the baby to become big and complications that pregnant women may have during delivery. It is essential to remember that pregnant women's health positively depends on taking IFA supplements and the achievement of IFA supplements highly depends on compliance with the tablets (17).

Providing pregnant women with precise information, and instructions on how to use and when to consume iron and folic acid supplements and educating them on the side effects and the health benefits can increase compliance with iron and folic acid supplementation (14).

A study in Nigeria revealed that pregnant women living in villages show less compliance with the iron supplement. Pregnant women living in the cities are more compliant than those living in the village because people living in the city can easily access health facilities, and pharmacies which makes it for them easier to find IFA supplements (16).

2.3 Socio-demographic Factors Affecting Adherence to IFA Supplementation.

Studies show that mother's age, economic status, education level and poor diet are linked to anemia during pregnancy (16).

Education level, high earnings, antenatal care checkups, family support, and knowledge about the benefits of IFA supplements among pregnant women are correlated with good adherence (18). On the contrary, a study conducted in northern Sudan showed that the mother's socio-demographic characteristics, such as education level, career as well as place of residence, did not affect the mother's adherence level to iron and folic acid supplementation (19). An Ethiopian study indicates that pregnant women over twenty-five years old were more likely to adhere to IFA supplements than those below twenty-five. This demonstrates that older women are more concerned about their health and pregnancy outcomes and have better experience preventing and treating IFA deficiencies. In addition, pregnant women who went to antenatal care 4 or more times complied better than those who went less than four times (15).

Previous researches also discovered that maternal education had an impact on IFA supplementation. Women who completed secondary school or obtained high diplomas were more likely to adhere to IFA supplementation than uneducated mothers. This finding was consistent with the findings of numerous studies in Ethiopia. Education is more likely to raise female awareness of micronutrient deficiency and how to overcome these deficiencies. Overall, educated women had a more ability to stick to healthcare inputs such as IFAs, which provide better healthcare for both the infant and the mother (14).

Pregnant women from high-income families have more adherence than those in poorer households, and their livelihood is dependent on small business activities (21).

The mother's age, lack of maternal knowledge, postnatal care, and belonging to the poorest household were all socio-demographic factors attributing to non-adherence to IFA supplements among pregnant women in Pakistan (18).

An Ethiopian study found that the reason for noncompliance was cultural beliefs that taking supplements during pregnancy would harm the baby, afraid of side effects, and increase the baby's weight (22). Studies also revealed that family support is critical to reducing pregnant women forgetting to take the tablets, which is the main factor of low adherence.

Furthermore, pregnant women who live with their spouses were more inclined to use their supplementation than single mothers. This proves that married women gain support from their spouses, such as remembrance to take supplements and attend antenatal care checkups (23).

A variety of variables causes low adherence to IFA supplements. The lack of clinics near residential areas, particularly in villages, where women should always walk 60 minutes or more to reach the health facility to access antenatal care services, makes IFA supplements less likely to be taken. On other hand, women who live near clinics that assist them in avoiding health problems during their pregnancy are more likely to take IFA supplements (24).

According to an East African study found single/widowed women, teenagers, and illiterate women had a higher prevalence of anemia during pregnancy (25).

2.4 Knowledge About the Tablet Intake of IFA Supplementation

A community-based cross-sectional study with in-depth interviews carried out in Misha District, Ethiopia, found that the compliance rate among pregnant women was 39.2%, which is extremely low (15). Sharing enough information and knowledge about IFA supplements during antenatal care visits among pregnant women would improve the level of compliance to IFA supplements (15).

A Tanzanian study found that mothers who never had a baby with neural tube defects or anemia were associated with being less to adhere to IFA supplements. (24). Another study finding shows that women with a diploma degree or at least attending primary school also correlated with high adherence levels. The elevated consumption of IFA supplements during pregnancy was related to improving increased maternal health (26).

A study finding confirms that adherence to IFA supplements among women in cities had better results and was observed about 59.2% to be less risk to anemia. Other results pointed out that pregnant women who live in rural areas did not adhere to IFA supplements (28).

2.5 Healthcare Factors towards IFA Supplementation among Pregnant Mothers.

A study in Cambodia found, that providing antenatal care services and solid follow-up of pregnant women attending ANC, availability of supplements, and plan for nutrient food were considered to provide good results to adherence (30).

Knowledge about the advantage of taking IFA supplements, health education sessions during tablet collection from the health facility, not having trouble reaching the health facility, and no obstacles faced while at the health facility for antenatal checkups were related to adhering to IFA supplementation. Pregnant women with a history of abortion and anemia were related to adhering to IFA supplements and taking four or more tablets per week (31).

A community-based cross-sectional study conducted in India in 2010 found that 62% of pregnant mothers were adhering to IFA supplementation and the adherence was higher among expectant mothers who received health education and counseling from health workers compared to mothers who did not get any health education from health workers (32).

3 MATERIAL AND METHODS

3.1 Introduction

This chapter describes the methods of how the study was carried out. It includes the study site, study design, study population, sample size, sampling procedure, study variables, inclusion and exclusion criteria, Sources of data, data collection method, data collection tools, data Analysis method, ethical considerations and limitations of the study.

3.2 Study Site

This study was conducted at SOS Hospital in Mogadishu, Somalia. SOS Children's Village is an independent non-governmental, nonprofit international organization. The SOS Children's Village was established in Mogadishu in 1985, and the Hospital is for maternity, pediatric, and other humanitarian services.

SOS Hospital in Mogadishu receives thousands of pregnant mothers attending Antenatal care. In addition, the Hospital provides free medical care for many of the poorest areas in Mogadishu. Unfortunately, there is a lack of government hospitals in Somalia, and some of the existing healthcare facilities in Mogadishu are not equipped with maternity services.

The SOS Hospital has 26 sick beds for maternity, treatment rooms, maternity rooms, an operating theatre for cesarean sections, a pharmacy, a laboratory, and a blood bank. An average of 7,000 babies are born yearly at SOS Hospital in Mogadishu. SOS Hospital receives immense antenatal care enrollment in Mogadishu, Somalia (33).

3.3 Study Design

This is a hospital-based cross-sectional study, where quantitative data collection method have been used. The participating mothers completed a detailed structured form of a questionnaire. The researcher administered the study questionnaire to present pregnant women, and face-to-face in-depth interviews with five healthcare providers were performed. The adherence was considered as pregnant women taking iron folate supplements six or seven days per week to get adherence of greater than 90%.

Non-adherence was defined as pregnant women taking IFA supplements less than 6 days per week.

3.4 Study Population

Pregnant mothers aged 15-49 years attending Antenatal care at SOS Hospital. The researcher selected SOS Hospital as the study site since it is one of the hospitals receiving yearly thousands of pregnant mothers seeking antenatal care services.

3.5 Sample Size

The sample size was determined using the Kish Leslie formula

$$n = Z^2pq/d^2$$

n = sample size

P = number of babies born at SOS Hospital is like 7,000 annually. Then it becomes 583 babies born each month.

p=p/100 daily birth, were 19 babies born each day.

$$q = 1-p =$$

d = error of assumption = 5%

Z = normal distribution at 95% confidence interval (1.96)

n= 236 pregnant mothers

Therefore, the total sample size required was 236 pregnant mothers.

Sampling Procedure

The study used systematic sampling, a probability sampling method. The reason for using systematic sampling is that it is considered the purest and most straightforward probability sampling strategy, has better chances that the sample represents the entire population, and can be concluded in a shorter time.

A random number was picked for the starting point using systematic sampling by listing all mothers who attended the clinic on that day from the Antenatal register and choosing the first mother by chance. Then every fourth (4th) woman who met the inclusion criteria was included in the study.

Sampling interval= N/n

Where N-study population =7,000 annually, meaning in two months average population is 1,166 (duration of data collection is two months)

N-sample size =236

Sampling interval=1166/236

The sampling interval is 4

This means that after the first number is randomly picked, every fourth number is picked until the sample size of 236 is achieved.

3.6 Study Variables Dependent variables

3.6.1 Dependent Variable: Adherence to iron and folic acid supplementation.

3.6.2 Independent Variables

Independent variables: Attendance to antenatal care visits

Socio-demographic and individual factors affecting adherence to IFA supplementation,

- Age of the mother
- Level of education of the mother
- Level of education of the husband
- Occupation
- Parity
- Marital status
- Substance use
- Household characteristics
- Level of income

Awareness towards IFA supplementation,

- Attitude
- Beliefs
- Critical period to begin IFAs
- Duration to take IFAs
- Source of information

Knowledge Factors affecting IFA supplements

- Knowledge about IFAs
- Understanding the importance of IFA supplementation
- Knowledge about the required dosage of IFAs

Healthcare factors affecting adherence to IFA supplements

- Distance to Health Centre
- Health Education
- Availability of IFAs
- Staff morale
- Counselling services

3.7 Inclusion Criteria

All pregnant mothers in their second and third trimesters aged 15 to 49 years who were attending antenatal care at SOS Hospital and had provided written informed consent to the study at the time of data collection were potential respondents.

3.8 Exclusion Criteria

The study excluded those pregnant mothers in their first trimester and those who did not want to participate in the study. Pregnant mothers younger than 15 years, and older than 49 years, those with severe illness conditions like eclampsia, preeclampsia, ectopic pregnancy, and individuals with conditions where iron intake is contraindicated were also excluded from the study.

3.9 Source of Data

Pregnant mothers aged 15-49 years in their second and third trimesters attending Antenatal care will be the major primary source of data. Secondary data was collected from healthcare providers.

3.10 Data Collection Methods and Tools

The study employed face-to-face interviewing, which involves direct interaction between the interviewer and interviewee. The researcher developed a questionnaire with close-ended and open-ended questions for the study. Close-ended and open-ended questions were used to enable the participants to easily select the options which related to them and facilitate easy analysis after that based on the quantitative approach to the research. There was a semi-structured interview form for the healthcare givers, and interviews were conducted with five healthcare providers, including a doctor, clinical officer, nurses, and midwife. The questionnaire was pre-tested on a sample of 10 pregnant mothers at SOS Hospital in Mogadishu, which was conducted a month prior to the study. The pre-test showed no need to change the tool. Also, the participants understood the informed consent and questions in the questionnaire. The data collection period was between April 2022 and May 2022.

3.11 Data Analysis

Objective one required the determination of the level of adherence to IFA supplementation. Therefore, the collected data were analyzed descriptively; that is, the data were analyzed for frequencies and good percentages only. As such, the findings at this level were presented as frequencies and percentages.

Data collected was first and foremost analyzed descriptively, using frequency distributions, following which descriptive cross-tabulations were also analyzed. Next, all variables whose descriptive cross-tabulations did not have an integer of 0 in any of their cells were considered for bivariate analysis, as they were the ones that could generate p-values and odd ratios. This was done using a binary regression in SPSS version 25. The Pearson correlation Coefficient test was used to test the relationship among the variables and regression coefficient models to determine the extent to which the dependent variable impacted the independent variables.

The findings at this point were reported using odd crude ratios at a 95% confidence interval since there was no adjustment for confounders made. Statistical significance was set at 5%; all p-values equal or less than 0.05 were considered significant.

All variables found to be significant following the bivariate analysis were fitted in a multivariate, using MANOVA test in which each significant variable was analyzed against the dependent

variable and potential confounders that it was adjusted. The findings henceforth were reported in terms of adjusted odd ratios, and the variables were considered predictors of adherence to IFA supplementation.

3.12 Ethical Considerations

To start this study, an acceptance letter was obtained from the SOS Hospital in Mogadishu, Somalia. Then the ethical approval for the study was obtained from Yeditepe University Non-Interventional Clinical Research Ethics Board. Oral consent was made before the distribution of the informed consent to the participants. After explaining the purpose of this study, they were asked if they were ready and prepared to participate in the study, upon which they were requested to sign the informed consent. Only those willing to participate were asked to participate in the study voluntarily. They were also told that all the information they would provide would remain confidential and that the questionnaire they were to respond to would not be accessed by anyone else apart from the principal investigator only after the data was collected. Participating in the study was voluntary, and no mother was given any incentives to persuade participation in the study. However, they participated at their discretion and could thus also withdraw from the study without any consequence. A Coronavirus disease risk management plan was also adopted; all standard operating procedures for preventing or transmitting infection risk of COVID-19 were observed during interviews. The interviewer and every respondent had their mask on, and social distancing was applied.

3.13 Limitations of the Study

The study's limitation was that it was conducted in one Hospital and could not cover the situation of other hospitals in the city.

Another limitation of this research is that the serum hemoglobin level of pregnant women was not measured to confirm the diagnosis of anemia in pregnancy.

4 RESULTS

4.1 Socio-demographic factors affecting pregnant women attending antenatal care service at SOS Hospital in Mogadishu, Somalia

Table 1: Socio-demographic factors of the expecting women

Variables	Category	Frequency N	Percentage %
Place of birth	City	117	49.6
	Town/village/county	119	50.4
Marital status	Not married	30	12.7
	Married	206	87.3
Housing condition	Refugee camp	7	3.0
	Rented residency (house, apartment)	145	61.4
	Own residency (house, apartment)	84	35.6
Level of education	Completed high school	19	8.1
	Completed university with a degree	9	3.8
	No diploma but can read and write	45	19.1
	No diploma and cannot read and write	96	40.7
	Primary level	67	28.4
Current occupation	Housewife	200	84.7
	Salaried employee	10	4.2
	Self-employment/ business owner	13	5.5
	Unemployed	13	5.5
Current occupation of the partner	Farmer	25	10.6
	Salaried employee	133	56.4
	Self-employment/ business owner	50	21.2
	Unemployed	28	11.9
Level of income per month	150-199 USD	49	20.8
	200-249 USD	33	14.0
	250-299 USD	17	7.2
	300 or above	30	12.7
	≤ 149 USD	107	45.3
Age at marriage	15-19	174	73.7
	20-24	53	22.5
	25 or above	9	3.8
Number of children	0	22	9.3
	1	25	10.6
	2	34	14.4
	3	35	14.8
	4	28	11.9
	5 or more	92	39.0
Husband/partner's age	20-29 years	56	23.7
	30-39 years	102	43.2
	40-49 years	59	25.0
	50 or above	19	8.1
Husband/partner's level of education	Completed high school	33	14.0
	Completed university with a degree	44	18.6
	No diploma and cannot read and write	42	17.8
	No diploma but can read and write	86	36.4
	Primary level	31	13.1

Husband/partner has other wives	I don't know	11	4.7
	No	171	72.5
	Yes	54	22.9
Husband/partner has children from other wives	I don't know	9	3.8
	No	139	58.9
	Yes	88	37.3
Number of people living in the same household	2 people	21	8.9
	3 people	18	7.6
	4 people	29	12.3
	5 people	27	11.4
	More than 5 people	141	59.7
Person making decision at home	Me	36	15.3
	Me and my husband together	81	34.3
	My husband	119	50.4
All the household members healthy	No	19	8.1
	Yes	217	91.9
Respondents smoking status	No	236	100.0
Husband/partner smoke	No	220	93.2
	Yes	16	6.8
Frequency of experiencing problems in providing enough food	Never	112	47.5
	Often	10	4.2
	Rarely	61	25.8
	Sometimes	53	22.5
Frequency of experiencing problems in paying your bills	Always	12	5.1
	Never	101	42.8
	Often	14	5.9
	Rarely	64	27.1
	Sometimes	45	19.1
Need other's support for times when you come to the hospital.	No	151	64.0
	Yes	85	36.0

#The frequency and percentages of socio-demographic factors of the expect women is written in the above table.

Table 1 shows that half (50.4%) of the respondents were born in towns/villages/counties, the majority (87.3%) were married, and 61.4% were living in rented residences (house, apartment). Four in every ten 40,7% of the respondents had no diploma and could not read and write, 84.7% of the respondents were housewives, 56.4% of the respondents' husbands were salaried employees, 45.3% had a level of income of below 150 USD per month.

Regarding age at marriage, most (73.7%) of the respondents married between 15-19 years of age, 39.0% of the respondents had 5 or more children, 43.2% of the respondents' husbands were aged 30-39 years, 36.4% of the husbands had no diploma but could read and write, 72.5% of the respondents said their husband did not have another wife, 58.9% noted that their husband did not

have children from other wives, almost six in every ten 59.7% had more than 5 people in the household, slightly above half (51.3%) lived in the household with their husband, and children, on decision making 50.4% noted that the person making decisions at home is the husband, 91.9% of the respondents noted that all the members in the household were healthy, all the respondents (100%) were non-smokers, while 93.1% of the husbands were non-smoker. Most 47.5% of the respondents never experienced any problems in providing enough food in the household, 42.8% never experienced problems with paying bills and the majority (64%) of the respondents did not need other's support for the times when they came to the hospital.

Table 2: Socio-demographic factors affecting adherence to IFA supplementation

Variables	Category	Adherence n (%)	Non- adherence n (%)	cOR95% CI	p-value
Place of birth	City Town/village/county	82(70.1) 66(55.5)	35(29.9) 53(44.5)	1.881(1.101- 3.216) 1.0	0.021
What is your current marital status?	Not married Married/cohabiting	13(43.3) 135(65.5)	17(56.7) 71(34.5)	0.402(0.185- 0.875) 1.0	0.022
Housing condition	Refugee camp Rented residency (house, apartment) Own residence (house, apartment)	5(71.4) 94(64.8) 49(58.3)	2(28.6) 51(35.2) 35(41.7)	1.786(0.327- 9.738) 1.317(0.758- 2.286) 1.0	0.503 0.329
Level of education	Completed high school Completed university with a degree No diploma but can read and write No diploma but cannot read and write Primary level	12(63.2) 6(66.7) 25(55.6) 58(60.4) 47(70.1)	7(36.8) 3(33.3) 20(44.4) 38(39.6) 20(29.9)	0.766(0.301- 1.948) 0.609(0.327- 1.134) 0.688(0.400- 2.001) 0.627(0.482- 2.717) 1.0	0.576 0.118 0.521 0.219
Current occupation	Housewife Salaried employee Self-employment Unemployed	130(65.0) 7(70.0) 5(38.5) 6(46.2)	70(35.0) 3(30.0) 8(61.5) 7(53.8)	2.167(0.701- 6.697) 2.722(0.479- 15.468) 0.729(0.153- 3.474) 1.0	0.197 0.259 0.692

Current occupation of the partner	Farmer Salaried employee Self-employment/ business owner Unemployed	15(60.0) 90(67.7) 25(50.0) 18(64.3)	10(40.0) 43(32.3) 25(50.0) 10(35.7)	0.833(0.274-2.535) 1.163(0.495-2.372) 0.556(0.215-1.438) 1.0	0.748 0.729 0.226
Monthly level of income	150-199 USD 200-249 USD 250-299 USD 300 or above Below 149 USD	30(61.2) 24(72.7) 8(47.1) 18(60.0) 68(63.6)	19(38.8) 9(27.3) 9(52.9) 12(40.0) 39(36.4)	0.906(0.451-1.817) 1.529(0.646-3.619) 0.510(0.182-1.429) 0.860(0.375-1.972) 1.0	0.780 0.334 0.200 0.722
Age at marriage	15-19 20-24 25 or above	113(64.9) 29(54.7) 6(66.7)	61(35.1) 24(45.3) 3(33.3)	0.926(0.224-3.834) 0.604(0.136-2.675) 1.0	0.916 0.507
Number of children	0 1 2 3 4 5 or more	8(36.4) 17(68.0) 15(44.1) 26(74.3) 17(60.7) 65(70.7)	14(63.6) 8(32.0) 19(55.9) 9(25.7) 11(39.3) 27(29.3)	0.237(0.089-0.631) 0.883(0.340-2.288) 0.328(0.146-0.739) 1.200(0.497-2.896) 0.642(0.266-1.550) 1.0	0.004 0.797 0.007 0.685 0.324
Husband/partner's age	20-29 years 30-39 years 40-49 years 50 or above	29(51.8) 65(63.7) 42(71.2) 12(63.2)	27(48.2) 37(36.3) 17(28.8) 7(36.8)	1.308(0.962-1.777) 1.560(0.851-2.817) 1.851(0.725-3.526) 1.0	0.078 0.141 0.310
Husband's level of education	Completed high school Completed university with a degree No diploma but cannot read and write No diploma but can read and write Primary level	18(54.5) 31(70.5) 23(54.8) 58(67.4) 18(58.1)	15(45.5) 13(29.5) 19(45.2) 28(32.6) 13(41.9)	1.264(0.540-2.961) 1.245(0.560-2.767) 1.151(0.234-2.017) 0.584(0.341-1.786) 1.0	0.590 0.591 0.345 0.472

Husband/partner having other wives	I don't know No Yes	7(63.6) 113(66.1) 28(51.9)	4(36.4) 58(33.9) 26(48.1)	1.625(0.426-6.202) 1.809(0.973-3.365) 1.0	0.477 0.061
Husband/partner having children from other wives	I don't know No Yes	6(66.7) 93(66.9) 49(55.7)	3(33.3) 46(33.1) 39(44.3)	1.592(0.374-6.775) 1.609(0.292-2.787) 1.0	0.529 0.090
Number of people in the same household	2 people 3 people 4 people 5 people More than 5 people	9(42.9) 9(50.0) 12(41.4) 21(77.8) 97(68.8)	12(57.1) 9(50.0) 17(58.6) 6(22.2) 44(31.2)	0.340(0.134-0.866) 0.454(0.169-1.221) 0.320(0.141-0.727) 1.588(0.599-4.208) 1.0	0.024 0.118 0.007 0.353
Person making decision at home	Me Me and my husband together My husband	16(44.4) 61(75.3) 71(59.7)	20(55.6) 20(24.7) 48(40.3)	0.541(0.255-1.148) 2.062(1.105-3.848) 1.0	0.109 0.023
All the household members healthy	No Yes	14(73.7) 134(61.8)	5(26.3) 83(38.2)	1.734(0.603-4.992) 1.0	0.307
Husband/partner smokes	No Yes	137(62.3) 11(68.8)	83(37.7) 5(31.2)	0.750(0.252-2.235) 1.0	0.606
Frequency of experiencing problems in providing enough food	Never Often Rarely Sometimes	65(58.0) 7(70.0) 44(72.1) 32(60.4)	47(42.0) 3(30.0) 17(27.9) 21(39.6)	0.908(0.466-1.767) 1.531(0.356-6.595) 1.699(0.775-3.724) 1.0	0.755 0.567 0.186
Frequency of experiencing problems in paying bills	Always Never Often Rarely Sometimes	6(50.0) 61(60.4) 6(42.9) 45(70.3) 30(66.7)	6(50.0) 40(39.6) 8(57.1) 19(29.7) 15(33.3)	0.500(0.138-1.817) 0.763(0.356-1.593) 0.375(0.110-1.279) 1.184(0.522-2.688) 1.0	0.292 0.471 0.117 0.686
Need other's support for times when coming to the hospital.	No Yes	53(62.4) 95(62.9)	32(37.6) 56(37.1)	1.024(0.591-1.774) 1.0	0.932

*p-value for cross-tab test.

Bivariate analysis percentile divided by into two categories as adherence and non-adherence.

#The Pearson correlation Coefficient test was used. CI; confidence interval.

The socio-demographic factors of being born in the city (cOR: 1.881; 95% CI: 1.101-3.216, p-0.021), and wife and husband making decisions together at home (cOR: 2.062; 95% CI: 1.105-3.848, p-0.023) were associated with higher adherence to IFA supplementation. While adherence to IFA supplementation was low among the pregnant mothers who were not married (cOR: 0.402; 95% CI: 0.185-0.875, p-0.022), having no child (cOR: 0.237; 95% CI: 0.089-0.6318, p-0.004), or two children (cOR: 0.340; 95% CI: 0.134-0.866, p-0.007), having two people living in the household (cOR: 0.328; 95% CI: 0.146-0.739, p-0.024), and having four people living in the household (cOR: 0.320; 95% CI: 0.141-0.727, p-0.007).

4.2 Awareness factors affecting pregnant women attending antenatal care service at SOS Hospital in Mogadishu, Somalia

Table 3: Awareness factors of the expecting mothers

Variables	Category	Frequency n	Percentage %
Knowing the drug called iron/folate	No	33	14.0
	Yes	203	86.0
Knowing what the tablet is for	No	70	29.7
	Yes	166	70.3
Thinking it's important to take iron/folate tablet throughout pregnancy	No opinion	47	19.9
	No	28	11.9
	Yes	161	68.2
Critical period to begin folic acid intake	Preconception	70	21.2
	First month of pregnancy	40	16.9
	Second month of pregnancy	26	29.7
	Third month of pregnancy	50	11.0
	Beyond three months	50	21.2
Knowledge on duration of taking tablets	Two months	30	30.9
	Three months	58	31.8
	More than Six months	75	24.6
	I don't now	73	12.7
Knowing what happens or which disease will occur if pregnant mother does not take iron/folate tablets	Anemia	125	53.0
	Neural tube defects	11	4.7
	I don't know	100	42.4
Knowing the benefits of taking iron/folate tablets for the mother	No opinion	39	16.5
	No	29	12.3
	Yes	168	71.2
Knowing benefits of taking iron/folate tablets to the baby	No opinion	61	25.8
	No	48	20.3
	Yes	127	53.8
Thinking iron/folate tablets has side effects	I am not sure	43	18.2
	No	139	58.9
	Yes	54	22.9

Source of information about iron/folate tablets	A friend	9	3.8
	Family member	26	11.0
	Healthcare	171	72.5
	Other	30	12.7
Tendency in the family or neighborhood to go to antenatal visit during pregnancy	No	63	26.7
	Yes	173	73.3
Awareness of any beliefs in the community, which may prevent people to go to antenatal care	No	215	91.1
	Yes	21	8.9
Awareness of any beliefs in the community, which may prevent people from taking iron tablets	No	228	96.6
	Yes	8	3.4

#The frequency and percentages of awareness factors of the expecting women is written in the above table.

Most (86%) of the respondents were aware of the drug called iron/folate, seven in every ten (70.3%) knew what the drug is for, 68.2% think it is important to take iron/folate tablet throughout the pregnancy, 29.7% said the critical period to begin folic acid intake is preconception, 31.8% knew that tablets are supposed to be taken for at-least six months, 53.0% knew that if pregnant mother does not take iron/folate tablets they can get anemia, 71.2% knew the benefit of taking iron/folate tablets to the mothers, and 53.8% to the baby, 58.9% think iron/folate tablets have no side effect, 72.5% mentioned health care workers as the main source of information about iron/folate tablets, 73.3% said it was the common in their family or neighborhood to go to antenatal visits during pregnancy, 91.1% were not aware of any beliefs in the community, which may prevent them or others to go to antenatal care and 96.6% were not aware of any beliefs in the community, which may prevent them or others to take iron tablets.

Table 4: Awareness factors affecting adherence to IFA supplementation

Variables	Category	Adherence n (%)	Non- adherence n (%)	cOR95% CI	p- value
Knowing the drug called iron/folate	No	6(18.2)	27(81.8)	0.095(0.038-0.243)	0.000
	Yes	142(70.0)	61(30.0)	1.0	
Knowing what this tablet is for	No	28(40.0)	42(60.0)	0.256(0.142-0.459)	0.000
	Yes	120(72.3)	46(27.7)	1.0	
Thinking it's important to take iron/folate tablet throughout pregnancy	I do not know/ no opinion	13(27.7)	34(72.3)	0.135(0.065-0.280)	0.000
	No	16(57.1)	12(42.9)	0.471(0.206-1.076)	
	Yes	119(73.9)	42(26.1)	1.0	
Critical period to begin folic acid intake	Preconception	27(38.6)	43(61.4)	0.138(0.058-0.328)	0.000
	First month of pregnancy	25(62.5)	15(37.5)	0.366(0.139-0.960)	0.041
	Second month of pregnancy	20(76.9)	6(23.1)	0.732(0.229-2.341)	0.000
	Third month of pregnancy	41(82.0)	9(18.0)	1.0	0.599

	Beyond three months	35(70.0)	15(30.0)	0.512(0.200-1.313)	0.164
Knowledge on duration one take tablets	Two months Three months More than Six months I don't know	65(86.7) 44(75.9) 19(63.3) 20(27.4)	10(13.3) 14(24.1) 11(36.7) 53(72.6)	3.763(1.388-10.202) 1.820(0.700-4.731) 1.0 0.218(0.089-0.539)	0.220 0.009 0.001
Knowing what happens or which disease will occur if pregnant mother does not take iron/folate tablets	Anemia Neural tube defect I don't know	97(77.6) 7(63.6) 44(44.0)	28(22.4) 4(36.4) 56(56.0)	4.409(2.477-7.850) 2.227(0.613-8.094) 1.0	0.000 0.224
Knowing the benefits of taking iron/folate tablets for the mother	I do not know No Yes	8(20.5) 12(41.4) 128(76.2)	31(79.5) 17(58.6) 40(23.8)	0.081(0.034-0.190) 0.221(0.097-0.501) 1.0	0.000 0.000
Knowing benefits of taking iron/folate tablets to the baby	I do not know No Yes	17(27.9) 24(50.0) 107(84.3)	44(72.1) 24(50.0) 20(15.7)	0.072(0.035-0.151) 0.187(0.089-0.392) 1.0	0.000 0.000
Thinking iron/folate tablets has side effects	I am not sure No Yes	9(20.9) 101(72.7) 38(70.4)	34(79.1) 38(27.3) 16(29.6)	0.111(0.044-0.285) 1.119(0.560-2.238)	0.000 0.750
Source of information about iron/folate tablets	A friend Family member Healthcare provider Other	3(33.3) 17(65.4) 123(71.9) 5(16.7)	6(66.7) 9(34.6) 48(28.1) 25(83.3)	2.500(0.463-13.495) 9.444(2.693-33.126) 12.812(4.636-35.406) 1.0	0.287 0.000 0.000
Tendency in the family or neighborhood to go to antenatal visit during pregnancy	No Yes	24(38.1) 124(71.7)	39(61.9) 49(28.3)	0.243(0.133-0.446) 1.0	0.000
Awareness of any beliefs in the community, which may prevent people to go to antenatal care	No Yes	133(61.9) 15(71.4)	82(38.1) 6(28.6)	0.649(0.242-1.739) 1.0	0.390
Awareness of any beliefs in the community, which may prevent people from taking iron tablets	No Yes	141(61.8) 7(87.5)	87(38.2) 1(12.5)	0.232(0.028-1.914) 1.0	0.175

*p-value for cross-tab test.

#Bivariate analysis percentile divided by into two categories as adherence and non-adherence.

#The Pearson correlation Coefficient test was used. CI; confidence interval.

There is a statistically significant (p=0.000) between the level of adherence to IFA supplements and pregnant mothers who had knowledge on the drug called iron/folate (cOR: 0.095; 95% CI: 0.038-0.243, p=0.000), those who had knowledge on what the drugs is for (cOR: 0.256; 95% CI: 0.142-0.459, p=0.000), important to take iron/folate tablet throughout pregnancy (cOR: 0.135; 95% CI: 0.065-0.280, p=0.000), those who had knowledge that the critical period to begin folic acid intake was first months of pregnancy (cOR: 0.366; 95% CI: 0.139-0.960, p=0.041), those who had knowledge that the critical period to be begin folic acid intake was preconception (cOR: 0.138;

95% CI: 0.058-0.328, p=0.000), those who did not have knowledge on the duration one should take the tablets (cOR: 0.218; 95% CI: 0.089-0.539, p=0.001), those who did not had knowledge on the benefit of iron/folate to the mother (cOR: 0.081; 95% CI: 0.034-0.190, p=0.000), those who did not have knowledge the benefit of iron/folate to the baby (cOR: 0.072; 95% CI: 0.035-0.151, p=0.000), and those who were not sure if iron/folate tablets has side effects (cOR: 0.111; 95% CI: 0.044-0.285, p=0.000).

However, adherence to IFA supplementation was high among pregnant women, who knew that the duration for taking the tablets was more than six months (cOR: 3.763; 95% CI: 1.388-10.202, p=0.001), those who knew that if the pregnant women do not take iron/folate, it will lead to anemia (cOR: 4.409; 95% CI: 2.477-7.850, p=0.000), those whose primary source of information was family members (cOR: 9.444; 95% CI: 2.693-33.126, p=0.000) and those whose primary source of information were health care provider (cOR: 12.812; 95% CI: 4.636-35.406, p=0.000).

4.3 Healthcare related factors affecting pregnant women attending antenatal care service at SOS Hospital in Mogadishu, Somalia

Table 5: Healthcare related factors of the expecting mothers

Variables	Category	Frequency N	Percentage %
Distance to the health facility	Within 5km	204	86.4
	Beyond 5km	32	13.6
Means to the health facility	On Bajaj	69	29.2
	On bus	103	43.6
	On foot	64	27.1
Provided with health education about taking IFA tablets by health workers during antenatal care visits	No	149	63.1
	Yes	87	36.9
Topic of the health education	Benefits or importance	39	44.8
	Dosing and dosage	11	12.6
	Target individuals for IFA	35	40.2
	When to take IFA	2	2.3
Ever accessed iron folic acid tablets since becoming pregnant	No	65	27.5
	Yes	171	72.5
Ever taken iron and folic acid tablets during this current pregnancy	No	73	30.9
	Yes	163	69.1
Duration been taking IFA tablets during this pregnancy	Less than a month	58	24.6
	One month	50	21.2
	Two months	28	11.9
	Three months	52	22.0

	More than three months	48	20.3
Number of tablets collected	30 tablets	114	48.3
	60 tablets	27	11.4
	90 tablets	7	3.0
	>90 tablets	88	37.3
	Other		
In the past one week, having taken iron and folic acid tablets	No	149	63.1
	Yes	87	36.9
Number of days taken the tablets in the last 30 days	2 weeks per month	18	7.6
	3 times per week	40	16.9
	7 days	99	41.9
	Never	79	33.5
Average waiting time in the health facility while collecting iron/folate tablets	Within 60 minutes	185	78.4
	Beyond 60 minutes	51	21.6
Facing any problem in the facility while collecting IFA tablets	No	218	92.4
	Yes	18	7.6
Medical advice or counselling about IFA supplements given by healthcare provider	No	120	50.8
	Yes	116	49.2
Planned pregnancy	No	155	65.7
	Yes	81	34.3
Wanting to have this child	No	2	.8
	Yes	234	99.2
Number of pregnancies experienced before	One	44	18.6
	Two	28	11.9
	Three	38	16.1
	More than three	126	53.4
Ever having miscarriage or abortion during your pregnancies?	No	139	58.9
	Yes	97	41.1
Experiencing any problem with household members when coming to hospital for antenatal care	No	216	91.5
	Yes	20	8.5
History of Taking iron/folic acid supplementation during previous pregnancies	I do not remember	10	4.2
	No	68	28.8
	Yes	158	66.9
Experiencing any health problem during current pregnancy	No	136	57.6
	Yes	100	42.4
Having had therapy to become pregnant	No	146	61.9
	Yes	90	38.1
Wanting to have more children	No	8	3.4
	Yes	228	96.6
Experiencing health problems in previous pregnancy/ies	No	181	76.7
	Yes	55	23.3
Having chronic diseases or health problems	No	221	93.6
	Yes	15	6.4

#The frequency and percentages of healthcare factors of the expect women is written in the above table.

Majority (86.4%) of the respondents lived within 5km from the health facility (hospital), 43.6% came on a bus to the health facility, 63.1% were not provided with health education about IFA tablets by the health workers during ANC visit, of those who were provided with health education, 44.8% were educated on benefits or importance of taking the tablets, 69.1% of the respondents had ever taken iron and folic acid tablets during this current pregnancy, 24.6% had taken the tablets for less than a month, 29.2% have taken 7 tablets in the past 7 days, 48.3% of the respondents collected 30 tablets, 63.1% had taken iron and folic acid tablets in the past one week, 41.9% took 7 tablets the last 7 days, 78.4% had an average waiting time of within 60 minutes at the facility, 92.4% did not face any problem while collecting the tablets, 50.8% did not received any medical advice or counselling about IFA supplements form the healthcare provider, 65.7% said the pregnancy was not planned, 99.2% though wanted the pregnancy, 53.4% had more than three pregnancies before, 58.9% of the respondents had never had miscarriage or abortion during pregnancies, 91.5% never experienced any problems with household members when they wanted to come to hospital for antenatal care, 66.9% took iron/folic acid supplementation during their previous pregnancies, 57.6% of the respondents did not experience any health problems in their current pregnancy, 61.9% of the respondents did not have therapy to become pregnant, 96.6% wanted more children, 76.7% did not experience health problems in their previous pregnancy/ies and 93.6% did not have any chronic diseases or health problems.

4.4 The level of adherence to IFA supplementation

The adherence was considered as pregnant women taking iron folate supplements six or seven days per week to get adherence of greater than 90%.

Non-adherence was defined as pregnant women taking IFA supplements less than 6 days per week. When the pregnant mothers were asked, if they were able to take their IFA tablet every day after receiving (level of adherence), 62.7% showed adherence to the IFA supplementation by taking the tablet every day.

Figure 2: Level of adherence to iron and folic acid supplementation

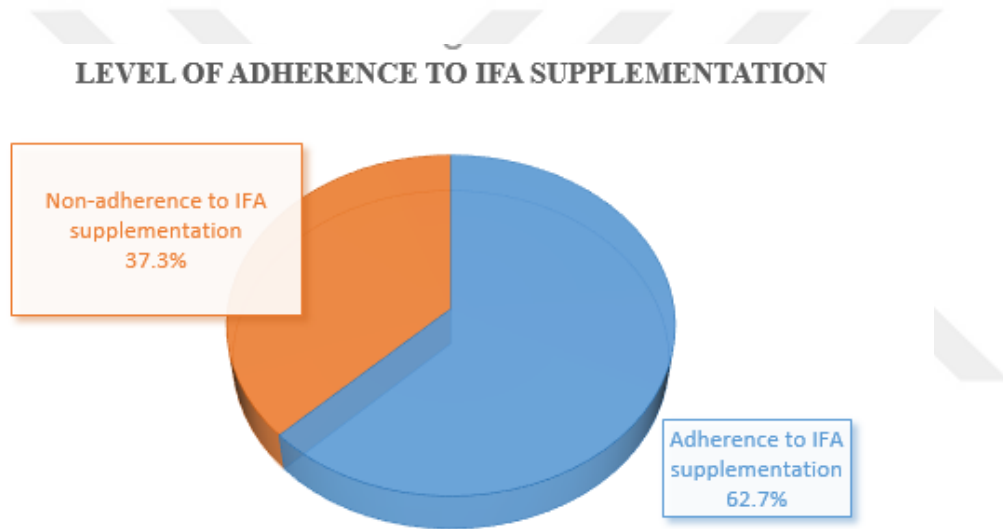


Table 6: Health care related factors affecting adherence to IFA supplementation

Variables	Category	Adherence n (%)	Non- adherence n (%)	cOR95% CI	p-value
Distance to the health facility	Within 5 km	125 (61.3)	79(38.7)	1.615(0.711-3.669) 1.0	0.252
	Beyond 5km	23 (71.9)	9(28.1)		
Means of transport to the health facility	On Bajaj	43 (62.3)	26(37.7)	2.126(1.063-4.254) 3.808(1.959-7.400) 1.0	0.033 0.000
	On bus	77(74.8)	26(25.2)		
	On foot	28(43.8)	36(56.2)		
Provided with health education about taking IFA tablets by health workers during antenatal care visits	No	69(46.3)	80(53.7)	0.087(0.039-0.193) 1.0	0.000
	Yes	79(90.8)	8(9.2)		
Average waiting Time in the health facility while collecting iron/folate tablets	Within 60 minutes	112(60.5)	73(39.5)	1.564(0.800-3.059) 1.0	0.191
	Beyond 60 minutes	36(70.6)	15(29.4)		

Facing problems in the facility while collecting tablets	No Yes	138(63.3) 10(55.6)	80(36.7) 8(44.4)	1.380(0.523-3.639) 1.0	0.515
Medical advice or counselling about IFA supplements given by Healthcare provider	No Yes	55(45.8) 93(80.2)	65(54.2) 23(19.8)	0.209(0.117-0.374) 1.0	0.000
Planned pregnancy	No Yes	93(60.0) 55(67.9)	62(40.0) 26(32.1)	0.709(0.402-1.249) 1.0	0.234
Number of previous pregnancies	One Two Three More than three	23(52.3) 15(53.6) 26(68.4) 84(66.7)	21(47.7) 13(46.4) 12(31.6) 42(33.3)	0.949(0.367-2.453) 1.0 1.878(0.684-5.154) 1.733(0.756-3.975)	0.221 0.914 0.194
History of miscarriage or abortion	No Yes	82(59.0) 66(68.0)	57(41.0) 31(32.0)	0.676(0.392-1.165) 1.0	0.158
Experiencing any problems with household members when coming to hospital for antenatal care	No Yes	84(38.9) 4(20.0)	132(61.1) 16(80.0)	0.393(0.127-1.215) 1.0	0.105
Taking Iron/folic acid supplementation during previous pregnancies	I do not remember No Yes	3(30.0) 21(30.9) 124(78.5)	7(70.0) 47(69.1) 34(21.5)	0.118(0.029-0.479) 0.123(0.065-0.232) 1.0	0.003 0.000
Experience of any health problems during current pregnancy	No Yes	86(63.2) 62(62.0)	50(36.8) 38(38.0)	1.054(0.618-1.797) 1.0	0.846
History of therapy to become pregnant	No Yes	82(56.2) 66(73.3)	64(43.8) 24(26.7)	0.466(0.263-0.824) 1.0	0.009
Experience of any health problems in previous pregnancy/ies	No Yes	119(65.7) 29(52.7)	62(34.3) 26(47.3)	1.721(0.933-3.173) 1.0	0.082
History of chronic diseases or health problems	No Yes	136(61.5) 12(80.0)	85(38.5) 3(20.0)	0.400(0.110-1.459) 1.0	0.165

*p-value for cross-tab test.

#Bivariate analysis percentile divided by into two categories as adherence and non-adherence.

#The Pearson correlation Coefficient test was used. CI; confidence interval.

Respondents who used Bajaj and bus to the health facility were more likely to adhere to IFA supplementation compared to those who came on foot to the health facility (cOR: 2.126; 95% CI: 1.063-4.254, p=0.033), and (cOR: 3.808; 95% CI: 1.959-7.400, p=0.000) respectively.

Respondents who were not provided with health education about taking IFA tablets by healthcare givers during antenatal care visits were less likely to adhere to IFA supplementation compared to those who were provided health education on IFA tablets from health workers during ANC visits (cOR: 0.087; 95% CI: 0.039-0.193, p=0.000).

Respondents who did not access iron folic acid tablets since becoming pregnant were less likely to adhere to IFA supplementation than those who get access to the IFA table since pregnancy (cOR: 0.149; 95% CI: 0.080-0.280, p-0.000).

Respondents who did not take iron and folic acid tablets in the past week were less likely to adhere to IFA supplementation than those who took the tablets in the past week (cOR: 0.027; 95% CI: 0.008-0.089, p-0.000).

Respondents who did not receive medical advice or counseling about IFA supplements from the healthcare workers were less likely to adhere to IFA supplementations than those who received medical advice or counseling about IFA supplements (cOR: 0.209; 95% CI: 0.117-0.374, p-0.000).

Respondents who did not remember taking iron/ folic acid supplementation during previous pregnancies were less likely to adhere to IFA supplementation than those who remembered to take iron/ folic acid supplementation during previous pregnancies (cOR: 0.118; 95% CI: 0.029-0.479, p-0.003).

Respondents who did not take iron/ folic acid supplementation during previous pregnancies were less likely to adhere to IFA supplementations than those who took iron/ folic acid supplementation during previous pregnancies (cOR: 0.123; 95% CI: 0.065-0.232, p-0.000).

Respondents who did not have therapy to become pregnant were less likely to adhere to IFA supplementation than those who became pregnant with therapy (cOR: 0.466; 95% CI: 0.263-0.824, p-0.009).

4.5 Multivariate analysis

Table 7: Factors affecting adherence to IFA supplementation

Variables	Category	cOR95% CI	p-value	aOR95% CI	p-value
Place of birth	City Town/village/county	1.881(1.101-3.216) 1.0	0.021	3.372(1.026-11.086) 1.0	0.045
Means of transport to the health facility	On Bajaj On bus On foot	2.126(1.063-4.254) 3.808(1.959-7.400) 1.0	0.033 0.000	4.497(0.821-24.633) 7.216(1.524-34.174) 1.0	0.083 0.013
Medical advice or counselling about IFA supplements given by healthcare provider	No Yes	0.209(0.117-0.374) 1.0	0.000	0.141(0.023-0.845) 1.0	0.032
Taking iron/folic acid supplementation during previous pregnancies	I do not remember No Yes	0.118(0.029-0.479) 0.123(0.065-0.232) 1.0	0.003 0.000	0.003(0.000-0.355) 0.167(0.02601.084)	0.017 0.061
Knowledge on duration of tablet intake	I don't now More than Six months Three months Two months	0.218(0.089-0.539) 3.763(1.388-10.202) 1.820(0.700-4.731) 1.0	0.001 0.009 0.220	0.338(0.049-2.321) 10.632(1.115-101.371) 0.378(0.049-2.929) 1.0	0.270 0.040 0.352
Source of information about iron/folate tablets	A friend Family member Healthcare Mass media	2.500(0.463-13.495) 9.444(2.693-33.126) 12.812(4.636-35.406) 1.0	0.287 0.000 0.000	11.961(0.261-547.448) 2.120(0.135-33.266) 31.215(2.261-43.981)	0.203 0.593 0.010

#Multivariate Analysis of variance= MANOVA according to factors affecting adherence to IFA supplements. CI; confidence interval.

When the variables that were significant at the bivariate level were adjusted for confounding and interaction, pregnant mothers who were born in the city, were more likely to adhere to IFA supplementation (aOR: 3.372; 95% CI: 1.026-11.086; p-0.045) compared to those born in the town/villages/county. Pregnant mothers who used the bus as a means of transport to the health facility were more likely to adhere to IFA supplementation (aOR: 7.216; 95% CI: 1.524-34.174; p-0.013) compared to the mothers who came to the health facility on foot.

Pregnant women who noted that the healthcare provider did not give them medical advice or counseling about IFA supplementation were less likely to adhere to IFA supplementation (aOR: 0.141; 95% CI: 0.023-0.845; p-0.032) compared to those who were provided medical advice or counseling about IFA supplementation by the health care providers. Pregnant women who did not remember taking iron/folic acid supplementation during their previous pregnancies were less likely

to adhere to IFA supplementation (aOR: 0.003; 95% CI: 0.000-0.355-0.845; p=0.017) compared to those who took iron/folic acid supplementation during their previous pregnancies.

Pregnant women who knew that IFA supplementation should be taken for more than six months were more likely to adhere to IFA supplementation (aOR: 10.632; 95% CI: 1.115-101.371; p=0.040) compared to those who knew that IFA supplementation should be taken for only two months, which shows the importance of appropriate counseling.

In addition, pregnant women whose source of information about iron/folate tablets was healthcare workers were more likely to adhere to IFA supplementation (aOR: 31.215; 95% CI: 2.261-43.981; p=0.010) compared to those whose source of information about iron/folate tablet was mass media such as TV, which shows the importance of spreading awareness.

4.6 Healthcare Givers View on Adherence to IFA Supplementation

Interviews with healthcare providers revealed following findings.

The healthcare givers expressed their opinion that pregnant women's education level, family support, and place of residence are associated with their adherence to IFA supplements. The following are the healthcare givers' responses:

"Lack of education is a significant barrier. However, educated mothers tend to adhere to taking IFA tablets" (Midwife responded).

"Support from the husband and friends would improve the mother's compliance with IFA supplementation" (Midwife responded).

"Pregnant mothers from refugee camps and rural areas are the women I observe the most they do not usually take IFA supplements but are also hesitant to use medication" (Nurse responded).

"The majority of pregnant women who visit our health facility are unplanned pregnancies" (Midwife responded).

When the healthcare givers were asked if they give health education sessions for the pregnant women attending antenatal care, a healthcare giver said, *"Yes, most pregnant women who came to this hospital, we give them health education about the number of tablets, how to take the tablets—drinking more water, asking them about the side-effects they got while taking the tablets"* (Nurse

responded). Another healthcare giver added "*The number of mothers who come to the hospital and ask for IFA supplements is increasing yearly. Some mothers are attentive, listen, and comply with health education messages*" (Midwife responded).

In addition, when the healthcare givers asked if the pregnant women take the educational program seriously, they answered as follows:

"*Every time mothers receive health education; they first listen but ignore it most of the time. However, some mothers are serious, especially those aware of the benefits of IFA. Direct engagement between pregnant mothers and doctors can enhance the awareness uptake*" (Nurse responded).

"*All mothers do not take education programs seriously. To enhance mothers' attendance, awareness campaigns through mass and social media tell people about the benefits of IFA*" (Nurse responded).

When healthcare givers asked about the prescription of IFA tablets and if the health facility has a policy of supplementing pregnant women with IFA tablets, they responded, "*In the hospital here, we prescribed IFA as a supplement,*" and "*Yes, the health facility has a policy and follows the WHO guidelines; all pregnant women get a standard dose of iron and folic acid supplement*" (Clinical officer responded).

However, all the healthcare givers interviewed concluded that "*Encouraging pregnant women to take their supplements as prescribed, strengthening health education, and performing frequent antenatal checkups would enhance IFA supplementation during pregnancy.*"

5 DISCUSSION and CONCLUSION

5.1 DISCUSSION

5.1.1 Level of Compliance Towards IFA Supplementation

According to the current study, our findings of adherence to IFA supplementation level was 62.7%. It is most likely that the survey was conducted in a city where access to health services is more improved than in remote area. This was similar to a study in a rural area in India in 2010 on 50 antenatal mothers revealed that 62% of the mothers adhered the IFA supplements (33). Meanwhile, in this present study, compliance was low among non-married women. This indicates that married women were more likely to comply the IFA supplements compare to non-married women.

In this study, 29.7% of pregnant women reported that the critical period to begin folic acid is preconception, while only 4.1% knew that folic acid deficiency causes neural tube defects in the baby. In addition, pregnant women were well aware that iron deficiency might cause anemia compared to folic acid deficiency, which causes neural tube defects that lead to the baby's congenital malformations.

Furthermore, the adherence was considered as pregnant women taking iron folate supplements six or seven days per week to get adherence of greater than 90%.

5.1.2 Socio-demographic Factors Affecting IFA Supplementation

The study discovered no significant link between education and IFA adherence. Similarly, a study from Northern Sudan Khartoum in 2014 results of 856 women attending Khartoum Hospital revealed that a mother's socio-demographic characteristics, such as education level and career, did not affect the mother's adherence to Iron and Folic acid supplementation (19).

The study found that the place of birth affects adherence to IFA supplements, where pregnant women born in the cities are more likely to adhere to IFA supplements than those born in the

villages. This is because women born in the city can access IFA supplements and get an antenatal checkup regularly. In addition, adherence to IFA supplements was low among Unmarried pregnant women. The main reason for low adherence among Unmarried pregnant women was the lack of a husband who supports them and not remembering to take the tablet.

On the other hand, a study discovered that women who completed at least secondary school were more than six times more likely to adhere than uneducated mothers to use IFA supplements (13). This finding contradicted numerous studies conducted in Ethiopia and India. Overall, educated women were more likely to adhere to healthcare treatment approaches such as IFA, which provide better care for both the infant and the mother (13).

This study revealed a history of using IFA supplementation during previous pregnancies positively linked with adherence to IFA supplementation. Similarly, the findings from Northern Ethiopia showed that knowledge of anemia, iron folate tablets, history of anemia in previous pregnancies, and educational level was significantly associated with good adherence to iron folate supplements (36).

5.1.3 Knowledge Factors Affecting IFA Supplementation

The study found that knowing the benefits of IFA supplements for the mother and baby was positively and significantly associated with adherence to IFAS. Similarly, a South Ethiopian study revealed that knowledge helps pregnant women to know the benefit of taking supplements during pregnancy. However, a community based cross sectional study in Ethiopia results of 303 pregnant mothers attending antenatal care in Misha District found that Pregnant mothers who are knowledgeable about iron-folate supplementation were 50 % more likely to adhere to iron-folate supplementation during pregnancy than those utterly ignorant of the iron-folate supplement (15).

The study found that 53% of the respondents knew that pregnant mothers who do not take iron/folate tablets get anemia because most pregnant women had a history of anemia. Similarly, a research study conducted in Northern Ethiopia, results of 418 pregnant mothers in Aykel Town found that the mother's knowledge of anemia, iron folate tablets, and a history of anemia during

previous pregnancies was significantly associated with adherence to iron and folate supplementation (36).

The present study found that 72.5% of the pregnant women get the information about IFA supplements from the healthcare givers. It is in line with the finding that mothers' practice of taking iron and folic acid supplements was significantly associated with well-trained healthcare givers being the primary source of their knowledge of IFAS (39).

At the bivariate level, the study discovered that beginning folic acid intake in the periconception period was associated with good adherence to folic acid.

The study found that access to IFA tablets was significantly associated with adherence at the bivariate level. A study conducted in Pakistan a sample of two demographics in 2016 found that low adherence to IFA supplements might be related to inaccessible and lower antenatal care service utilization, lack of IFA supplements, lack of counseling, insufficient knowledge about anemia, and particular negative beliefs about IFAS (34).

5.1.4 Healthcare Factors Affecting IFA Supplementation

This study found that pregnant women who received medical advice or counseling about IFA supplements from their healthcare givers were more likely to adhere to IFA supplementation. A study conducted in different regions in Nigeria findings support that increasing awareness of IFAS, adequate counseling, and community education among pregnant women has improved compliance (21).

The study found that pregnant women who come to the hospital by Bus and Bajaj were more likely to adhere to IFA supplements than those who come on foot. This is because pregnant women who come on foot might travel long distances to reach the hospital, which makes it hard for them to walk every time they want to access IFA tablets and antenatal care services.

The present study found that receiving health education from healthcare givers about IFA supplementation was positively associated with adherence to IFA supplementation at the bivariate level. In addition, a comparative cross-sectional study conducted in Western Ethiopia, of 358 urban

pregnant women and 356 rural pregnant women revealed that quality counseling, for instance, clarity of the messages and improving support from ANC providers (such as sufficient tablet supply and clear messages on the benefits of the tablet), is attributed to compliance with IFA supplementation (28).

5.1.5 Healthcare Givers View on Adherence to IFA Supplementation

In this present study, findings yielded from interviews with healthcare givers showed that the non-adherent factors that affect the use of IFA tablets were lack of health education, awareness and ignorance of the tablet. However, healthcare givers should be ready to give knowledge, counseling, and guidance about IFA supplements to pregnant women during antenatal follow-ups while collecting the tablets; they are the primary source of knowledge and must be well prepared to communicate with the patients (27).

The findings from the healthcare givers showed that the main reason for not adhering is that pregnant women tend to forget to take the supplement daily. Similarly, a study conducted in South Ethiopia in 2015 found that the reason for not adhering to IFA supplements by pregnant mothers forget to take the tablets, believe the supplement will harm the baby and fear side effects (15).

This study found that stockouts of supplements in the health facility may lead to difficulty for pregnant women to receive an adequate quantity of supplements due to frequent stockouts. Therefore, there is a need to improve the logistics system for supplying IFA supplements to all the health facilities in the city.

According to the adherent pregnant women, the study found reasons for adherence were receiving advice and counseling from healthcare providers about the knowledge of the health benefits of IFAS, such as preventing anemia.

5.2 CONCLUSION

Iron and Folic Acid supplementation was adhered to by 62.7% of pregnant women.

Iron/folic acid supplementation was highly adhered to among pregnant women born in the city; those who used the Bajaj and Bus to the health facility took their tablets for 7 days.

In addition, pregnant women who knew that IFA supplementation should be taken for more than six months and pregnant mothers whose source of information about iron/folate tablets was healthcare workers were more likely to adhere to IFAs and had a high level of adherence.

Pregnant women who did not receive medical advice or counseling about IFA supplementation, as well as those who did not remember taking iron/folic acid supplementation during their previous pregnancy, had lesser adherence to Iron and Folic Acid supplementation.

5.3 RECOMMENDATION

Based on these findings, the following recommendations have been made:

First, to increase adherence to IFAS, there is a need to increase health education on the goals and benefits of IFAS and guidance on swallowing the drug as recommended.

The community should be continually educated about the goals and benefits of IFAS.

The community and other local leaders must constantly advocate for and support early attendance at ANC by pregnant mothers, as well as support mothers on IFAS in order to make them complete the required doses.

The findings suggest that individualized strategies targeting such factors and increased health education, guidance, and counseling are needed to improve iron and folic acid supplementation adherence.

This findings highlight the importance of improving supplement information dissemination and developing a reminder mechanism to improve adherence behavior.

This study requires enhancing and increasing health education, spreading awareness, and avoiding any frustrating situations in health facilities while collecting the tablets are crucial to improving and boosting the low rate of IFA supplementation adherence in the study area.

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7 APPENDICES

7.1 Acceptance Letter of the SOS Hospital, Mogadishu.



P.O.Box 599, Mogadishu
Wadajir District, Office Airport Road
Bulo Hubey

17th Apr, 2021

TO WHOM IT MAY CONCERN:

This is to confirm that KHADIJA OSMAN MOHAMUD has been official granted permission to carryout her research study from our steamed Hospital premises in Mogadishu.

Khadija will be accorded supervision from the hospital's top authorities.

In reference to confidential matters, you will not without consent of your hospital supervisor disclose any confidential matters to any one not authorized to receive them.

All information gathers should be entirely for academic purposes.

Sincerely

General Manager
SOS Hospital Mogadishu



7.2 Ethical Approval



YEDİTEPE UNIVERSITY
NON-INTERVENTIONAL CLINICAL RESEARCH ETHICS BOARD

Version No 2.0
Feb.13, 2022
Page 1 / 2

DECISION FORM

March 3, 2022

ETHICAL BOARD INFO	Name	Yeditepe University Non-Interventional Clinical Research Ethics Board
	Address	Yeditepe Üniversitesi Kayışdağı Kampüsü, Tıp-Mühendislik Binası, Sağlık Bilimleri Enstitüsü, İnönü Mah. Kayışdağı Cad. 326A, 26 Ağustos Yerleşimi 34755 Ataşehir, İstanbul
	Website	http://goetik.yeditepe.edu.tr/
	Phone	0216 578 00 00
	E-mail	goetik@yeditepe.edu.tr

EVALUATED DOCUMENTS	Application file original signatures, CD and online application	☒
	Title of research and the names of the researchers	☒
	Letter of application	☒
	Application Form-Nature of the Research;	☒
	• Type	☒
	• Significance and distinctive value	☒
	• Aims and objectives	☒
	• Method	☒
	• Management of the research	☒
	• Widespread impact	☒
	• Pertinence of the budget and reason (if applicable)	☒
	• Timeframe and convenience	☒
	• References	☒
	Informed consent form (uniquely prepared for the research)	☒
	Letter of Undertaking-1 A commitment to undertake the responsibility of obtaining institutions permission from where the data collection will be made	☒
	Letter of Undertaking-2 A commitment to read the latest version of the World Medical Association Declaration of Helsinki and all relevant guidelines of the Ministry of Health	☒
	Letter of Undertaking-3 A commitment on whether there are previous ethical board applications	☒
	Letter of Undertaking-4 A commitment that no action will be taken during the research that is not included in the research budget and that will bring additional burden to the volunteer or the Social Security Institution	☒
	Letter of Undertaking-5 A commitment to reading the circular on treatment approaches and scientific research in COVID-19 patients	☒
	Letter of Undertaking-6 A commitment to reading the document of Research Application Permissions that is published by Ministry of Education	☒
	'Resume Forms' filled separately by all the researchers and signed.	☒
	Additional documents (Scale permissions used, if any, etc.)	☒

DECISION DETAILS	Application Number	202202151
	Meeting Date	31.01.2022
	Meeting Place	Online (Google Meet)
	Decision No.	1

Research Title Adherence to Iron and Folic Acid Supplementation and Associated Factors Among Pregnant Mothers Attending Antenatal Care at SOS Hospital Mogadishu, Somalia.

Researchers Khadija Osman Mohamud, Dr. Öğr. Üyesi Ayşe Arzu Akalın



YEDİTEPE UNIVERSITY
NON-INTERVENTIONAL CLINICAL RESEARCH ETHICS BOARD

Version No 2.0
Feb.13, 2022
Page 2 / 2

APPLICATION NUMBER: 202202151

DECISION

March 3, 2022

☒ APPROVED	☐ REJECTED ☐ OUT OF SCOPE (INTERVENTIONAL STUDY) ☐ AGAINST SCIENTIFIC AND/OR ETHICAL RULES ☐ THERE ARE MORE THAN TWO (2) SUBMISSIONS WITH THE SAME PRINCIPAL INVESTIGATOR ☐ THE ELECTRONIC SUBMISSION IS NOT PERFORMED VIA AND INSTITUTIONAL E MAIL ACCOUNT ☐ ASKED REVISIONS ARE NOT PERFORMED APPROPRIATELY AND/OR ON TIME
---	--

On Behalf of Yeditepe University Non-Interventional Clinical Research Ethics Board
Prof. Dr. Didem ÖZDEMİR ÖZENEN
Chair

Research Title

Adherence to Iron and Folic Acid Supplementation and Associated Factors Among Pregnant Mothers Attending Antenatal Care at SOS Hospital Mogadishu, Somalia.

Researchers

Khadija Osman Mohamud, Dr. Öğr. Üyesi Ayşe Arzu Akalın

7.3 Informed Consent Forms

Information of Informed Consent for Health Care Providers

You are invited to participate in research conducted by Khadija Osman Mohamud from Yeditepe University School of Public Health. The study you will be participating in is about the **Adherence to Iron and Folic Acid(IFA) Supplementation and Associated Factors Among Pregnant Mothers Attending Antenatal Care at SOS Hospital Mogadishu, Somalia.** This consent form will provide you with information on the research project, what you will need to do, and the associated risks and benefits of the research. Your participation is voluntary. Please read this form carefully and read the information below also ask questions about what you don't understand. You will receive a copy of this document to take with you.

The purpose of this study is to assess the level of awareness, adherence to iron/folic acid supplementation and associated factors among pregnant mothers attending antenatal care at SOS Hospital Mogadishu, Somalia. Participation in this study typically takes 20-30 minutes and is strictly anonymous. Participants will be interviewed by the researcher. Participating health worker will complete a detailed interview related on adherence to IFA supplements and ways to improve the level of awareness and compliance in the community.

There will be no expense for you when participating in the study and you will not receive any financial payment or compensation for participating in the study.

All responses are treated as confidential and the information will be used for research purposes only, taking part in this research study is entirely up to you. You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time.

If you have any questions or concerns about this study, please, feel free to contact the researcher Khadija Osman Mohamud on this phone number +252613092121

Statement of Informed Consent

I have read all the information described above and understood. I voluntarily participate the research; I know that I can leave the research without any reason at any time. All my questions have been answered to my satisfaction and I agree to participate this study. I have been given a copy of this form.

Name of the participant	
Date	
Signature of the participant	

Name of the interviewer	
Date	
Signature of the interviewer	

Name of the witness	
Date	
Witness signature	

Information of Informed Consent for Pregnant Mothers

You are invited to participate in research conducted by Khadija Osman Mohamud from Yeditepe University School of Public Health. The study you will be participating in is about the **Adherence to Iron and Folic Acid (IFA) Supplementation and Associated Factors Among Pregnant Mothers Attending Antenatal Care at SOS Hospital Mogadishu, Somalia**. This consent form will provide you with information on the research project, what you will need to do, and the associated risks and benefits of the research. Your participation is voluntary. Please read this form carefully and read the information below also ask questions about what you don't understand. You will receive a copy of this document to take with you.

The purpose of this study is to assess the level of awareness, adherence to iron/folic acid supplementation and associated factors among pregnant mothers attending antenatal care at SOS Hospital Mogadishu, Somalia. Participation in this study typically takes 20-30 minutes and is strictly anonymous. Participants will be interviewed by the researcher. Participating pregnant mothers will complete a detailed interview comprising of three sections. The first part includes questions on personal characteristics such as gender, age, education, occupation, income and household members. The second part includes questions related to their healthcare factors such as distance to health center, health education, availability of IFAs tablets, staff morale/attitude and counselling services. The third part includes questions related to their level of awareness such as attitude, beliefs, knowledge about iron folic acid tablets, understanding the importance of (IFA) supplementation, knowledge about the intake of iron folic acid tablets.

You will not receive any financial payment or compensation for participating in the study, and there will be no expenses due to participating in this study.

All responses are treated as confidential and the information will be used for research purposes only, taking part in this research study is entirely up to you. You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study. You are free to participate in this research or withdraw at any time.

If you have any questions or concerns about this study, please feel free to contact the researcher Khadija Osman Mohamud on this phone number +252613092121.

Statement of Informed Consent

I have read all the information described above and understood. I voluntarily participate the research; I know that I can leave the research without any reason at any time. All my questions have been answered to my satisfaction and I agree to participate this study. I have been given a copy of this form.

Participant name	
Date	
Signature	

Name of the interviewer	
Date	
Signature of the interviewer	

Name of the witness	
Date	
Witness signature	

7.4 Data Collection Tools

QUESTIONNAIRE

SECTION (A) SOCIO-DEMOGRAPHIC FACTORS

S/N	QUESTIONS	RESPONSES (<i>please read and circle the answer</i>)	SKIPS
1	Please specify your date of birth (Day, Month, Year).		
2	Where were you born?	1. Country 2. City 3. Town/village:	
3	What is your current marital status?	1. Single 2. Married 3. Co-habitant 4. Divorced 5. Widowed	
4	Where do you live in Mogadishu?		
5	Can you specify your housing condition?	1. Rented residency (house, apartment) 2. Your own residency (house, apartment) 3. Refugee camp 4. Others, please specify.....	

6	What is the level of your education?	1. No diploma but cannot read and write 2. No diploma but can read and write 3. Primary level 4. Not completed high school 5. Completed high school 6. Two years technical education 7. Not complete university with a degree 8. Completed university with a degree	
7	What is your current Occupation (What kind of work do you mainly do)?	1. Salaried employee 2. Full time (30 hours a week or more) 3. Part time employee (less than 30 hours a week) 4. Farmer 5. Self-employment/ business owner 6. Housewife 7. Unemployed (seeking for work) 8. Unemployed (not seeking for work) 9. Other(specify)..... 	
8	What is the current occupation of your partner (what kind of work does your husband/partner mainly do)?	1. Salaried employee 2. Full time (30 hours a week or more) 3. Part time employee (less than 30 hours a week) 4. Farmer 5. Self-employment/ business owner 6. Unemployed (seeking for work) 7. Unemployed (not seeking for work) 8. Other (Specify)..... 	

9	What is the level of your income per month?	1. No regular income 2. Below 149 USD 3. 150-199 USD 4. 200-249 USD 5. 250-299 USD 6. 300 or above	
10	At what age did you get married?	1. 15-19 2. 20-24 3. 25-29 4. 30-34 5. 35 or above	
11	How many children do you have?	1. 0 2. 1 3. 2 4. 3 5. 4 6. 5 or more	
12	How old is your husband? Please specify the date of birth (Day, Month, Year).		
13	What is the level of education of your husband?	1. No diploma but cannot read and write 2. No diploma but can read and write 3. Primary level 4. Not completed high school 5. Completed high school 6. Two years technical education 7. Not completed university with a degree 8. Completed university with a degree	
14	Does your husband/partner have other wives?	1. No 2. Yes 3. I don't know	

15	Does your husband/partner have children from other wives?	1. No 2. Yes 3. I don't know	
16	How many people are living in the same household?	1. 1 person 2. 2 people 3. 3 people 4. 4 people 5. 5 people 6. More than 5 people	
17	And who are they?	1. Me alone 2. My husband and I 3. My husband, child and I 4. My husband, children and I 5. Others	
18	Who makes the decision at home?	1. Me 2. Me and my husband together 3. My husband	
19	Are all the household members healthy? If not please explain.	1. No 2. Yes	
20	Do you smoke?	1. No 2. Yes	
21	Does your husband/partner smoke?	1. No 2. Yes	

22	How often do you experience problems in providing enough food?	1. Never 2. Rarely 3. Sometimes 4. Often 5. Always	
23	How often do you experience problems in paying your bills (for example for electricity, gas, water etc.)?	1. Never 2. Rarely 3. Sometimes 4. Often 5. Always	
24	Do you need other's support for times when you come to the hospital? please comment.		

SECTION (B) AWARENESS TOWARDS IFA SUPPLEMENTATION

54	Do you know the drug called iron/folate? (Show the strip)?	1. No 2. Yes 3. I am not sure	
55	Do you know what this tablet is for?	1. No 2. Yes 3. If yes please explain 	
56	Do you think it's important to take iron/folate tablet throughout pregnancy	1. No 2. Yes 3. I do not know/ no opinion	

57	What is the critical period in beginning folic acid intake?	1. Preconception 2. First month of pregnancy 3. Second month of pregnancy 4. Third month of pregnancy 5. Beyond three months	
58	For how long does the tablets should be taken?	1. Two months 2. Three months 3. Six months 4. More than Six months 5. I don't now 6. Other (specify)	
59	Do you know what happens or which disease will occur if pregnant mother does not take iron/folate tablets	1. Loss of weight 2. Fever 3. Malaria 4. Anemia 5. Neural tube defect 6. Other, (explain).....	

60	Do you know any benefits of taking iron/folate tablets for the mother?	1. No 2. Yes 3. I do not know	
61	Do you know any benefits of taking iron/folate tablets to the baby	1. No 2. Yes 3. I do not know	
62	Do you think iron/folate tablets has side effects?	1. No 2. Yes 3. I am not sure	

63	What are the side effects		
64	What is your source of information about iron/folate tablets?	1. Healthcare 2. Family member 3. A friend 4. Neighbor 5. Television 6. Other, specify	
65	Is it common in your family or neighborhood to go antenatal visit during pregnancy?	1. No 2. Yes	
66	Are you aware of any beliefs in the community, which may prevent you or others to antenatal care? If yes, please explain.	1. No 2. Yes, explain	
67	Are you aware of any beliefs in the community, which may prevent you or others to take iron tablets? If yes, please explain.	1. No 2. Yes, explain	

SECTION (C) HEALTH CARE RELATED FACTORS

25	How far is your home from this Hospital? Distance or time.	1. Minutes on foot 2. km	
26	How did you come?	1. On Bajaj 2. On bus 3. On foot 4. Other, specify 	
27	During any of your antenatal care visits, did a health care provider give you a health education about taking IFA tablets?	1. No 2. Yes	
28	If yes, what was the health education about?		
29	Have you ever accessed any iron folic acid tablets since you became pregnant?	1. No 2. Yes	
30	Have you ever taken any iron/ folic acid tablets during this current pregnancy?	1. No 2. Yes	
31	Have you been taking iron/ folic acid tablets every day since you collected from here	1. No 2. Yes	
32	In this pregnancy, how many months have you been taking IFA tablets?	1. One month 2. Two months 3. Three months 4. More than three months 5. Other (specify).....	
33	How many tablets did you take per week?	1. Tablets	

34	How many tablets did you collect per visit?	1. 30 tablets 2. 60 tablets 3. 90 tablets 4. >90 tablets Other (specify).....	
35	In the past one week, have you taken iron/ folic acid tablets?	1. No 2. Yes	
36	How many days did you take the tablets the last 7 days or more than a week?	1. 7 days 2. 3 times per week 3. 2 weeks per month 4. Never	
37	What is the average Waiting Time in the health facility while you were collecting iron/folate tablets?	1.minutes	
38	Do you face any problem in the facility while you are collecting your tablets?	1. No 2. Yes	
39	If yes, which problem do you face mainly?		
40	During any of your antenatal care visits, did a health care provider give you medical advice or counselling about IFA supplements?	1. No 2. Yes	
41	If yes which advice, did you get?		
42	Was this a planned pregnancy?	1. No 2. Yes	
43	Did you want to have this child?	1. No 2. Yes	
44	How many pregnancies did you experienced before?	1. One 2. Two 3. Three 4. More than three	
45	Have you ever had any miscarriage or abortion during your pregnancies?	1. No 2. Yes	

46	When did you started with your antenatal care visits?		
47	Do you experience any problems with household members when you want to come to hospital for antenatal care?	1. No 2. Yes	
48	Did you take iron/folic acid supplementation during your previous pregnancies?	1. No 2. Yes 3. I do not remember	
49	Do you experience any health problems in your current pregnancy?	1. No 2. Yes	
50	Did you had any therapy to become pregnant?	3. No 4. Yes	
51	Do you want to have more children?	1. No 2. Yes	
52	Did you experience any health problems in your previous pregnancy/ies?	1. No 2. Yes, explain	
53	Do you have any chronic diseases or healthy problems? And what is it?	1. No 2. Yes, specify	

HEALTHCARE INTERVIEW

SEMI-STRUCTURED QUESTIONNAIRE

1. For how long have you been working in this Hospital? What is your job description? Please comment freely.

.....
.....

2. Does the health facility have a policy of supplementing pregnant women with iron and folic acid (IFA) tablets?

.....
.....

3. What is your opinion about iron and folic acid (IFA) supplementation during pregnancy?

.....
.....

4. Are the tablets prescribed as medication or as supplements to diet for all pregnant women?

.....

5. Are pregnant women advised/given any health education or counselling about IFA tablets during pregnancy? What is the content of this education or counselling?

.....
.....

6. Do you think that the given educational information is useful for pregnant woman?

.....
.....

7. Do pregnant women take the education program seriously? Can anything else be done to improve their attendance and benefit?

.....

.....
8. What is the source of supply for IFA tablets and have there been any challenges?

.....
.....

9. Is the supply flow perfect? If not, what are the challenges?

.....
.....

10. Which type of iron/folate tablets are issued to pregnant women?

.....
.....

11. Did you see any changes over the years in terms of supplementation and adherence of pregnant women to the tablets?

.....
.....

12. In your experience, what are the most common barriers that hinder good adherence to iron/ folic acid tablets among pregnant women?

.....
.....

13. In your opinion, what can be done to enhance supplementation of pregnant women with iron/folate tablets?

.....
.....

14. What do you think about the women who do not take the iron/ folate supplements? (Who are they? And what are the reasons)

.....

15. Is there anything else you want to add or share with us?.....

7.5 Curriculum Vitae

Personal Information

Name	Khadija Osman	Surname	Mohamud
-------------	---------------	----------------	---------

Education

Degree	Department	The name of the Institution Graduated From	Graduation year
Doctorate	-	-	-
Master	Public Health	Yeditepe University- Istanbul, Turkey	-
University	BSc Public Health	Cavendish University in Uganda	2018
High school	General	Moalim-fatah Primary and Secondary School – Mogadishu, Somalia	2013

All the grades must be listed if there is more than one (KPDS, ÜDS, TOEFL; EELTS vs),

Languages	Grades (#)
English	Advanced
Somali	Native Language

Work Experience (Sort from present to past)

Position	7.5.1 Institute	Duration (Year - Year)
Volunteer	Lungunja Community Center	2017-2018
Volunteer		-

Computer Skills

Program	Level
Advanced Computer Skills	Excellence
Microsoft office use	Average

*Excellent , good, average or basic

Scientific works**The articles published in the journals indexed by SCI, SSCI, AHCI**

None
None

Articles published in other journals

None
None

Proceedings presented in international scientific meetings and published in proceedings book.

None
None

Journals in the proceedings book of the refereed conference / symposium

None
None

Others (Projects / Certificates / Rewards)

Climate change
First Aid and Vital signs

7.6 THESIS CHECKLIST

Following checks must be done before finalizing and replicating the thesis.

- ☐ The title obtained as MSc. or Ph.D is written on cover and inner cover page. (The name of advisor should not be written on cover page)
- ☐ The name of PROGRAM to be graduated (not the name of DEPARTMENT) is written on cover page.
- ☐ The name-surname, name of institute, program and year are written on the back part of thesis cover as mentioned in the guide (attention about direction of writing!)
- ☐ On thesis cover; only title of thesis is written by 18 point and bold. For the name of INSTITUTE and DEPARTMENT 14 point, for other writings 12-point fonts are used.
- ☐ The approval page (earned titles as MSc or Ph.D must be included) is properly prepared and signed. (The signature of the Director of Institute is also necessary, pay attention about the colour of pen, it must be same colour while signing.
- ☐ The printouts are taken only one side of paper by using computer that provide a high-quality output.
- ☐ The index is prepared as explained in the guide.
- ☐ On front pages, i,ii,iii etc. are put in Roman numerals.
- ☐ The page numbers are prepared as explained in guide.
- ☐ The page layout is prepared as specified in guide.
- ☐ The main text is printed in Times New Roman by using 12 points font.
- ☐ The footnote letter is printed in 8-10 points font.
- ☐ The main text is written by using 1.5 line spacing.
- ☐ Turkish and English abstracts are written in compatible with each other.
- ☐ The proper keywords are used in Turkish and English summary.
- ☐ The abbreviations and symbols are appropriately made.
- ☐ In sources list, each source is numbered. It is written in accordance with source presentation principles and citation rules.
- ☐ All sources that used in thesis are provided.
- ☐ Appendixes are given with appropriate titles, starting from separate pages, according to the order of presentation in the thesis.

