KNOWLEDGE, ATTITUDE AND FACTORS ASSOCIATED WITH PRACTICE OF IRON AND FOLIC ACID SUPPLEMENTATION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINICS IN MOROGORO MUNICIPAL COUNCIL.

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School of Clinical Medicine

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By

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A Dissertation Submitted in (Partial) Fulfilment of the Requirements for the Degree of Master Medicine in Obstetrics and Gynaecology at

Muhimbili University of Health and Allied Sciences

October, 2024.

CERTIFICATION

The undersigned certifies that she/he has read and hereby recommends for examination of dissertation entitled in **"knowledge, attitude and factors associated with practice of iron and folic acid supplementation among pregnant women attending antenatal care clinics in Morogoro Municipal Council"** in partial fulfillment of the requirements for Muhimbili University of Health and Allied Sciences' master of medicine degree in obstetrics and gynecology.

_____

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Date: _____

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Dr. Brian Abraham

(Co-Supervisor)

Date:_ _____

DECLARATION AND COPYRIGHT

I, **Michael Kenneth Mabisi**, declare that this **dissertation** is my own original work and that has not been presented and will not be presented to any other university for a similar or any other degree award**.**

Signature…… **Date**…….....….....

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With all my heart I would first like to pose my sincerely gratitude to the Almighty God for letting me be alive and healthy.

I would also like to thank my family members for the encouragement they kept spelling to Me that made Me work tirelessly to make sure the study is completed.

Secondly, I present my special gratitude and appreciations to my main supervisor Dr. Peter Wangwe and co-supervisor Dr. Brian Abraham for their tireless supervision and direction that have led to the completion of this research.

Lastly, I present my special thanks and appreciation to all members of Academic in the department of Obstetrics and Gynecology, MUHAS, for their corrections, opinions and directives that enabled the happening of this study.

DEDICATION

I dedicate this study to my lovely family, members of Academic in department of Obstetrics and Gynecology, MUHAS and MNH (Upanga and Mloganzila) and colleagues for the support from the start of proposal writing to results presentation.

ABSTRACT

Background: Over 50% of cases of anemia worldwide are caused by iron deficiency, affecting 38.2% pregnant women aged 15 and 49 years; in contrast, the prevalence of anemia in pregnant women in Africa is 46.3%. It is strongly advised that every pregnant mother takes IFA supplements to meet her needs throughout pregnancy to prevent anemia and its potential risks including preterm birth, perinatal mortality, low birth weight, and intellectual disability in children. A few risk factors for developing anemia during pregnancy include grand multiparity, too early pregnancies, short interpregnancy interval, low socioeconomic status, illiteracy, and late ANC initiation which can be reduced if mothers' attitudes and knowledge of methods of preventing anemia is enhanced.

Objective: This study investigated about knowledge, attitude, and factors associated with the practices of IFA supplementation among pregnant women attending ANC clinic follow-ups.

Methodology: A quantitative analytical cross-sectional study, involved 358 pregnant women in their second and third trimesters attending antenatal clinics at three health centers in Morogoro municipal council. A structured self-administered Swahili version questionnaire (translated by BAKITA) was used to collect data from the participants. The data were analysed using IBM SPSS version 23. Descriptive statistics was carried out to determine the social-demographic and obstetrics characteristics of participants; and the Chi-square and ordinal logistic regression analysis for the factors associated with the practice of IFA supplementation during pregnancy.

Results: Out of 358 studied, the majority showed positive attitudes (94.4%), good practice (52.8%), but poor knowledge (56.7%) regarding IFA supplementation during pregnancy. The odds of having good practice were observed with primary education level aOR = 2.40, 95% CI: 1.11–5.27, p = 0.027; formal and informal employment aOR = 2.72, 95% CI: 1.14–6.77, p = 0.028; gravidity of >2 aOR = 2.28, 95% CI: 1.19–4.41, p = 0.014; and positive attitude towards IFA supplementation aOR = 6.64, 95% CI: 2.70–17.01, p = 0.001. There was no relation between the level of knowledge and good practice (P-value = 0.584).

Conclusion: Pregnant women were willing to know much about IFA supplementation and were compliant to the proper recommended IFA practices. Observed good practice is based on their good compliance rather than the level of knowledge. However, good knowledge about IFA supplementation and its importance is crucial to raise the level of good practices. We recommend sustainable and consistent health educations sessions at ANC clinics that accommodates all aspects of practice, introduction of a follow up mechanism for all pregnant women taking IFA supplements through direct intake observation by household caretakers under guidance of community healthcare providers, and further same titled studies be conducted with a sample size not less than a thousand participants (more powered studies).

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LIST OF ABBREVIATIONS

ANC	–	Antenatal Care
BAKITA	–	"Baraza la Kiswahili la Taifa"
HC	–	Health Center
IFA	–	Iron/Folic Acid
IFAS	-	Iron/Folic Acid Supplementation
IRB	–	Institution Review Board
KAP	–	Practice, Attitude and Practice
MUHAS	–	Muhimbili University of Health and Allied Sciences
NTD	–	Neural Tube Defect
RMO	–	Regional Medical Officer
SPSS	–	"Statistical Package for the Social Sciences"
WHO	–	"World Health Organization"

OPERATIONAL DEFINITIONS

Attitude: Referred to as to how participants agreed or disagreed with the importance of regular ANC checkups, regular IFA consumption during pregnancy, knowing more about IFA supplementation, preventing of anemia during pregnancy and fetal anomalies, and possible risks posed to both the mother and fetus due to IFA deficiency during pregnancy. Based on choices measuring the degree of agreement starting from strongly agree, to agree, neutral, disagree, and strongly disagree. Strongly agree and agree was counted as positive attitude, while neutral, disagree and strongly disagree as negative attitude. Status of attitude was in two order: positive (score ≥70) and negative (score <70).

Knowledge: Referred to as respondents' awareness about the IFA tablets, its advantages during pregnancy, if any risk(s) of taking the supplements, reliable sources of information about IFA, foods/drinks rich in IFA/enhancing absorption, and likelihood of having micronutrients deficiency. Total number of correct items was used as the denominator; and level of knowledge was in three order as poor (score <50%), fair (score 50% - 69%), and good (score ≥70%).

Practice: In this study is defined as the appropriateness of IFA supplementation categorized into three areas: proper supplements intake i.e., the right time to start taking the supplement, frequency, timing and duration; avoidance of taking the supplements together with drugs or foods/drinks that interfere with absorption and metabolism; and additional dietary intake rich in iron and folic acid and enhancing absorption of the supplements. Total number of correct items was used as the denominator; and level of practice was three order as poor (score <50%), fair (score 50% - 69%), and good (score ≥70%).

Critical illness: A serious medical state in which an ill pregnant woman had unstable or abnormal vital signs typically requiring short-term life support measures for stabilization to recover and that rendered her unable to communicate effectively.

1.0 INTRODUCTION

1.1 Background

Iron demand is higher during pregnancy due to physiological changes for the development and growth of the placenta and the fetus; thus, despite increased iron requirements, pregnancy is a period of increased risk of anemia compared to non-pregnant state (1). Anemia in pregnancy is identified by the WHO as hemoglobin level less than 11g/dl, and is sub-classified according to severity as; mild anemia (hemoglobin level 9–10.9g/dl), moderate anemia (hemoglobin level 7–8.9g/dl), and severe anemia (hemoglobin level <7g/dl) (1). Over 50% of cases of anemia worldwide are caused by iron deficiency where as it is present in 38.2% of pregnant women globally between the ages of 15 and 49years; in contrast, the prevalence of anemia in pregnant women in Africa is 46.3% (2). Preterm birth, perinatal mortality, low birth weight, and intellectual disability in children are all complications associated with anemia during pregnancy (3).

It is strongly recommended that every pregnant mother takes an iron supplement to meet her needs throughout pregnancy because pregnant mothers taking iron supplements have improved birth length and weight and reduced neonatal mortalities (4). Iron is also essential for fetal and placental development and growth and to expand maternal cell mass (1). For the formation of the neural tube, fetal growth, and metabolism, folic acid is also a crucial micronutrient that is especially vital during pregnancy (4). However, good nutrition is the best way to prevent iron deficiency anemia and its related complications during pregnancy (1).

Inadequate dietary intake and absorption, increased iron demand, excessive iron losses, and diseases that affect the organs that produce blood cells are the main contributing factors to iron deficiency anemia (3,5). A few risk factors for developing anemia during pregnancy include grand multiparity, pregnancies at youngest age, short interpregnancy interval, low socioeconomic status, illiteracy, and late ANC initiation (6,7). If mothers' knowledge of the causes and methods for preventing anemia is enhanced, many of these risk factors can be reduced (8)**.**

It is possible to increase the uptake of IFA supplements and have an impact on the success of anemia control during pregnancy with adequate knowledge, a positive attitude, and determination of the factors influencing practices toward IFA supplements among women of childbearing age (9). An emphasis on consistent intensive counseling and the motivation of pregnant women to take iron and folic acid supplements has been shown to be effective in preventing anemia during pregnancy (10). However, pregnant women from different low- and middle-income countries have different levels of knowledge and attitudes concerning the consumption of iron and folic acid (11).

1.2 Problem Statement

Pregnant women are more susceptible to anemia due to a variety of factors, including inadequate dietary knowledge, increased iron and folic acid deficiency, and increased micronutrient demand, especially iron for fetal growth and metabolism, which cannot be easily met by diet alone due to inadequate intake (4,12). The World Health Organization (WHO) recommends taking supplements containing iron and folic acid (IFA) for at least six months during pregnancy (13). Tanzania followed the WHO recommendation to provide all pregnant women 30-60mg of iron and 0.4mg of folic acid daily starting with the first antenatal contact (2,13,14).

Despite the WHO's recommendation, some low- and middle-income nations still utilize IFA supplements seldom or inconsistently. Tanzania has made progress in reducing maternal anemia, however, there are still obstacles to IFA supplement uptake practices through the antenatal care (ANC) package (15). According to data from the National Demographic and Health Survey, only 28.5% of women aged 15 to 49 who had previously given birth used IFA supplements for at least 90 days (16).

Therefore, adequate knowledge, positive attitude of IFA supplements and determination of practice associated factors among pregnant women in attempt to prevent anemia in pregnancy is vital. Very few studies have been conducted and little is known about the knowledge and attitudes of pregnant women on IFA supplements utilization in Tanzania (15,17,18).

1.3 Conceptual Framework

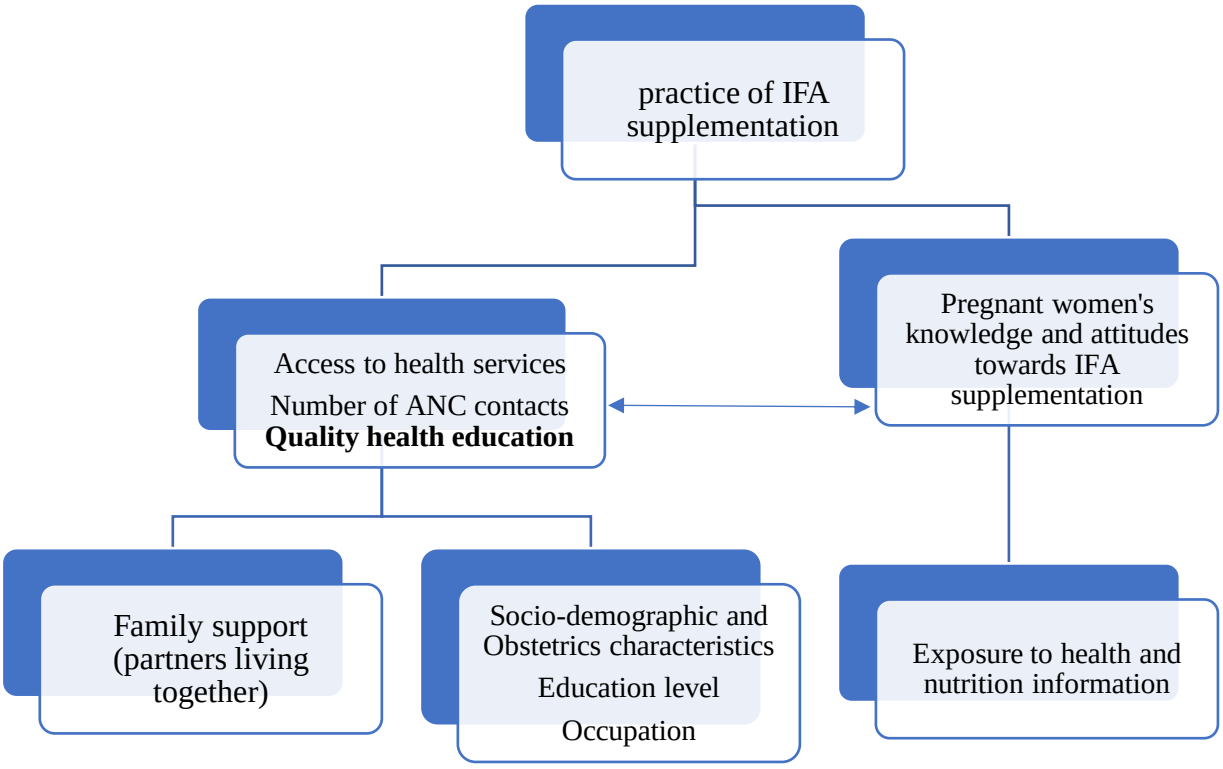


Figure 1: The conceptual framework describing factors associated with level of practice of iron and folic acid supplementation during pregnancy. Family support, socio-demographic and obstetrics characteristics, education level and occupation determine the access to ANC services. The latter together with health and nutrition education improve level of knowledge and attitudes towards IFA supplementation; eventually, culminating to influencing the practice of IFA supplementation. It was adapted from the previous study conducted in Indonesia (19).

1.4 Rationale

The current Tanzania Health Policy which is a reform of the 1990 Policy recognizes Iron Deficiency Anemia which affects both physical capacity and intelligence as one of the major four nutritional problems in the Country affecting socio-economic development. To alleviate these deficiencies, the new policy promotes strengthening better nutrition practices and general care for vulnerable groups including children, adolescents, pregnant and breastfeeding women; develop micronutrient deficiency control strategies including supplementation and food-based approaches; promote operational and basic research in nutrition; and strengthening nutrition information systems from community to national levels. These strategies have ensured decentralization of basic health services to primary level, public-private partnership and stakeholders in provision of health services to all by ensuring cost-effective availability, sustainability and accessibility of high-quality micronutrients for supplementation for better nutrition of its people particularly the aforementioned vulnerable groups.

This study aimed at assessing knowledge, attitudes and factors associated with practice of IFA supplementation among pregnant women in second and third trimester attending antenatal care clinics. The findings of this study will be used to address the factors influencing practices of iron and folic acid supplementation during pregnancy. Also adds information to the already present body of knowledge regarding correct IFA supplementation practice and improve the IFA supplementation practices in the targeted population in accordance to the recommendations.

1.5 Research Questions

1. What is the level of knowledge on IFA supplementation among second and third trimester pregnant women?
2. What is the attitude of the second and third trimester pregnant women towards IFA supplementation during pregnancy?
3. How is the practice of IFA supplementation among second and third trimester pregnant women?
4. What are the factors associated with practice of IFA supplementation among pregnant women in their second and third trimesters?

1.6 Objectives

1.6.1 Broad Objective

To assess knowledge, attitude, practice and factors associated with practice of IFA supplementation among second and third trimester pregnant women attending ANC clinics.

1.6.2 Specific Objectives

1. To determine the level of knowledge of IFA supplements among pregnant women in their second and third trimesters**.**
2. To determine the attitudes of pregnant women in their second and third trimesters on IFA supplementation.
3. To determine the IFA supplementation practice of pregnant women in their second and third trimesters**.**
4. To determine the factors associated with practice of IFA supplementation among pregnant women in their second and third trimesters**.**

2.0 LITERATURE REVIEW

2.1 Iron Deficiency Anemia

Iron deficiency is the most prevalent and leading micronutrient deficiency in pregnancy, making iron deficiency anemia the most common medical disorder in pregnancy (5). The WHO defines anemia in pregnancy as having a hemoglobin level of less than 11g/dl (20). The daily recommended dietary allowance for iron and folate increases by 50% during pregnancy from 18mg to 27mg and from 400μg to 600μg for iron and folate, respectively; this demand cannot be resolved solely through diet (21). Globally, 38.2% (equivalent to 32.4 million) of pregnant women are anemic (5). Still, the situation is considered a public problem in low and middle-income countries as the prevalence is estimated at 42.7% while it is only 22% in high-income regions (5,22).

WHO recommends a universal daily supplementation of IFA (30–60 mg elemental iron and 0.4 mg folic acid) for at least 180 days during pregnancy (23). Daily oral supplementation of a combination of iron and folic acid (IFA) is the most cost-effective intervention to reduce iron deficiency anemia in pregnancy, prevent adverse maternal and perinatal outcomes, and improve infants' linear growth (24). There is a dearth of data on the prevalence of neural tube defects at birth in Tanzania, and the primary indication for both folic acid and iron supplementation in this population is the prevention or treatment of anemia during pregnancy (18). Folic acid and iron supplementation in this population have also been linked to reduced risk of hypertension in HIV-positive pregnant women and malaria in their offspring (25,26).

2.2 Knowledge of pregnant women about IFA supplementation

Most pregnant women had learned about anemia prevention during hospital education sessions, whereas a smaller percentage had learned about it from the media (27)**.** Most of them were aware that folic acid should be taken daily by pregnant women, but very few were aware that it should also be taken five to six times a week (27). Notably, the majority of pregnant women have heard of folic acid, but only a minority of them are aware of its advantages, and even fewer understand when to take folic acid supplements during pregnancy (28). Interestingly, while a

quarter of pregnant women were unaware of the need for additional folic acid supplements during pregnancy, more than half of mothers believed that pregnant women needed folic acid supplements in addition to dietary folic acid (29)**.**

For most pregnant women understood how important it was to take iron supplements, they went on to list other benefits of supplementing with iron, such as preventing iron deficiency anemia, lowering the risk of low birth weights, meeting the increased demand, and preventing complications during childbirth (30). Contrary to studies by (10) and (11) where the majority of pregnant women lacked correct knowledge regarding iron supplementation during pregnancy. For example, just a minority knew that iron supplements should be taken up to six weeks after giving birth (10)**.**

2.3 Attitudes of pregnant women regarding IFA supplementation

In the context that iron and folic acid supplements are lifesaving and prevent the adverse neonatal outcome, the majority of pregnant women expressed good attitudes toward using the supplements, but a minority had negative attitudes because were unaware of the taste of the tablets (31). Regarding the use of iron supplements in addition to a healthy diet during pregnancy, the majority of them agreed, with only a small number strongly agreed (32). However, more than half of pregnant women concurred that folic acid intake can both prevent anemia during pregnancy as well as improve the fetus's health (33)**.**

Most pregnant women agreed that folic acid intake during pregnancy can help prevent congenital abnormalities (34). Additionally, they believed that folic acid is crucial for preventing anemia (35). They generally had positive attitudes to folic acid consumption (36). However, overall attitude toward folic acid supplementation was not favorable and varied between populations, as seen by the percentages of 40.25%, 4.4%, and 22% in three separate studied populations, respectively (37)

2.4 IFA supplements practice of pregnant women

The majority of pregnant women supplemented their diets with iron and folic acid, whereas just a minority did so on a regular basis and only a few avoided drinking tea or coffee with meals

that contained iron (38). However, very few pregnant women began taking folic acid during the first trimester up to the postpartum period; the majority began taking it before becoming pregnant (39). That was encouraging because it's well-known that folic acid supplements are crucial in the first trimester to avoid neural tube problems (39). Similarly, the majority (92.3%) of pregnant women took folic acid during their index pregnancies, but only 31.7% did so on a daily basis (36). In addition, a small percentage of women began taking folic acid during the first trimester of their pregnancies, and only a small number did so three months earlier (36). Few (47.7%) of them wanted to take folic acid exclusively from natural sources, while a smaller minority (53.8%) preferred to take it exclusively from complementary sources, and the majority (80%) opted to take it both naturally and from complementary sources (36).

Further, three-quarters of pregnant women said they usually take iron supplements, while the remaining quarter said they usually don't throughout pregnancy (27). The majority of pregnant women consumed iron supplements inconsistently, but routinely drank coffee or tea, which hinder the absorption of iron, which resulted in the conclusion that the practice was bad (1). Additionally, although the majority of pregnant women took iron supplements and complied with the recommendations, they began taking the iron tablets late from the fourth month of pregnancy (30).

2.5 Associated factors of practice regarding IFAS among pregnant women

There were numerous factors that negatively affected the use of IFA supplements, including knowledge of and bad attitudes toward IFA supplementation, barriers to intake including forgetfulness, and side effects of tablets like nausea (40). Similar to this, mothers had poor adherence to IFA supplements due to delayed initiation of ANC visits, distance to health facilities, availability of IFA tablets, perceived quality of facility health services, being in good health, misconceptions about multiple gestations, lacking enough knowledge of the benefits of IFA supplements, negligence, forgetfulness, and side effects of the tablets, such as nausea, dizziness, and vomiting (15).

3.0 METHODOLOGY

3.1 Study design

It was a health facility based quantitative analytical cross-sectional study.

3.2 Study duration

The study was conducted from **5th of December, 2022 to 30th of April, 2024.**

3.3 Study setting

Morogoro municipal council has a total of 51 private plus government owned health facilities. Of which, 20 facilities are government owned, being 2 hospitals (including regional referral hospital), 3 health centers and 15 dispensaries. The 3 health centers (Mafiga, Sabasaba and Kingolwira) are in urban area with inter-facility distance of less than 7 kilometers, they offer comprehensive emergency obstetrics and newborn care (CEmOC) services. Pregnant women receive their routine antenatal care and follow up services at these 3 health centers. The regional referral hospital is reserved as referral center for the pregnant women diagnosed as high-risk pregnancies/obstetric complications from the health centers. Therefore, this study included the 3 health centers (Mafiga HC, Sabasaba HC and Kingolwira HC). These health centers were purposeful selected out of 51 health facilities in Morogoro municipal council to be study sites with accordance to data from Municipal Medical Officer Office shown to be high volume health facilities where most pregnant women with similar life style in Morogoro municipal council attend for routine antenatal care clinics and follow ups.

All three facilities; Mafiga HC, Sabasaba HC and Kingolwira HC offer routine antenatal care and follow up services of similar package and quality from Monday to Friday a week with exceptional of public holidays; with 35, 30 and 22 bed capacities respectively; and they do serve maximum of 4800, 3840 and 2400 pregnant women per year, with average of 400, 320 and 200 pregnant women per month respectively.

At these facilities' ANC clinics Nurses and Midwives provided the pregnant women with health education focusing on pregnancy danger signs, proper dietary intake, plans for family planning and protection against sexually transmitted infections, proper dietary intake, and childbirth

preparedness; vaccinations; IFA tablets; Mebendazole and Sulphadoxine-Pyrimethamine tablets for worms and malaria prevention, respectively.

3.4 Study population

The study involved pregnant women who were attending antenatal clinics follow ups at the selected health facilities during the study period.

3.4.1 Study sample

All consented pregnant women in their second and third trimesters who were attending antenatal clinics follow ups at the study areas. Determination of their pregnancies' trimesters was done through estimation of gestation age of each participant from either early obstetric ultrasound ever done, booking estimated gestation age or last normal menstrual period for participants who had regular and were sure with their menses.

3.4.2 Inclusion criteria

Pregnant women in their second and third trimesters who were ANC clinic attendees at particular facility with at least one prior ANC contact during index pregnancy for the primigravidae.

3.4.3 Exclusion criteria

Pregnant women who were in their second and third trimesters on ANC follow ups but had critical illness during data collection. During conduction of this study, we encountered only two pregnant women who were critically ill.

3.5 Estimation of the sample size

The sample size was determined by considering the specific objectives of the study. It was calculated for the first specific objective using a single population proportion formula, by the assumption that a 95% confidence interval, the margin of errors (ð) is 5%, and the proportion of pregnant women with good practice on IFA supplementation from the previous study conducted in north west Ethiopia was 70%, with 10% nonresponse rate (41).

$$n = \frac{Z^2 \rho(1-\rho)}{\delta^2}$$

n=the required "sample size"
Z = (1.96), the standard normal distribution
δ=Margin of error, is 5%, or 0.05
p=Percentage of knowledge about IFA supplementation from previous study (70%=0.7)

Therefore, the sample size (n) = $\frac{1.96^2 * 0.7(1 - 0.7)}{0.05^2} = 322$

With adjustment for nonresponse rate of 10%, the final required sample size was **358**.

The sample size for each selected health centers was obtained by "probability proportion to size": product of number of attendances per month (ni) and total sample size (n) divided by the total population served per month from all selected health centers (N).

Total pregnant women being attended at antenatal clinics from all 3 health centers was estimated to 920 per month. Thus,

Sample size for Mafiga health center was: ni x n/N = 400 x 358/920 = 156

Sample size for Sabasaba health center was: ni x n/N = 320 x 358/920 = 124

Sample size for Kingolwira health center was: ni x n/N = 200 x 358/920 = 78

3.6 Sampling procedure

Participants were sampled at the ANC registry point each day of data collection. To give each individual an equal chance to be selected, simple random probability sampling was used to get participants of the study from all three health facilities. At the ANC registration point, calculation of gestation age was done from last normal menstrual period for those who were sure with their menses or first ANC contact estimated gestation age or first trimester obstetric ultrasound if ever done to determine pregnant mothers in second and third trimester and were verbally requested to participate in the study and assigned numbers; then the "random number generator (random between) method by Microsoft Excel" was applied to randomly select the participants from among the consented assigned numbers pregnant women in their second and

third trimesters who were attendees for ANC follow up on each day of data collection. When it happened that a sampled participant withdrew to be involved in the study, the Microsoft random between method was reapplied for the remaining consented second and third trimester pregnant women to randomly get the participants.

3.7 Study variables

3.7.1 Independent variables

Age, marital status, parity status, education level, occupations, number people in household, health education, number of ANC visits and drugs (IFA) availability, knowledge and attitude.

3.7.2 Dependent variable

Practice.

3.8 Data collection tools

Data were collected using an interviewer administered structured questionnaire, that consisted of three parts with questions assessing for socio-demographic characteristics, level of knowledge about IFA and practices; "1" mark was awarded to correct answer for each item and a "0" for the incorrect response. A 5-points Likert scale was applied to assess attitudes of participants regarding IFA supplementation; "1" mark was scored for agree (agree and strongly agree), and a "0" for others (neutral, disagree, and strongly disagree). Total number of items per each section were used as denominator to obtain a total score for particular given section. For the attitude domain total score of ≥70% was regarded as positive attitude while <70% was negative attitude; and for the knowledge and practices domains the scores were categorized as poor (<50%), fair (51 – 69%) and good (≥70%). The questionnaires collected the quantitative/numerical data and ordinal data were collected by the Likert scale (42). Ten questionnaires pretesting was done prior to data collection.

The tools were into two languages; English and Swahili language. The tools were adapted from the previous similar studies done in Ethiopia, Tanzania and Malaysia (31,41,43).

3.9 Data collection procedure

Data were collected in December 2023 through January 2024 by the principal investigator and three assistants (Nurses and Midwives providing routine ANC services) one from each study health center, who were trained by the principal investigator for one day about the objectives of the study, data collection instruments, data collection procedures and the ethical consideration during data collection. The data collectors (interviewers) who assisted the illiterate participants to fill the data collection tools were selected based on exposure on research, familiarity with the study area, local language and interest to participate on the study (41).

A questionnaire was provided to each randomly selected participant in a closed room and was asked to fill it for not more than 30 minutes for each participant at the same facility and on the same day after they had received routine ANC services, and that they had to respond to all questions in the questionnaire and Likert scale. For pregnant women below 18 years of age were regarded as "emancipated" or "mature" minors and were authorized to consent without the agreement or even the awareness of their parents or guardians (44). The ANC cards of already interviewed participants were marked by a sticker to avoid reviewing similar clients in their subsequent visits. Data collection was conducted every week day at each study center until the study sample size was reached.

3.10 Data management

The principal investigator did daily reviews of the questionnaires and check for completeness. Daily data entry and cleaning was performed by the principal investigator and confidentially was assured by proper handling of the filled questionnaires and Likert scale by the principal investigator

3.11 Data analysis

The principal investigator performed data entry and data analysis using the Statistical Package for the Social Science (SPSS) version 23. Descriptive statistics including frequencies, means, and percentages were used for socio-demographic and obstetrics characteristics. The association between practice and the influencing factors were examined using chi-square, and ordinal

logistic regression analysis. A cut-off P-value of less than 0.2 was used to select variables for multivariate logistic regression analysis. A P-value of less than 0.05 was used to determine statistical significance.

3.12 Ethical consideration

The MUHAS Research, Publications and Innovation Ethical Committee was contacted approved the study to be conducted through the letter with reference number DA.282/298/01.C/1929. The approval to conduct the study in Morogoro municipal council was obtained from the Director of Morogoro Municipal Council and Municipal Medical Officer offices through the latter with reference number R.10/MMC/PF-24/68.

Since human subjects were directly involved in this study, participants' informed verbal consent was obtained prior to data collection. Information about participants were only discussed confidentially by the research team and thus were used for research purposes only. There was no usage of participants' identities; instead, numbers were assigned to each participant who took part in the study. No harm was anticipated from this study. Participants were free to withdraw from the study whenever inevitable need to do so arose.

3.13 Dissemination plan

The study findings will be presented to the Muhimbili University of Health and Allied Sciences (MUHAS) department of Obstetrics and Gynecology before the dissertation is defended. To fulfill a part of the requirements for the Masters of Medicine in Obstetrics & Gynecology, the dissertation report will be submitted to MUHAS.

Also, the results will be shared to Morogoro municipal council director, and the Ministry of Health. Manuscript will be prepared for publication in peer review journals.

4.0 RESULTS

4.1 Socio-demographic and Obstetrics characteristics of the study participants

A total of 358 pregnant women in their second and third trimesters attending antenatal clinics in Morogoro municipal council were recruited in the study. Majority (72.6%) were aged between 20 – 34 years with a median age of 27 (IQR: 22, 32). More than half of respondents (68.2%) were married and had primary school education (38.3%) while most of their partners had secondary school education (31.9%). Regarding the number of people in household, majority of the participants (43.6%) lived in families with ≤3 people. Furthermore, most of the respondents (37.2%) were self-employed (Table 1 below).

Table 1: Socio-demographic and Obstetrics characteristics of the study participants

Variable	Frequency (n)	Percent (%)
Age group (years)		
< 20	35	9.8
20 – 34	260	72.6
≥ 35	63	17.6
Median age year (IQR)	27 (22, 32)	
Marital status		
Single	60	16.8
Married	244	68.2
Cohabiting	36	10.1
Widowed	7	2.0
Divorced	11	3.1
Level of education		
No formal education	34	9.5
Primary	137	38.3
Secondary	115	32.1
College	72	20.1
Occupation		
Professional	56	15.6
Sales services	133	37.2
Unskilled manual	10	2.8
Skilled manual	4	1.1
Agriculture	65	18.2
Other (house wives)	90	25.1
Partner level of education		
No formal	32	9.0
Primary	109	30.5
Secondary	114	31.9
College	102	28.6
Number of people in the household		
≤ 3	156	43.6
4 - 5	127	35.5
>5	75	20.9
Gravidity		
1	80	22.3
2	87	24.3
>2	191	53.4
Parity		
0	91	25.4
≥1	267	74.6
Number of abortions		
0	281	78.5
≥1	77	21.5
Number of living children		
0	100	27.9
1	104	29.1
2	71	19.8
>2	83	23.2
ANC visit(s)		
≤2	139	38.8
>2	219	61.2

Table 1: Majority of the studied pregnant women (53.4%) had gravidity of ≥3; correspondingly, three quarter of the respondents (74.6%) had parity of ≥1, with a pronounced number of them (29.1%) having only one living child. It was also observed that almost all respondents made at least one prior ANC contact, with most of them (61.2%) had made more than two prior ANC contacts for the index pregnancy.

4.2 Level of knowledge of IFA supplements among respondents

Only minority of the respondents (14.5%) had good knowledge about IFA supplementation during pregnancy, of which they knew the IFA tablet and its pregnancy related benefits and were correctly aware of the duration of taking the supplement as recommended. However, the overall level of knowledge was observed to be poor as majority (56.7%) did not know the correct time of starting using IFA supplement, and that consuming foods rich in vitamin C enhance iron absorption, importance of taking iron supplement during pregnancy as prescribed by healthcare providers, and they usually got information about the supplements from unreliable sources.

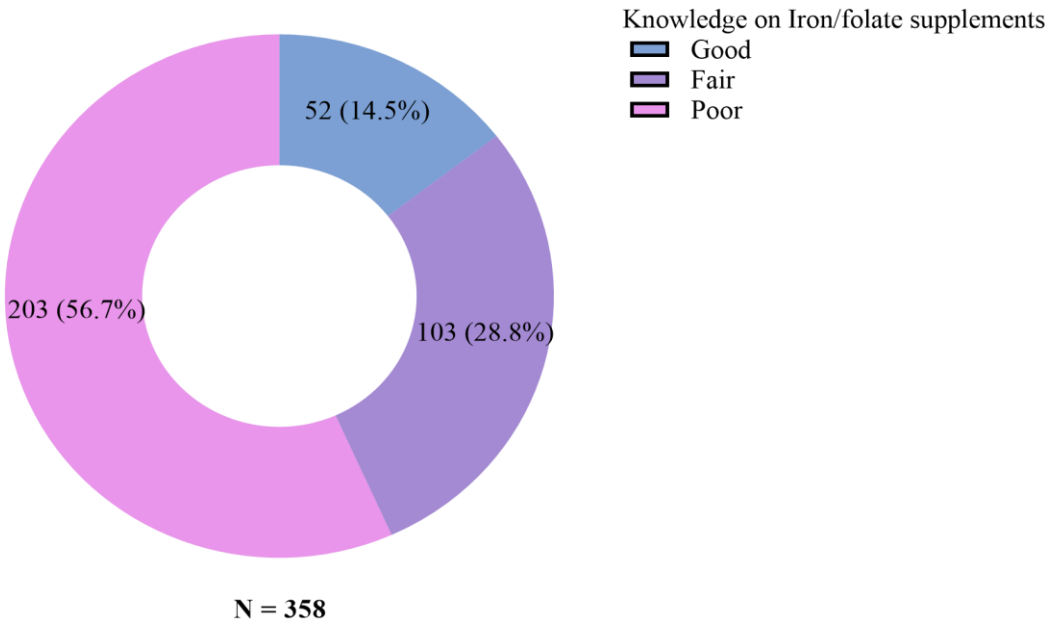


Figure 1: The overall level of knowledge of IFA supplementation among respondents

4.3 The attitudes towards IFA supplementation among respondents

Most of the interviewed participants showed positive attitudes (94.4%) towards the use, benefits and were eager to learn more about IFA supplementation during pregnancy (figure 2).

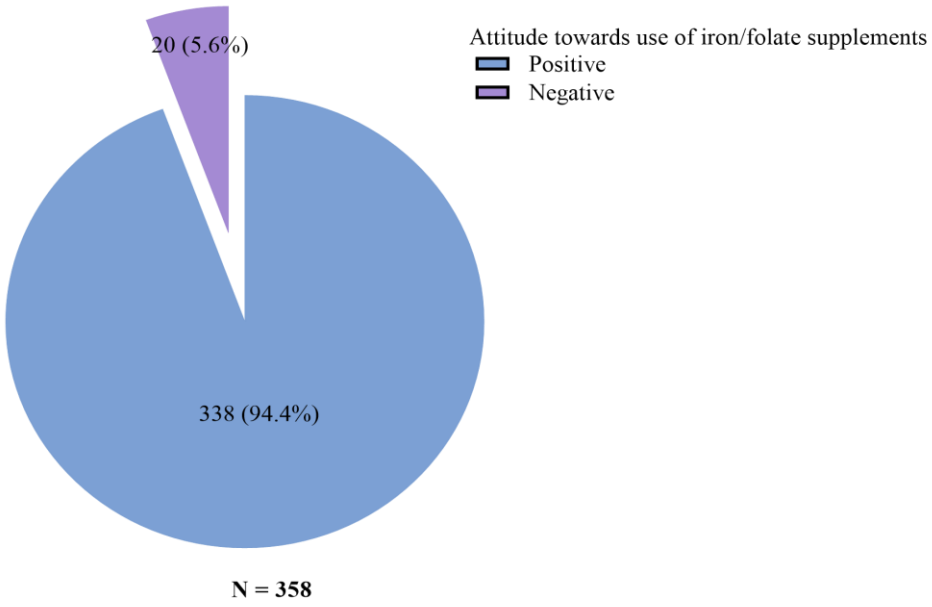


Figure 2: The overall attitude towards IFA supplementation among respondents

4.4 The IFA supplements practices habit among respondents

Despite majority of respondents showing poor knowledge about IFA supplementation, they had good practices (52.8%) of IFA supplementation whereby, they took the supplements as instructed by healthcare providers, easily accessed the tablets from either health facility or pharmacy, faced no significant challenges when using the supplements, apart from the tablets they also consumed animal products and foods rich in iron and folic acid. The minority (16.8%) with poor practices usually took the supplements with either milk, coffee, black tea or anti-acid drugs that interfere with iron absorption, consumed less of animal products and reported to be facing difficulties in consuming the supplements due to side effects like nausea, vomiting and passing black stools (figure 3).

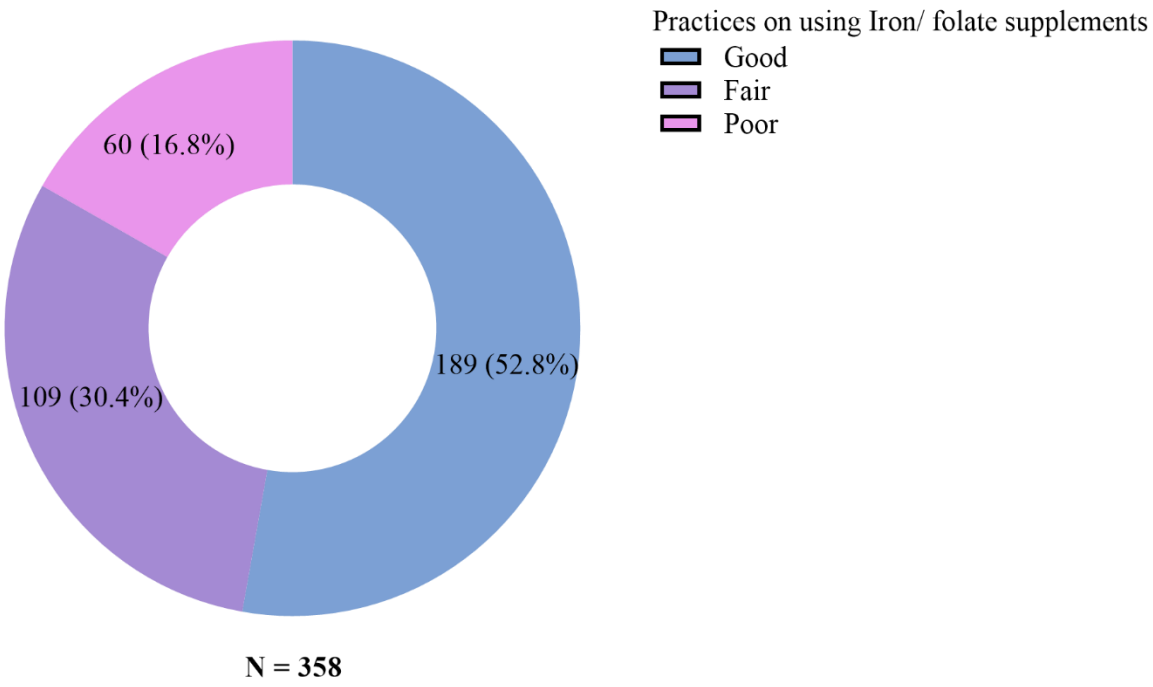


Figure 3: Level of practice habit of IFA supplements among the respondents

4.5 Factors associated with practices of IFA supplementation during pregnancy

Good IFA supplementation practice was observed to be positively affected by advanced maternal age, higher level of formal education, employment, large number of household members, gravidity of more than two, and history of delivery and alive child/children in a household. However, the amount knowledge about IFA supplementation showed no effect to practice (Table 2).

Table 2: Factors associated with the practices of iron/folate supplementation during pregnancy

	Practices of iron/folate supplements			
Variable	**Good (%)**	**Fair (%)**	**Poor (%)**	**p - value**
Age group (years)				
< 20	14 (40.0)	9 (25.7)	12 (34.3)	**0.016**
20 – 34	139 (53.5)	86 (33.1)	35 (13.5)	
≥ 35	36 (57.1)	14 (22.2)	13 (20.6)	
Marital status				
Living together	154 (55.0)	84 (30.0)	42 (15.0)	0.162
Not living together	35 (44.9)	25 (32.1)	18 (23.1)	
Level of education				
No formal education	7 (20.6)	16 (47.1)	11 (32.4)	**< 0.001**
Primary	70 (51.1)	47 (34.3)	20 (14.6)	
Secondary	57 (49.6)	35 (30.4)	23 (20.0)	
College	55 (76.4)	11 (15.3)	6 (8.3)	
Occupation				
Employed (formal & informal)	49 (81.7)	6 (10.0)	5 (8.3)	**< 0.001**
Self employed	75 (56.4)	36 (27.1)	22 (16.5)	
Housewife & student dependant	42 (42.0)	40 (40.0)	18 (18.0)	
Farming and livestock keeping	23 (35.4)	27 (41.5)	15 (23.1)	
Partner level of education				
No formal	8 (25.0)	16 (50.0)	8 (25.0)	0.001
Primary	47 (43.1)	40 (36.7)	22 (20.2)	
Secondary	66 (57.9)	29 (25.4)	19 (16.7)	
College	68 (66.7)	24 (23.5)	10 (9.8)	
Number of people in household				
≤ 3	69 (44.2)	59 (37.8)	28 (17.9)	0.046
4 – 5	73 (57.5)	34 (26.8)	20 (15.7)	
>5	47 (62.7)	16 (21.3)	12 (16.0)	
Gravidity				
1	30 (37.5)	30 (37.5)	20 (25.0)	**0.005**
2	43 (49.4)	32 (36.8)	12 (13.8)	
>2	116 (60.7)	47 (24.6)	28 (14.7)	
Parity				
0	33 (36.3)	35 (38.5)	23 (25.3)	**0.001**
≥1	156 (58.4)	74 (27.7)	37 (13.9)	
Number of abortions				
0	146 (52.0)	89 (31.7)	46 (16.4)	0.626
≥1	43 (55.8)	20 (26.0)	14 (18.2)	
Number of living children				
0	36 (36.0)	39 (39.0)	25 (25.0)	**< 0.001**
≥1	153 (59.3)	70 (27.1)	35 (13.6)	
ANC visit				
≤ 2	64 (46.0)	45 (32.4)	30 (21.6)	0.067
>2	125 (57.1)	64 (29.2)	30 (13.7)	
Knowledge on Iron/folate supp				
Poor	107 (52.7)	56 (27.6)	40 (19.7)	0.059
Fair	52 (50.2)	41 (39.8)	10 (9.7)	
Good	30 (57.7)	12 (23.1)	10 (19.2)	

Good practice is associated with advanced maternal age, formal education, employment, alive children, gravidity >2 and large number of people in household.

4.6 Logistic regression analysis for factors associated with good practices of IFA supplementation during pregnancy

Primary education level was two times more associated with good practices compared to those with non-formal education (OR=2.40, 95% CI=1.11–5.27). Employees were two times more likely to have good practices compared to housewives and students (OR=2.72, 95% CI=1.14–6.77). Those more than gravida two were two times more likely to have good practices compared to primigravidae (OR=2.28, 95% CI=1.19–4.41). Respondents with positive attitude had 6 folds more of having good practices compared to those with negative attitudes towards IFA supplementation (OR=6.64, 95% CI=2.70–17.01) (Table 3).

Table 3: Univariable and multivariable analysis of the factors associated with good practices of iron/folate supplementation during pregnancy

		Univariable analysis			Multivariable analysis		
Variable	**Category**	**cOR**	**95% CI**	**p - value**	**aOR**	**95% CI**	**p - value**
Age group (years)	≥ 35	2.20	0.99 – 4.95	0.054	0.76	0.29 – 2.02	0.587
	20 – 34	2.22	1.12 – 4.38	0.021	1.04	0.48 – 2.26	0.913
	< 20	Ref					
Marital status	Living together	1.56	0.97 – 2.51	0.066	1.18	0.68 – 2.04	0.546
	Not living together	Ref					
Level of education	College	8.97	4.00 – 20.75	< 0.001	2.45	0.79 – 7.80	0.125
	Secondary	2.67	1.33 – 5.41	0.006	1.35	0.55 – 3.32	0.508
	Primary	3.08	1.56 – 6.16	0.001	**2.40**	1.11 – 5.27	**0.027**
	No formal education	Ref					
Occupation	Employed	5.40	2.63 – 11.91	< 0.001	**2.71**	1.14 – 6.77	**0.028**
	Self-employed	1.57	0.96 – 2.57	0.071	1.46	0.86 – 2.49	0.167
	Farming & livestock	0.76	0.43 – 1.35	0.354	0.77	0.42 – 1.41	0.394
	Housewives & student	Ref					
Partner level of education	College	4.36	2.09 – 9.21	< 0.001	1.78	0.65 – 4.87	0.260
	Secondary	2.84	1.39 – 5.84	0.004	1.62	0.68 – 3.87	0.273
	Primary	1.71	0.84 – 3.46	0.137	0.99	0.44 – 2.21	0.988
	No formal education	Ref					
Number of people in the household	>5	1.84	1.07 – 3.20	0.029	1.43	0.73 – 2.87	0.304
	4 – 5	1.54	0.99 – 2.42	0.058	1.02	0.60 – 1.72	0.957
	≤ 3	Ref					
Gravidity	1	Ref					
	2	1.70	0.97 – 3.00	0.064	1.82	0.97 – 3.44	0.063
	>2	2.41	1.47 – 3.96	< 0.001	**2.28**	1.19 – 4.41	**0.014**
Abortions	0	Ref					
	≥1	1.09	0.67 – 1.80	0.721			
ANC visit	≤ 2	Ref					
	>2	1.60	1.07 – 2.41	0.023	1.04	0.65 – 1.65	0.867
Knowledge	Good	1.18	0.65 – 2.18	0.584			
	Fair	1.11	0.71 – 1.74	0.651			
	Poor	Ref					
Attitude	Positive	6.06	2.59 – 14.8	< 0.001	**6.64**	2.70 – 17.01	**< 0.001**
	Negative						

Key: cOR: crude Odds Ratio, aOR: adjusted Odds Ratio, Ref: Reference Category

Note: Odds ratio derived from ordinal logistic regression, dependent variable practices in order: poor |fair |good

5.0 DISCUSSION

Overall, IFA supplementation practices were good: most pregnant women (52.8%) took the supplement as directed by healthcare providers, easily accessed the tablets in pharmacies or medical facilities, and had no problems taking them. In addition to taking the tablets, they also ate foods high in iron and folic acid and animal products. With the exception of the fact that few people took the supplement with tea, coffee, or anti-acids, and the majority began using it later than is recommended. Consistent with the study by Berhanu et al and Jamil et al, "the majority of pregnant women supplemented their diets with iron and folic acid, but only a small percentage did so regularly, and even fewer avoided consuming tea or coffee with the tablets or iron-containing meals" (38,39).

Of 358 study participants 72.6% were aged 20 – 34 years, married, had formal education, self-employed and lived in families with few members (≤3 family members). They had poor knowledge about IFA supplementation as it was observed that they usually got information regarding IFA supplementation from unreliable sources. They showed positive attitudes towards IFA supplementation and good practice that were influenced by advanced maternal age, higher level of formal education, employment, large number of household members, high gravidity and prior delivery with alive children. The good practice observed showed no association with knowledge about IFA supplementation.

The majority had little to no awareness regarding IFA supplementation during pregnancy. They lacked knowledge on the appropriate timing for beginning iron supplementation, iron-absorption enhancing food supplements, iron-rich food supplements (vegetables and animal products), and precautions to prevent iron deficiency anemia during pregnancy. A small percentage of respondents were aware of the tablets' advantages during pregnancy as well as the ideal length of time to take them. This may be as a result of the majority of the participants obtained information on IFA from unreliable sources. Similarly, to the studies by Claire et al and Abdulmalek et al that showed majority of pregnant women had heard of folic acid, but only a minority of them were aware of its advantages, and even fewer understood when to take folic acid supplements during pregnancy, and very few were aware that it should be taken five to six

times a week. Contrary, to the study by El-mani et al where more than half of mothers knew that pregnant women needed folic acid supplements in addition to dietary folic acid. This indicates that knowledge on IFA supplementation differs across study settings (27–29).

Most of respondents (94.4%) showed positive attitudes towards the use of IFA supplementation and were eager to learn more about the benefits and proper practices of the supplements. Although from some previous studies by Rehan et al and Mshanga et al revealed that the overall attitude varied across studied populations, most of them showed similar results about attitude in comparison to this study findings; for instance, majority of pregnant women expressed good attitudes toward using the supplements, but a minority had negative attitudes because were unaware of the taste of the tablets (31,37). Similar findings by Serbesa et al and Al-marwani et al regarding the consumption of supplemental healthy diets in addition to the use of iron supplements during pregnancy, majority agreed, and they generally showed positive attitudes towards folic acid consumption (36,45).

We observed the high odds of good practices of IFA supplementation during pregnancy with primary education level, employed professionals, gravidity of more than two, and positive attitude towards IFA supplementation. This may be the result of high household incomes among employed individuals; for multiparas have attended health education seminars at ANC clinics on multiple occasions and formal education facilitates access to trustworthy sources of information regarding IFA supplementation; and even though knowledge level was found to have no association with practices, it showed an influence on positive attitudes towards IFA supplementation. Contrary to the earlier study by Mabuza et al, where it was found that inadequate knowledge and attitudes towards IFA supplementation, as well as obstacles to consumption including forgetfulness and tablet side effects like nausea, contributed to the poor practices of IFA supplementation during pregnancy (40).

The findings of this study alerts on the variation in the level of knowledge and attitudes across populations and that both good level of knowledge and positive attitudes towards IFA supplementation, together with good household income, and formal education are crucial to improving and ensuring consistent good practices of IFA during pregnancy. Nevertheless, more powered similar study should be done to accommodate and obtain broad insight from large population for the use by policy makers to ensure sustainable good practices of IFA supplementation during pregnancy.

6.0 STUDY STRENGTH, STUDY LIMITATION, CONCLUSION AND RECOMMENDATION

6.1 Study strength

This study showed strong association between positive attitude and good practices of IFA supplementation. It also explicitly revealed that, despite the lack of association between level of knowledge and practice, minority who accessed information about IFA supplementation during pregnancy from reliable sources had good practices and was under the influence of formal education and exposure to health education provided during ANC contacts.

6.2 Study limitation and mitigation

1. This study was prone to information bias. That was mitigated by comparing the collected information to the written medical records at the facilities.
2. The sample size might not be representative of the general population.

6.3 Conclusion

Pregnant women were willing to know much about IFA supplementation and were compliant to the proper recommended IFA practices. The observed good practice is based on their good compliance rather than the level of knowledge. However, good knowledge about IFA supplementation and its importance is crucial to raise the level of good practices. The offered health education during ANC visits where majority of pregnant women primarily obtain reliable information about IFA and its proper practices seem not to be comprehensive to cover all aspects of practice. Should include details about the benefits of the supplements during pregnancy, timing, frequency and duration and the supplemental diets or drinks or drugs to take with the supplements which enhances absorption and metabolism; and the like to avoid which hinders absorption and metabolism.

6.4 Recommendation

We recommend policy makers to review the teaching methodology about IFA supplementation, and the healthcare providers should ensure consistent and sustainable teaching sessions prior to providing ANC services at each visit. We also recommend an introduction of follow up mechanism for all pregnant women consuming IFA supplements to ensuring all aspects of IFA supplementation practices as defined in this study are covered for better intended outcome; this can be accomplished through direct observation of the practice by household member(s) under guidance of community healthcare workers.

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APPENDICES

Appendix I: Informed Consent Form

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED HEALTH SCIENCES

DIRECTORATE OF RESEARCH AND PUBLICATIONS

Dear participant, Greetings! My name is **Michael Kenneth Mabisi**, a postgraduate student with registration number HD/MUH/T.117/2021, from Muhimbili University of Health and Allied Sciences (MUHAS), conducting a study on knowledge, attitude, practice and associated factors of iron and folic acid supplementation during pregnancy in Morogoro Municipal Council

Introduction: The main aim of this study is to assess knowledge, attitude, practice and associated factors of iron and folic acid supplementation among second and third trimester pregnant women on ANC follow up in Morogoro municipal council. You are selected to be one of the study participants if you are willing to participate. We are so happy finally you are kindly requested to give your genuine response in the questionnaires.

Benefits, risk and/or discomfort: By participating in this research project you may feel some discomfort in wasting your time (a maximum of 30 minutes). However, your participation is definitely important for the success of this study. There is no risk or direct benefit in participation in this research project.

Incentives/payments for participating: You will not provide any incentives or payment to take part in this project.

Confidentiality: We will keep the confidentiality by using codes instead of any personal identifiers and is meant only for the purpose of the study.

Right to refusal or withdraw: You will not be forced to participate; you have the full right to refuse and have the right to discontinue the process at any point in this research.

Person to contact: This research project will be reviewed and approved by the ethical committee of the Muhimbili University of Health and Allied Sciences. If you have any question you can contact: **Dr. Michael Kenneth Mabisi** (Principal Investigator), MMed student from department of Obstetrics and Gynecology, Muhimbili University of Health and Allied Sciences, P.O BOX 65001, Dar es Salaam, phone number **+255 765960450**.

If you ever have questions about this study you may call, the Chairperson of the Research and Publications Committee, MUHAS. P.O. Box 65001, Dar es Salaam-Tanzania **255 0222151596**.

I have read the contents of this form and understood. My questions have been answered. I agree to participate in this study.

Signature of participant……...

Signature of data collector……...Facility……...

Kiambatisho I: Fomu Ya Ridhaa

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI - MUHIMBILI

KURUGENZI YA UTAFITI NA MACHAPISHO

Mpendwa mshiriki, Salaam! Naitwa **Michael Kenneth Mabisi**, mwanafunzi wa shahada ya uzamili mwenye namba ya usajiri HD/MUH/T.117/2021, katika Chuo cha Afya na Sayansi Shirikishi - Muhimbili (MUHAS), nafanya utafiti kuhusu maarifa, mtazamo, utendaji na mambo yanayohusiana/ambatana na utumiaji wa madini chuma na folic asidi kipindi cha ujauzito ndani ya Manispaa ya Morogoro.

Utangulizi: Lengo kuu la utafiti huu ni kuchunguza kiwango cha uelewa (maarifa), mtazamo, utendaji na mambo yanayohusiana na utumiaji wa madini chuma na folic asidi kipindi cha robo ya pili na ya tatu kwa wajawazito wanao hudhuria kliniki ya ujauzito ndani ya Manispaa ya Morogoro.
Umechaguliwa kuwa mmoja wa washiriki wa hiari katika utafiti huu. Kwa hiari yako, tunaomba ushiriki wako wa dhati ambao utahusisha kujibu maswali yaliyo katika dodoso lililo ambatishwa.

Manufaa na madhara: Kwa kushiriki katika utafiti huu hakutakuwa na usumbufu wowote mbali na muda wako usiozidi dakika 30 utakao tumia kujibu maswali ya kwenye dodoso. Hata hivyo, ushiriki wako ni muhimu na wa thamani sana ili kufanikisha utafiti huu. Hakuna madhara au manufaa za moja kwa moja kwa kushiriki katika utafiti huu.

Motisha/malipo ya ushiriki: Hutolazimika kutoa motisha au malipo yoyote ya ushiriki katika utafiti huu.

Usiri: Taarifa zote zinazohusian na utafiti zibaki kuwa siri baina ya mtafiti na mtoa taarifa kwa malengo yaliyokusudiwa kwa utafiti huu tu, na kwamba hakuna utambulisho wako wowote wa wazi utakaotumika.

Haki ya kukataa au kujiondoa: Ni chaguo lako kushiriki katika utafiti huu. Pia, sio lazima kuzungumza juu ya kitu chochote ambacho hutaki na unaweza kumaliza mahojiano wakati wowote. Hata hivyo, nakuhimiza kushiriki kwa sababu maoni yako ni muhimu sana katika utafiti huu.

Kwa mawasiliano kuhusu utafiti huu: Ukiwa na swali lolote kuhusiana na utafiti huu usisite kuwasiliana na: **Dr. Michael Kenneth Mabisi** (Mtafiti Mkuu), mwanafuzi wa shahada ya uzamili, idara ya Magonjwa ya Wanawake na Afya ya Uzazi, Chuo Kikuu cha Afya na Sayansi Shirikishi - Muhimbili, S.L.P 65001, Dar es Salaam, simu **+255 765960450**.

Pia, ukiwa na changamoto au maswali yoyote kuhusu utafiti huu unaweza kumpigia simu, Mwenyekiti wa Kamati ya Utafiti na Machapisho, MUHAS. S.L.P 65001, Dar es Salaam-Tanzania **255 0222151596**.

Nimesoma yaliyomo katika fomu hii na kuelewa. Maswali yangu yamejibiwa. Ninakubali kushiriki katika utafiti huu.

Sahihi ya Mshiriki……...

Sahihi ya mdodosaji…….Kituo cha tiba……...

Appendix II: English Version Questionnaire and Likert Scale

Part I: Socio-demographic and Obstetrics characteristics

1. Age in years …….
2. Number of Gravidity……Parity……Abortion……Living children……
3. Number of prior ANC visits for index pregnancy…….
4. What is your current marital status?
    a) Single
    b) Married
    c) Divorced
    d) Widowed
    e) Cohabiting
5. What is your highest level of education?
    a) No formal education
    b) Primary level
    c) Secondary level
    d) College
6. What is your current occupation?.....
7. What is your partner's highest level of education?
    a) No formal education
    b) Primary level
    c) Secondary level
    d) College
8. Approximately how much do you spend for food supplies per month at your home?.....
9. How many are you in your household?.....

Part II: Knowledge on Iron/Folate Supplementation

1. Do you know the drug called iron/folate?
    a) Yes
    b) No
2. Do you know the benefit of iron/folate supplement?
    a) Yes
    b) No
3. Can you tell why it is important to take iron supplements during pregnancy? (more than one is correct)
    a) For normal mental and physical development of the unborn baby
    b) For prevention of iron-deficiency anemia
    c) I don't know
    d) Others
    (specify)…….
4. Can you tell why it is important to take folic acid supplements during pregnancy? (more than one is correct)
    a) For normal development of the nervous system of the unborn baby
    b) To prevent birth defects/abnormalities of the nervous system of the unborn baby
    c) I don't know
    d) Others
    (specify)……
5. Do you think that iron/folate supplement has risk?
    a) Yes
    b) No

6. What is the risk(s) of iron/folate supplements use?
    a) No risk(s)
    b) Cause bigger fetus
    c) Result in complicated delivery
    d) Others
    (specify)…….
7. What is the right time to start taking folic acid tablet supplement?
    a) Before pregnancy
    b) During pregnancy
    c) After pregnancy (during breastfeeding)
    d) I don't know
8. For how long should iron/folate supplement be taken during pregnancy? (more than 1 answer)
    a) One month
    b) Two months
    c) Three months
    d) More than three months
    e) During the entire pregnancy
    f) I don't know
9. What is your source of information about iron/folate supplement? (more than one correct answer is possible)
    a) Antenatal Health workers
    b) Media
    c) Friends
    d) School
    e) Others
    (specify)…….

10. How can anemia in pregnancy be prevented? (more than one correct answer is possible)
    a) Eating diet rich in iron/folate vitamins
    b) Eating Vitamin-C rich foods during or right after meals
    c) Taking iron supplements as prescribed
    d) Treat other causes of anemia (diseases and infections)
    e) Others
       (specify)…….
    f) I don't know
11. How likely do you think you are to have iron/folic acid deficiency?
    a) Likely
    b) Not likely
    c) Not sure
    d) I don't know

Part III: Likert Scale: Attitudes of participants regarding iron/folate supplementation

1. Regular antenatal checkups are essential for pregnancy.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral
2. Pregnant woman should consume iron/folate tablets.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral

3. Mother and unborn baby are benefited by taking iron/folate tablets.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral
4. It is essential for pregnancy to take iron/folate supplement regularly.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral
5. Iron supplement can positively affect maternal and fetal health.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral
6. Folic acid deficiency can lead to abnormality in newborn.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral
7. Are you willing to know more about iron/folate supplement?
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral

8. Iron/folate supplement can prevent anemia in pregnancy.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral
9. Regular intake of iron/folate during pregnancy can prevent newborn anomaly.
    a) Agree
    b) Strongly agree
    c) Disagree
    d) Strongly disagree
    e) Neutral

Part IV: Practices toward use of IFA supplements among third trimester pregnant women

1. Do you take iron and folic acid tablets as instructed by health workers?
    a) Yes, always
    b) Sometimes
    c) Not at all
2. Is it difficult for you to take iron/folic acid supplements?
    a) Not difficult
    b) Difficult
3. Can you afford to buy iron and folic acid supplements?
    a) Yes
    b) No
4. Where do you usually get such supplements from?
    a) Pharmacy
    b) Health facility
    c) Friends
    d) Don’t know

5. Do you face any challenges in taking iron and folic acid tablets?
    a) None
    b) Nausea/vomiting
    c) Bad taste
    d) Black stool
    e) Others

    (specify)…….
6. Other than iron and folic acid tablets, do you consume animal foods?
    a) Yes
    b) No
7. If yes in 6 above, how often in a week?
    a) Once
    b) Twice
    c) Three times
    d) Everyday
8. Do you afford and consume food rich in folic acid such as Greenleaf vegetables?
    a) Yes
    b) Sometimes
    c) Not at all
9. Do you usually take iron/folate tablets and foods rich in iron with citrus fruits/juice?
    a) Yes
    b) Sometimes
    c) Not at all
10. Do you usually take iron/folate tablet with tea/milk/coffee?
    a) Yes
    b) No
11. Do you use iron/folate tablets while taking anti-acids drugs for heartburn/dyspepsia?
    a) Yes
    b) No
12. If yes in 11 above, what is the name(s) of anti-acid drugs? …….

Kiambatisho II: Dodoso Na Kipimo Cha Likert

Sehemu I: Taarifa binafsi za mshiriki

1. Umri (miaka) …….
2. Mimba ya ngapi?.....Umejifungua mara ngapi?.....Mimba ngapi zimeharibika?.....Una watoto hai wangapi?.....
3. Idadi ya mahudhurio ya kiliniki iliyopita kwa mimba hii…….
4. Hali ya ndoa
    a) Sijaolewa
    b) Nimeolewa
    c) Mtalikiwa
    d) Mjane
    e) Naishi pamoja na mwenza bila ndoa
5. Kiwango cha juu cha elimu yako
    a) Sina elimu rasmi
    b) Elimu ya msingi
    c) Elimu ya sekondari
    d) Elimu ya chuo
6. Unafanya kazi gani?.....
7. Kiwango cha juu cha elimu ya mwenza wako
    a) Hana elimu rasmi
    b) Elimu ya msingi
    c) Elimu ya sekondari
    d) Elimu ya chuo
8. Kiasi gani cha fedha hutumika kwa ajili ya mahitaji ya chakula kwa mwezi kwenye kaya yako?.....
9. Kaya yako ina watu wangapi?.....

Sehemu II: Maarifa juu ya matumizi ya madini chuma na folic asidi

1. Unavifahamu vidonge vya madini chuma/foliki ya asidi?
    a) Ndiyo
    b) Hapana
2. Unazijua faida za kutumia vidonge vya madini chuma/foliki ya asidi?
    a) Ndiyo
    b) Hapana
3. Kwa nini ni muhimu kutumia vidonge vya madini chuma kipindi cha ujauzito? (jibu laweza kuwa zaidi ya moja)
    a) Kwa ukuaji mzuri wa ubongo na mwili wa mtoto aliye tumboni
    b) Huzuia upungufu wa damu
    c) Sijui
    d) Sababu nyingine (zitaje)……
4. Kwa nini ni muhimu kutumia vidonge vya foliki ya asidi kipindi cha ujauzito? (jibu laweza kuwa zaidi ya moja)
    a) Kwa ukuaji mzuri wa mfumo wa fahamu wa mtoto aliye tumboni
    b) Kuzui kasoro ya mgongo-wazi kwa mtoto aliye tumboni
    c) Sijui
    d) Sababu nyingine (zitaje)……
5. Je, kutumia madini chuma/foliki ya asidi kipindi cha ujauzito kuna hatari yoyote?
    a) Ndiyo
    b) Hapana
6. Ni yapi matokeo hasi ya madini chuma/foliki ya asidi kipindi cha ujauzito?
    a) Hakuna matokeo hasi
    b) Husababisha mtoto aliye tumboni kuwa mkubwa kupitiliza
    c) Husababisha changamoto wakati wa kujifungua
    d) Mengine (taja)…….

7. Ni kipindi gani sahihi kuanza kutumia vidonge vya foliki ya asidi?
    a) Kabla ya kupata mimba
    b) Kipindi cha mimba
    c) Baada ya kujifungua (kipindi cha kunyonyesha)
    d) Sijui
8. Ni kwa muda gani vidonge vya madini chuma/foliki ya asidi hupaswa kumezwa? (jibu laweza kuwa zaidi ya moja)
    a) Mwezi mmoja
    b) Miezi miwili
    c) Miezi mitatu
    d) Zaidi ya miezi mitatu
    e) Kipindi chote cha mimba
    f) sijui
9. Umepata wapi elimu/taarifa kuhusu matumizi ya madini chuma/foliki ya asidi? (jibu laweza kuwa zaidi ya moja)
    a) Watoa huduma za afya katika kiliniki ya wajawazito (kituo cha huduma za afya)
    b) Vyombo vya habari
    c) Marafiki
    d) Masomoni (Shule)
    e) kwingineko
        (taja)……
10. Ni jinsi gani ya kuzuia upungufu wa damu kipindi cha ujauzito? (jibu laweza kuwa zaidi ya moja)
    a) Kula vyakula vyenye madini chuma/foliki ya asidi kwa wingi
    b) Kula vyakula vyenye vitamini C
    c) Kumeza vidonge vya madini chuma kama inavyo shauriwa na wataalam wa afya
    d) Kutibu magonjwa sababishi (malaria, minyoo n.k)
    e) Njia nyingine (taja)……
    f) Sijui

11. Je, unafikiri kuna uwezekano wa kukapata upungufu wa madini chuma/foliki ya asidi?
    a) Kuna uwezekano
    b) Hakuna uwezekano
    c) Sina uhakika
    d) Sijui

Sehemu III: Kipimo cha Likert: Mtazamo wa mshiriki juu ya matumizi ya vidonge vya madini chuma/foliki ya asidi

1. Je, mahudhurio ya mara kwa mara kiliniki ya ujauzito na upimaji ni muhimu?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
2. Je, mama mjamzito anapaswa kutumia vidonge vya madini chuma/foliki ya asidi?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
3. Je, mama na mtoto aliye tumboni hunufaika na utumiaji wa vidonge vya madini chuma/foliki ya asidi?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui

4. Je, ni muhimu kwa mama mjamzito kutumia vidonge vya madini chuma/foliki ya asidi kwa usahihi mara kwa mara?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
5. Je, matumizi ya vidonge vya madini chuma yana matokeo chanya kwa afya ya mama na mtoto aliye tumboni?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
6. Je, upungufu wa vitamini ya foliki ya asidi husababisha kasoro za kuzaliwa kwa mtoto mchanga?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
7. Je, upo tayari kufahamu zaidi kuhusu matumizi ya madini chuma/foliki ya asidi?
    a) Nakuliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui

8. Je, vidonge vya madini chuma/foliki ya asidi huzuia upungufu wa damu?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
9. Je, matumizi ya vidonge vya madini chuma/foliki ya asidi kipindi cha ujauzito husaidia huzuia kasoro za kuzaliwa kwa mtoto mchanga?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui

Sehemu IV: Utumiaji wa vidonge vya madini chuma/foliki ya asidi kipindi cha ujauzito

1. Unatumia vidonge vya madini chuma/foliki ya asidi kama inavyoelekezwa na watoa huduma za afya?
    a) Ndiyo, kila mara
    b) Si kila mara
    c) Situmii kabisa
2. Unapata ugumu kutumia vidonge vya madini chuma/foliki ya asidi?
    a) Ndiyo, kuna ugumu
    b) Hapana, hakuna ugumu
3. Unamudu kununua vidonge vya madini chuma/foliki ya asidi?
    a) Ndiyo
    b) Hapana

4. Unapata wapi vidonge vya madini chuma/foliki ya asidi?
    a) Duka la dawa
    b) Kituo cha kutolea huduma za afya
    c) Marafiki
    d) Sijui
5. Unapata changamoto gani wakati wa kutumia vidonge vya madini chuma/foliki ya asidi?
    a) Hakuna
    b) Kichefuchefu/kutapika
    c) Ladha mbaya
    d) Kinyesi cheusi
    e) Nyingine (zitaje)…….
6. Mbali na vidonge vya madini chuma chuma/foliki ya asidi, unatumia vyakula vya mazao ya wanyama?
    a) Ndiyo
    b) Hapana
7. Kama jibu ni ndiyo katika swali la 6, unatumia mara ngapi kwa wiki?
    a) Moja
    b) Mbili
    c) Tatu
    d) Kila siku
8. Unamudu kutumia vyakula vyenye foliki ya asidi kwa wingi kama mboga mboga?
    a) Ndiyo, kila mara
    b) Si kila mara
    c) Situmii kabisa
9. Unatumia vidonge vya madini chuma/foliki ya asidi na vyakula vya madini chuma kwa wingi pamoja na juisi ya matunda jamii ya machungwa mara kwa mara?
    a) Ndiyo, kila mara
    b) Si kila mara
    c) Situmii kabisa

10. Je, huwa unatumia vidonge vya madini chuma/folic asidi pamoja na chai, kahawa au maziwa?
    a) Ndiyo
    b) Hapana
11. Unatumia vidonge vya madini chuma/foliki ya asidi wakati unatumia dawa za kutoa asidi tumboni kwa ajili ya kiungulia au vidonda vya tumbo mara kwa mara?
    a) Ndiyo, kila mara
    b) Si kila mara
    c) Hapana
12. Kama jibu ni ndiyo katika swali la 11, taja majina ya dawa za kutoa asidi tumboni ambazo huwa unazitumia sambamba na vidonge vya madini chuma/foliki ya asidi ……...

DODOSO NA KIPIMO CHA LIKERT

Sehemu I: Taarifa binafsi za mshiriki

1. Umri (miaka) .....
2. Mimba ya ngapi?..... Umejifungua mara ngapi?..... Mimba ngapi zimeharibika?.....Una watoto hai wangapi?.....
3. Idadi ya mahudhurio ya kiliniki iliyopita kwa mimba hii.....
4. Hali ya ndoa
   a) Sijaolewa
   b) Nimeolewa
   c) Mtalikiwa
   d) Mjane
   e) Naishi pamoja na mwenza bila ndoa
5. Kiwango cha juu cha elimu yako
   a) Sina elimu rasmi
   b) Elimu ya msingi
   c) Elimu ya sekondari
   d) Elimu ya chuo
6. Unafanya kazi gani?.....
7. Kiwango cha juu cha elimu ya mwenza wako
   a) Hana elimu rasmi
   b) Elimu ya msingi
   c) Elimu ya sekondari
   d) Elimu ya chuo
8. Kiasi gani cha fedha hutumika kwa ajili ya mahitaji ya chakula kwa mwezi kwenye kaya yako? .....
9. Kaya yako ina watu wangapi?.....

Sehemu II: Maarifa kuhusu matumizi ya vidonge vya madini chuma na foliki ya asidi

1. Unavifahamu vidonge vya madini chuma/foliki ya asidi?
   a) Ndiyo
   b) Hapana
2. Unazijua faida za kutumia vidonge vya madini chuma/foliki ya asidi?
   a) Ndiyo
   b) Hapana
3. Kwa nini ni muhimu kutumia vidonge vya madini chuma kipindi cha ujauzito? (jibu linaweza kuwa zaidi ya moja)
   a) Kwa ukuaji mzuri wa ubongo na mwili wa mtoto aliye tumboni
   b) Huzuia upungufu wa damu
   c) Sijui
   d) Sababu nyingine (zitaje) .....
4. Kwa nini ni muhimu kutumia vidonge vya foliki ya asidi kipindi cha ujauzito? (jibu linaweza kuwa zaidi ya moja)
   a) Kwa ukuaji mzuri wa mfumo wa fahamu wa mtoto aliye tumboni
   b) Kuzui kasoro ya mgongo-wazi kwa mtoto aliye tumboni
   c) Sijui
   d) Sababu nyingine (zitaje) .....
5. Je, kutumia madini chuma/foliki ya asidi kipindi cha ujauzito kuna hatari yoyote?
   a) Ndiyo
   b) Hapana
6. Ni yapi matokeo hasi ya madini chuma/foliki ya asidi kipindi cha ujauzito?
   a) Hakuna matokeo hasi
   b) Husababisha mtoto aliye tumboni kuwa mkubwa kupitiliza
   c) Husababisha changamoto wakati wa kujifungua
   d) Mengine (taja).....
7. Ni kipindi gani sahihi kuanza kutumia vidonge vya foliki ya asidi?
   a) Kabla ya kupata mimba
   b) Kipindi cha mimba
   c) Baada ya kujifungua (kipindi cha kunyonyesha)
   d) Sijui
8. Ni kwa muda gani vidonge vya madini chuma/foliki ya asidi hupaswa kumezwa? (jibu linaweza kuwa zaidi ya moja)
   a) Mwezi mmoja
   b) Miezi miwili
   c) Miezi mitatu
   d) Zaidi ya miezi mitatu
   e) Kipindi chote cha mimba
   f) sijui
9. Umepata wapi elimu/taarifa kuhusu matumizi ya madini chuma/foliki ya asidi? (jibu linaweza kuwa zaidi ya moja)
   a) Watoa huduma za afya katika kiliniki ya wajawazito (kituo cha huduma za afya)
   b) Vyombo vya habari
   c) Marafiki
   d) Masomoni (Shule)
   e) kwingineko (taja).....

ITHIBATI:
LUGHA IMETHIBITISHWA NA BARAZA LA KISWAHILI LA TAIFA
SAHIH
TAREHE 1.12.2023

10. Ni jinsi gani unaweza kuzuia upungufu wa damu kipindi cha ujauzito? (jibu linaweza kuwa zaidi ya moja)
    a) Kula vyakula vyenye madini chuma/foliki ya asidi kwa wingi
    b) Kula vyakula vyenye vitamini C
    c) Kumeza vidonge vya madini chuma kama inavyoshauriwa na wataalam wa afya
    d) Kutibu magonjwa sababishi (malaria, minyoo n.k)
    e) Njia nyingine (taja) .....
    f) Sijui
11. Je, unafikiri kuna uwezekano wa kapata upungufu wa madini chuma/foliki ya asidi?
    a) Kuna uwezekano
    b) Hakuna uwezekano
    c) Sina uhakika
    d) Sijui

Sehemu III: Kipimo cha Likert: Mtazamo wa mshiriki kuhusu matumizi ya vidonge vya madini chuma/foliki ya asidi

1. Je, mahudhurio ya mara kwa mara kiliniki ya ujauzito na upimaji ni muhimu?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
2. Je, mama mjamzito anapaswa kutumia vidonge vya madini chuma/foliki ya asidi?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
3. Je, mama na mtoto aliye tumboni hunufaika na utumiaji wa vidonge vya madini chuma/foliki ya asidi?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
4. Je, ni muhimu kwa mama mjamzito kutumia vidonge nya madini chuma/foliki ya asidi kwa usahihi mara kwa mara?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
5. Je, matumizi ya vidonge vya madini chuma yana matokeo chanya kwa afya ya mama na mtoto aliye tumboni?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
6. Je, upungufu wa vitamini ya foliki ya asidi husababisha kasoro za kuzaliwa kwa mtoto mchanga?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
7. Je, upo tayari kufahamu zaidi kuhusu matumizi ya madini chuma/foliki ya asidi?
    a) Nakuliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
8. Je, vidonge vya madini chuma/foliki ya asidi huzuia upungufu wa damu?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui
9. Je, matumizi ya vidonge vya madini chuma/foliki ya asidi kipindi cha ujauzito husaidia kuzuia kasoro za kuzaliwa kwa mtoto mchanga?
    a) Nakubaliana
    b) Nakubaliana sana
    c) Sikubaliani
    d) Sikubaliani kabisa
    e) Sijui

ITHIBATI:
LUGHA IMETHIBITISHWA NA
BARAZA LA KISWAHILI LA TAIFA
CHETI NA: .....
TAREHE 1.12.2023

Sehemu IV: Utumiaji wa vidonge vya madini chuma/foliki ya asidi kipindi cha ujauzito

1. Unatumia vidonge vya madini chuma/foliki ya asidi kama inavyoelekezwa na watoa huduma za afya?
   a) Ndiyo, kila mara
   b) Si kila mara
   c) Situmii kabisa
2. Unapata ugumu kutumia vidonge vya madini chuma/foliki ya asidi?
   a) Ndiyo, kuna ugumu
   b) Hapana, hakuna ugumu
3. Unamudu kununua vidonge vya madini chuma/foliki ya asidi?
   a) Ndiyo
   b) Hapana
4. Unapata wapi vidonge vya madini chuma/foliki ya asidi?
   a) Duka la dawa
   b) Kituo cha kutolea huduma za afya
   c) Marafiki
   d) Sijui
5. Unapata changamoto gani wakati wa kutumia vidonge vya madini chuma/foliki ya asidi?
   a) Hakuna
   b) Kichefuchefu/kutapika
   c) Ladha mbaya
   d) Kinyesi cheusi
   e) Nyingine (zitaje).....
6. Mbali na vidonge vya madini chuma chuma/foliki ya asidi, unatumia vyakula vya mazao ya wanyama?
   a) Ndiyo
   b) Hapana
7. Kama jibu ni ndiyo katika swali la 6, unatumia mara ngapi kwa wiki?
   a) Moja
   b) Mbili
   c) Tatu
   d) Kila siku
8. Unamudu kutumia vyakula vyenye foliki ya asidi kwa wingi kama mboga mboga?
   a) Ndiyo, kila mara
   b) Si kila mara
   c) Situmii kabisa
9. Unatumia vidonge vya madini chuma/foliki ya asidi na vyakula vya madini chuma kwa wingi pamoja na juisi ya matunda jamii ya machungwa mara kwa mara?
   a) Ndiyo, kila mara
   b) Si kila mara
   c) Situmii kabisa
10. Unatumia vidonge vya madini chuma/foliki ya asidi pamoja na chai, kahawa au maziwa mara kwa mara?
    a) Ndiyo, kila mara
    b) Si kila mara
    c) Hapana
11. Unatumia vidonge vya madini chuma/foliki ya asidi wakati unatumia dawa za kutoa asidi tumboni kwa ajili ya kiungulia au vidonda vya tumbo mara kwa mara?
    a) Ndiyo, kila mara
    b) Si kila mara
    c) Hapana
12. Kama jibu ni ndiyo katika swali la 11, taja majina ya dawa za kutoa asidi tumboni ambazo huwa unazitumia sambamba na vidonge vya madini chuma/foliki ya asidi .....

ITHIBATI:
LUGHA IMETHIBITISHWA NA
BARAZA LA KISWAHILI LA TAIFA
CHETI NA:
TAREHE 1:12:2023

Appendix III: Ethical Clearance

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATION

Ref. No.DA.282/298/01.C/1929 Date: 03/10/2023

MUHAS-REC-10-2023-1929
MICHAEL KENNETH MABISI
SCHOOL OF MEDICINE
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: KNOWLEDGE, ATTITUDE AND PRACTICE OF IRON AND FOLIC ACID SUPPLEMENTATION AND ASSOCIATED FACTORS AMONG SECOND AND THIRD TRIMESTER PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINICS IN MOROGORO MUNICIPAL COUNCIL

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 03/10/2023
EXPIRATION DATE OF APPROVAL: 03/10/2024

STUDY DESCRIPTION:
Purpose:

The purpose of this analytical cross-sectional quantitative study is to determine the knowledge, attitude, and practice of iron and folic acid supplementation and associated factors among second and third trimester pregnant women on antenatal clinic follow-ups.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided.
https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2014801.pdf and in the MUHAS archives

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain data transfer agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain material transfer agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country,
8. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
9. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
10. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drc.muhas.ac.tz/.

Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research, Publications & Innovations
Box 65001

Appendix IV: Introduction to Data Collection Field

UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote:
Ref. No. HD/MUH/T.117/2021

05TH October, 2023

The Municipal Director Office,
Morogoro Municipal Council,
P.O. Box 166,
MOROGORO

Re: INTRODUCTION LETTER

We would like to inform you that the bearer of this letter is Michael Kenneth Mabisi with Reg. No. HD/MUH/T.117/2021 is a student at Muhimbili University of Health and Allied Sciences (MUHAS) "pursuing MMed. Obstetrics/Gynaecology.

As part of his studies, he will be doing an elective research titled: "**Knowledge, Attitude and Practice of Iron and Folic and Folic Acid Supplementation and Associated Factors Among Second and Third Trimester Pregnant Women Attending Antenatal Care Clinics in Morogoro.**"

The research has been approved by the Chairman of University Senate.

Kindly provide him the necessary assistance to facilitate the conduct of his research.

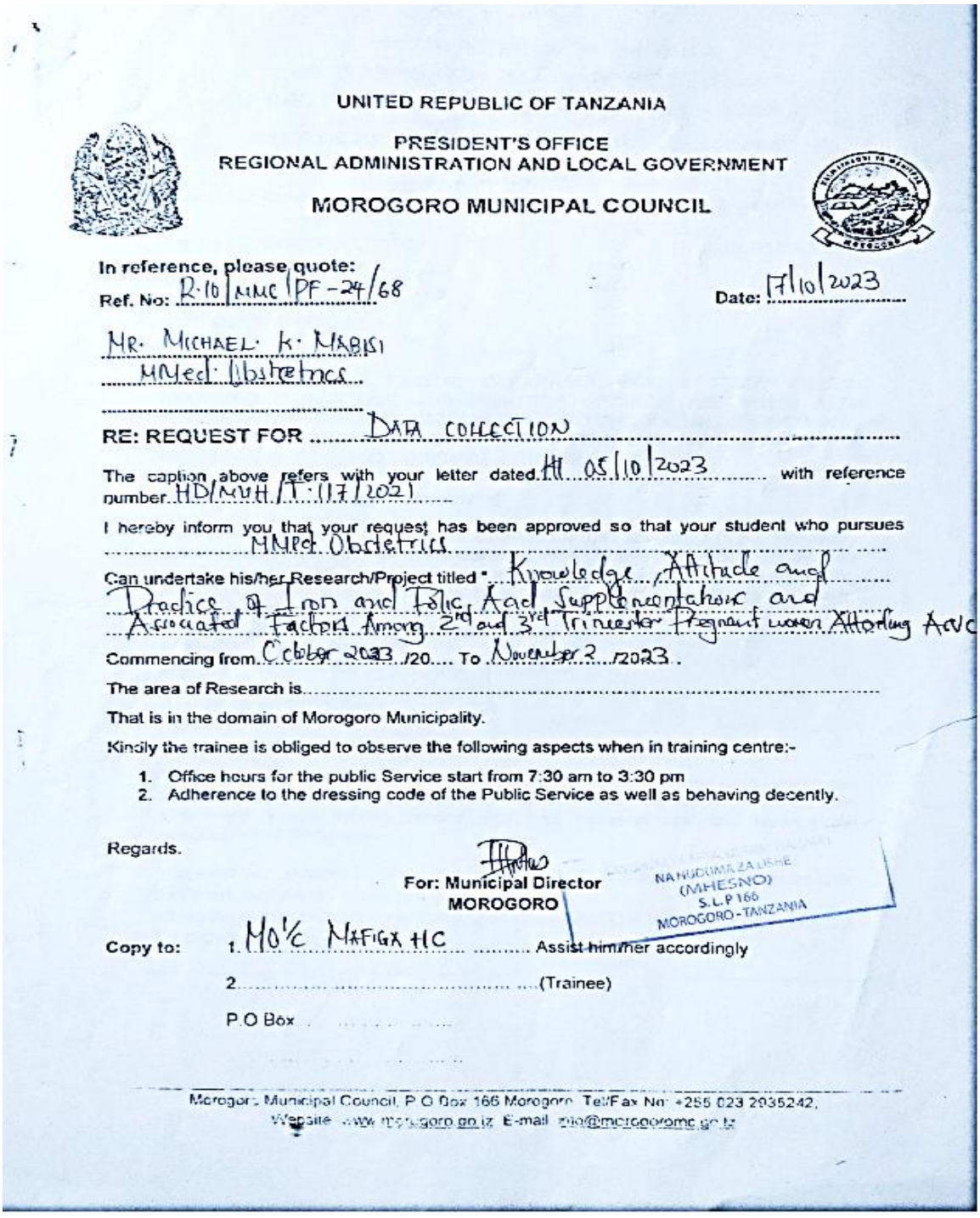
We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

c.c Michael Kenneth Mabisi

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix V: Data collection permission letters from Morogoro Municipal Council



UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

MOROGORO MUNICIPAL COUNCIL

In reference, please quote:
Ref. No: R.10/MMC/PF-24/68 Date: 17/10/2023

MR. MICHAEL K. MABISI
MMed: Obstetrics

RE: REQUEST FOR DATA COLLECTION

The caption above refers with your letter dated 05/10/2023 with reference number HD/MUH/T.117/2021

I hereby inform you that your request has been approved so that your student who pursues MMed Obstetrics

Can undertake his/her Research/Project titled " Knowledge, Attitude and Practices of Iron and Folic Acid Supplementation and Associated Factors Among 2nd and 3rd Trimester Pregnant Women Attending ANC

Commencing from October 2023 /20... To November 2023.

The area of Research is.....

That is in the domain of Morogoro Municipality.

Kindly the trainee is obliged to observe the following aspects when in training centre:-

1. Office hours for the public Service start from 7:30 am to 3:30 pm
2. Adherence to the dressing code of the Public Service as well as behaving decently.

Regards.

For: Municipal Director
MOROGORO

NA NDUGU MAZALISHE
(MHESNO)
S.L.P 166
MOROGORO - TANZANIA

Copy to: 1. M/C MAFIGA HC ..... Assist him/her accordingly

2. .....(Trainee)

P.O Box .....

Morogoro Municipal Council, P.O Box 166 Morogoro Tel/Fax No: +255 023 2935242,
Website: www.morogoro.go.tz E-mail: mlo@morogoromc.go.tz

UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

MOROGORO MUNICIPAL COUNCIL

In reference, please quote:
Ref. No: R-10/MMC/DF-24/68 Date: 17/10/2022

Mr. MICHAEL K. MABILI
MMed Obstetrics

RE: REQUEST FOR DATA COLLECTION

The caption above refers with your letter dated 05th October 2023 with reference number HD/MUH/1.117/2021

I hereby inform you that your request has been approved so that your student who pursues MMed Obstetrics

Can undertake his/her Research/Project titled "Knowledge, Attitude and Practice of Iron and Folic Acid Supplementation and Associated Factors among 2nd and 3rd Trimester Pregnant women Attending ANC clinics"

Commencing from October 2023/20... To November /2023

The area of Research is.....

That is in the domain of Morogoro Municipality.

Kindly the trainee is obliged to observe the following aspects when in training centre:-

1. Office hours for the public Service start from 7:30 am to 3:30 pm
2. Adherence to the dressing code of the Public Service as well as behaving decently.

Regards.

For: Municipal Director
MOROGORO

DIVISHENI YA UTAFITI NA HUDUMA ZA USHAURI
NA HUDUMA ZA LISHE
(MHESNO)
S.L.P 166
MOROGORO - TANZANIA

Copy to: 1. Mb/c Salawaba H C Assist him/her accordingly

2.....(Trainee)

P O Box.....

UNITED REPUBLIC OF TANZANIA

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

MOROGORO MUNICIPAL COUNCIL

In reference, please quote:
Ref. No: R-10/MMC/PF-24/68

Date: 17/10/2023

Mr. Michael K. Mabusi
MMed - Obs.

RE: REQUEST FOR DATA COLLECTION

The caption above refers with your letter dated 5th October 2023 with reference number HD/MUHAS/1171/2021

I hereby inform you that your request has been approved so that your student who pursues MMed Obs Gynae

Can undertake his/her Research/Project titled "Knowledge, Attitude and Practice of Iron and Folic Acid Supplementation and Associated Factors among 2nd and 3rd Trimester Pregnant women Attending ANC clinics"

Commencing from October 2023/20... To November /20.23

The area of Research is.....

That is in the domain of Morogoro Municipality.

Kindly the trainee is obliged to observe the following aspects when in training centre:-

1. Office hours for the public Service start from 7:30 am to 3:30 pm
2. Adherence to the dressing code of the Public Service as well as behaving decently.

Regards.

For: Municipal Director
MOROGORO

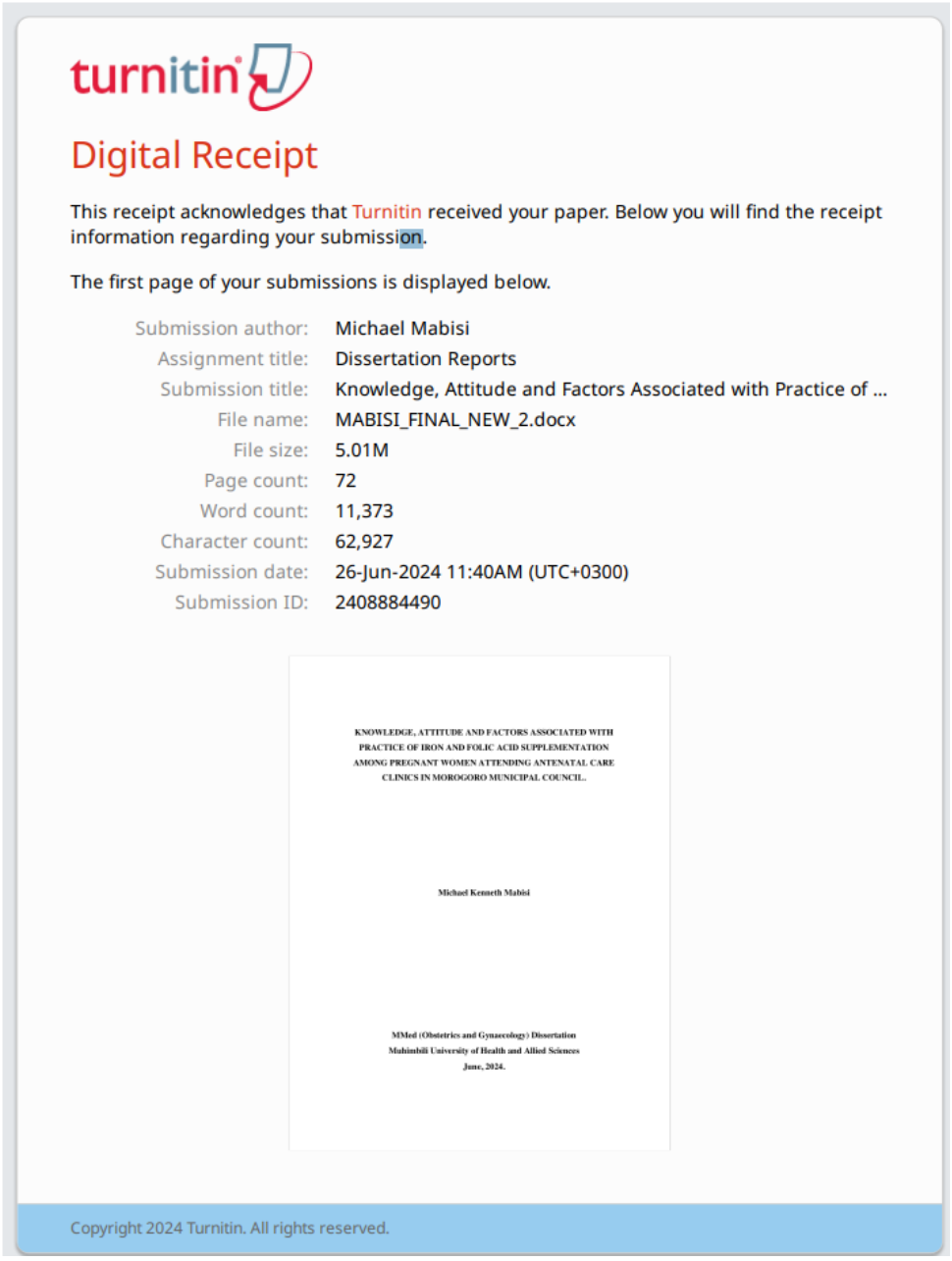
DIVISHENYA AFYA, USTAWI WA JAMII NA HUDUMA ZA LISHE (MHESNO) S.L.P 166 MOROGORO - TANZANIA

Copy to: 1. MO/C KINGOLWIRA HC Assist him/her accordingly

2.....(Trainee)

P.O Box.....

Appendix VI: Turnitin Receipt



turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Michael Mabisi
Assignment title:	Dissertation Reports
Submission title:	Knowledge, Attitude and Factors Associated with Practice of ...
File name:	MABISI_FINAL_NEW_2.docx
File size:	5.01M
Page count:	72
Word count:	11,373
Character count:	62,927
Submission date:	26-Jun-2024 11:40AM (UTC+0300)
Submission ID:	2408884490

KNOWLEDGE, ATTITUDE AND FACTORS ASSOCIATED WITH PRACTICE OF IRON AND FOLIC ACID SUPPLEMENTATION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINICS IN MOROGORO MUNICIPAL COUNCIL.

Michael Kenneth Mabisi

MMed (Obstetrics and Gynaecology) Dissertation
Muhimbili University of Health and Allied Sciences
June, 2024.

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Appendix VII: Plagiarism Report



Knowledge, Attitude and Factors Associated with Practice of Iron and Folic Acid Supplementation Among Pregnant Women Attending Antenatal Care Clinics in Morogoro Municipal Council

ORIGINALITY REPORT

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