Knowledge on the Use of Iron and Folic Acid Supplements and Iron-rich diet among pregnant women in Iringa Municipality, Iringa Region

ABSTRACT

This study aimed to document knowledge on the use of IFAs and iron-rich diet among pregnant women in Iringa Municipality. The study used both primary and secondary data. Primary data were collected from 100 respondents using researcher administered questionnaires and 4 key informants by using interview method. The sample size were selected by using purposive and convenience sampling technique. Qualitative data were analysed by using content analysis technique where data were organized and summarized into different themes and ideas which were express by key respondents. The findings indicated that 87% of respondents were aware of IFAs and 85% were aware of the sources of iron-rich diet to both maternal and foetal health, 62% became aware during their three months of pregnancies and 55% got information about IFAs from their healthcare's when visit clinics. The study concluded that most of the respondents were aware of IFAs and iron-rich diet through health workers when visit clinics during three months of pregnancies which is not proper since the supplements should be taken after one month of conceiving in order to prevent a mother from being anaemic and neural tube defects to unborn babies. Therefore, the study recommends that it is essential to implement comprehensive educational campaigns that utilize various media platforms: social media, community workshops, and radio broadcasts, to reach a wider audience.

Keywords: *Pregnant, Women, Iron, Folic Acid*, *Pregnant women*

1. INTRODUCTION

Iron and Folic Acid supplementation (IFAs) and iron-rich diet are critical food ingredients/minerals for pregnant women as they play a key role in preventing anaemia, which can lead to severe health complications for both mothers and infants. Globally, anaemia in pregnancy remains a significant public health challenge, with over 40% of pregnant women affected, particularly in low and middle-income countries (World Health Organization (WHO), 2012). This condition is associated with increased risks of maternal mortality and adverse birth outcomes, including pre-term births and low birth weight (Ibid).

IFA deficiencies are among the primary contributors to anaemia, and both nutrients are essential for the healthy development of the foetus and for maintaining the mother's overall health during pregnancy (Black *et al*., 2013). The MOHCDGEC 2018 guidelines emphasize the importance of IFAs for pregnant women in Tanzania as part of antenatal care. These supplements are recommended to prevent anaemia in mothers and promote healthy fetal development. The guidelines advocate for education and counselling on IFAs during antenatal visits, encouraging consistent adherence to the supplementation regimen for at least 90 days during pregnancy. They also stress the need for health systems strengthening to improve access and quality of antenatal services, ensuring equitable distribution of these critical health interventions

WHO provides specific guidelines for IFAs, recommending that pregnant women take 30-60 mg of elemental iron and 400 µg of folic acid daily to meet the increased demands of pregnancy and reduce the risks associated with nutrient deficiencies. This recommendation aims to prevent the onset of anaemia by ensuring that women receive adequate nutrient levels during pregnancy, which is particularly vital, given the high nutrient demands associated with foetal growth. In regions with lower healthcare access, the challenge of ensuring adherence to these recommendations becomes more pronounced. Factors such as socioeconomic status, healthcare infrastructure, and accessibility of IFAs and iron-rich diet can all influence whether women receive and adhere to these supplements (Darnton-Hill *et al*., 2005).

Despite the WHO recommendation on IFA supplements, their uses are still low in some developing countries. For instance, in Eswatini, 22.5% of participants did not consume or consumed a few IFAs (Mabuza *et al.,* 2021). A study in Kenya revealed that many women did not take IFA supplements because they were not well informed about their importance (Kimiywe *et al.*, 2017). While Tanzania has made positive progress in maternal anaemia

reduction, there are still barriers to the uptake of IFAs through the focused antenatal care (ANC) (Lyoba *et al.* 2020). This has significant impacts on mothers and foetus health (Erhabor 2013). Some of the widely known consequences of anaemia include birth defects, low birth weight, increase abnormalities such as Neural Tube Defects (NTDs) and foetal deaths. Other consequences are toxaemia, inadequate maternal weight gain and delivery complications, and increased risks of maternal deaths (Popa *et al.* 2013). In addition, these deficiencies may lead to physical and cognitive impairments; thus, stalling social and economic development. Anaemia in pregnancy is widely associated with poor nutrition such as inadequate intake of iron, folic acid and other micronutrients, low income and older maternal age

The socio-economic impacts of micronutrient deficiencies, especially IFA, are also substantial. Beyond the immediate health implications, deficiencies in these nutrients can impair both cognitive and physical capacities of women or children, limiting economic productivity in communities where these deficiencies are prevalent (Darnton-Hill *et al*., 2005). For instance, children born to mothers with severe nutrient deficiencies during pregnancy may face developmental challenges, impacting their academic performance and future job prospects. In Tanzania, public health programs aimed at promoting IFAs and iron-rich diet are part of broader maternal and child health initiatives, which are designed to enhance both health outcomes and socio-economic development (MoHCDGEC *et al.,* 2018). Tanzania's health policy framework supports the distribution of IFAs and iron-rich diet through maternal health programs, with the aim of addressing and reducing the health risks associated with IFA deficiencies during pregnancy (Ibid). However, implementing these programs effectively requires resources and infrastructure, which may be limited in areas facing the greatest need.

Education and awareness are crucial issues to improving adherence to IFAs and iron-rich diet. Studies show that when pregnant women and their communities are well-informed about the benefits of IFAs and iron-rich diet, they are more likely to adopt and adhere to these recommendations (Black *et al.*, 2013). Health education programs often delivered through antenatal care services, can provide essential information about the role of IFAs and iron-rich diet in maternal and fetal health, helping women understand the importance of consistent supplementation, highlights the need to integrate IFAs education within routine antenatal care to improve adherence rates. By embedding these education programs into regular healthcare interactions, healthcare providers create a supportive an environment that encourages women to prioritize their nutritional health during pregnancy.

Despite these efforts, significant challenges remain in terms of equitable access to IFAs across Tanzania, particularly in rural and remote areas that include limited healthcare infrastructure, inconsistent supply chains, and financial constraints. Others include accessibility, education, and structural barriers to healthcare. Addressing these barriers requires collaboration across various sectors, including healthcare, government, and non-governmental organizations, to ensure that resources reach underserved populations. It is against this background the study thought to document on knowledge of IFAs and iron-rich diet among pregnant women in Iringa Municipality.

1.1 Specific objective

The specific objectives for this study were;

To explore the knowledge on the use of IFAs and iron-rich diet among pregnant women in Iringa Municipal

2. EMPERICAL LITERATURE REVIEW

2.1 Women's Knowledge on IFA and the Use of IFA Supplementation and Diet

2.1.1 Women Education on and uptake of IFAs

The role of education in improving the knowledge and uptake of IFAs among pregnant women has been widely emphasized in various studies. Effective nutrition education can significantly influence pregnant women's understanding and practices regarding IFAs, which is essential for maternal health and for preventing complications such as iron deficiency anaemia. Since 2015, Nutrition International (NI) has collaborated with national and local governments in multiple African and Asian countries under the 'Right Start' initiative, aimed at adolescent nutrition and focused on IFAs and education. This initiative, which ran from 2015 to 2020, has demonstrated the benefits of structured nutrition programs on increasing IFAs awareness and uptake. Through the integration of IFAs education into community health services, NI's work exemplifies how government-backed education efforts can reduce anaemia and improve overall maternal health.

Further supporting this, Mirmiran *et al*. (2016) conducted a study indicating that community-based education significantly enhances knowledge and attitudes toward IFAs among pregnant

women. Their research suggests that women who receive regular, targeted nutrition education are more likely to incorporate IFAs into their routines. This education not only fosters knowledge but also helps pregnant women understand the critical consequences of not adhering to IFAs recommendations, potentially lowering the risks associated with iron-deficiency anaemia and maternal morbidity. Also, health workers should emphasize pregnant women to incorporating iron-rich diet, such as meat, leafy vegetables, and beans, into their daily meals. Furthermore, the guidance provided during antenatal care increases the likelihood of IFAs adherence, underscoring the role of healthcare systems in integrating nutritional counselling into maternal health services.

Peer-led education, in particular, has proven effective in addressing gaps in knowledge, especially in areas where formal health education may be lacking. The literature underscores that a multi-faceted approach—including healthcare provider counselling, community-based education, educational resources, and peer support—greatly enhances pregnant women's knowledge and uptake of IFAs and iron-rich diet. By addressing knowledge gaps through these combined efforts, there is potential to reduce anaemia prevalence, improve maternal health, and promote healthier pregnancy outcomes.

2.1.2 Women's awareness on, and the use of IFAs

Awareness of the correct use of IFAs is crucial for pregnant women, as it plays a vital role in preventing Iron Deficiency Anaemia (IDA) and associated health risks. Studies consistently show that a lack of awareness is a major barrier to the effective use of IFAs, contributing to higher rates of morbidity and mortality among pregnant women globally. found that IDA is the leading cause of lost Disability-Adjusted Life Years (DALYs) among pregnant women. This condition severely impacts health outcomes, leading to increased morbidity and mortality in this group. Iron deficiency contributes to complications such as low birth weight, preterm delivery, and maternal mortality, underscoring the importance of raising awareness about IFAs intake (Lopez *et al.*, 2016).

Furthermore, WHO (2012) reported over 30% of women in low-and-Middle-Income Countries have anaemia which is associated with lack of awareness on the best uses of IFAs hence decreased wellbeing and increased morbidity and mortality. Awareness of IFAs use among pregnant women remains critically low, particularly in rural and low-income regions. By addressing the barriers related to knowledge, access, and socioeconomic status, health systems

and community programs can significantly improve IFAs uptake, helping to reduce the rates of IDA and improve maternal and fetal health outcomes.

2.1.3 Sources of information on, and the use of IFAs among pregnancy women

Effective use and adherence to IFAs among pregnant women are strongly influenced by the availability and quality of information sources. Access to reliable and accurate information helps ensure that pregnant women understand the importance of IFAs, which can significantly contribute to reducing iron deficiency anaemia and related health risks. Good use and adherence to IFAs and diet depend much on the source of information available. The consumption of IFAs and diet are influenced by different factors including health education since it is the main source of information on the best use of IFAs (Kamau *et al.,* 2019).

These professionals can provide personalised dietary advice, suggest meal plans that include a variety of iron-rich diet, and address any dietary concerns or restrictions (Mirmiran *et al.,* 2016). Pregnant women get a wide scope of wellbeing advancement and preventive wellbeing administrations, including information about healthy practices during pregnancy, nourishing help, and iron deficiency anaemia prevention.

A key factor in improving adherence to IFAs are routine antenatal care. According to (Tinago *et al.*,2017), antenatal visits are pivotal moments for pregnant women to receive comprehensive health education. During these visits, healthcare providers deliver information on healthy pregnancy practices, nutrition, and the prevention of iron deficiency anaemia. These routine visits provide a direct link between the women and essential resources, reinforcing the importance of regular supplementation and improving maternal health.

Additionally, several studies suggest that information provided by reputable organizations plays a role in improving adherence. For instance, WHO guidelines, local health ministries, and Non-Governmental Organizations (NGOs) often provide informative materials, such as pamphlets, posters, and online resources, which further support pregnant women in understanding the importance of IFAs. These resources may include lists of iron-rich diet, instructions on proper supplementation, and guidance on overcoming common side effects, such as nausea or constipation, which can deter some women from taking the supplements regularly (Daemers *et al.,* 2022).

Thus, it is evident that the right sources of information whether through healthcare professionals, educational materials, or community programs are critical for promoting the proper use and adherence to IFAs among pregnant women. By utilizing these sources, pregnant women gain the knowledge and practical tools to incorporate iron-rich in diet and supplements into their daily lives, leading to improved maternal and fetal health outcomes.

2.1.4 Women awareness on and, consumption on sources of Iron-rich diet

Under normal circumstances, pregnant women are advised to consume adequate amounts of diets rich in energy, protein, vitamins, minerals, dietary fibers, and water to avoid disturbances in iron metabolism and anaemia. These nutrients are critical for the health of both the mother and the developing fetus. Furthermore, micronutrient deficiencies, particularly iron and folic acid, can lead to complications, including maternal mortality, premature births, and developmental defects in the baby. Pregnancy significantly increases the body's nutritional requirements (WHO, 2012) making it essential for women to meet these needs through both dietary sources and supplements.

To prevent deficiencies, pregnant women are advised to consume a diet rich in iron and folic acid, which are crucial in preventing anemia and supporting fetal development. WHO (2012) recommends daily oral IFAs and iron-rich diet to improve pregnancy outcomes and reduce the risk of maternal anaemia and dietary problems. Iron plays a vital role in the production of haemoglobin and in transporting oxygen to both the mother and the fetus. Folic acid, on the other hand, is necessary for the synthesis and repair of DNA, as well as cell division and growth, which are crucial processes during pregnancy and infancy. It shows that awareness of iron-rich diet such as lean meats, poultry, fish, legumes, dark leafy greens, and fortified cereals is vital for pregnant women, as these foods are integral to maintaining healthy iron levels.

The role of community health workers and local healthcare systems are also highlighted by Mirmiran *et al.* (2016), who found that routine antenatal care visits serve as key opportunities to educate pregnant women about the importance of a balanced diet, particularly focusing on iron and folic acid. These healthcare professionals provide tailored advice, addressing individual dietary needs, and offer resources such as pamphlets or cooking demonstrations to encourage adherence to a healthy diet.

Thus, promoting awareness about iron-rich diets, along with the importance of dietary supplementation, are essential to prevent nutritional deficiencies during pregnancy. By

increasing access to health education and improving the availability of iron-rich diets, pregnant women can make informed decisions that contribute to better health outcomes for themselves and their babies.

2.2 Knowledge gap

Despite extensive research on the utilization of IFAs and iron-rich diet during pregnancy, significant knowledge gaps persist, particularly in specific regional contexts like Iringa Municipality. For example, a study conducted by Ransom and Elder (2016) in several developing countries highlighted that while many pregnant women recognized the importance of IFAs and iron-rich diet, actual usage rates were alarmingly low. In their survey, they found that although 85% of respondents were aware of IFAs and iron-rich diet, only 53% had taken them consistently throughout their pregnancy. This disconnects between knowledge and practice underscores the complexity of promoting effective health behaviours among pregnant women, as awareness alone does not guarantee adherence to recommended supplementation practices.

Despite the insights gained from existing studies, there remains a significant gap in research specifically targeting the knowledge on the use of IFAs and iron-rich diet among of pregnant women in Iringa Municipality. This is particularly critical given the region's unique socio-cultural context, which may influence women's health-seeking behaviours and attitudes toward supplementation. A lack of localized data means that interventions may not be appropriately tailored to address the specific challenges faced by these women. Therefore, this study aims to fill this crucial research gap by examining the knowledge related to IFAs and iron-rich diet among pregnant women in Iringa Municipality, ultimately contributing to improved maternal health outcomes.

2.3 Conceptual Framework

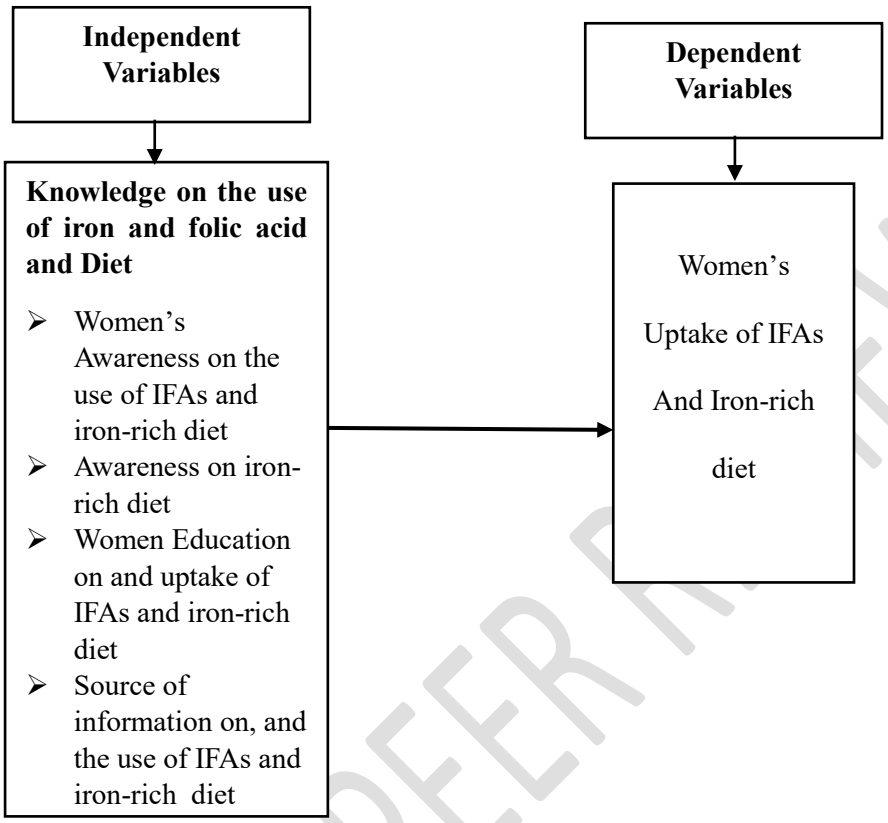

Figure 1: Conceptual Framework. Source; Researcher, 2023

3. RESEARCH METHODOLOGY

3.1 Study Area

This study was conducted in Iringa Municipality. It is one of the five districts in the Iringa Region. Others are Iringa District Council, Kilolo District Council, Mufindi District Council and Mafinga Town Council. It has a total surface area of 331.4sq.kms. The Municipality has three hospitals, four health centres and 19 dispensaries. Currently, Iringa Municipality has one division, 18 wards and 192 streets. Iringa Municipality is a town found in Highland zone with a population of 202,490 whereby male are 96,392 and female 106,098 (From the database of 2022 population census). It is situated at latitude of 7.77°S and longitude of 35.69°E. The town

stretches along a hilltop overlooking the little Ruaha River to the south, and spreads along ridges and valleys to the north.

3.2 Study Design

In this study, qualitative research approach was used. Qualitative approach concerned with valuation, opinions and actions which help to analyse, explain and build arguments to understand the content of the study.

Qualitative research provides a framework for collecting and analysing non-numeric data, including interviews and open-ended questionnaires responses, to gain insights into participants' thoughts, motivations, and behaviours. By focusing on subjective experiences, qualitative methods allow researchers to interpret and explain phenomena within specific contexts, offering a rich and nuanced understanding of the research topic. The study was able to leverage the strengths of each, ensuring a well-rounded analysis of the factors influencing the use and adherence to IFAs and iron-rich diet among pregnant women. The qualitative data provided depth and context.

3.3 Study Population and Sample Size

3.3.1 Sample size

Sample size refers to the number of all objects in the population from which the sample is drawn. Selection of sample took into consideration the factors like size of the whole population in an area, costs (funds and time) that was incurred in obtaining the sample and accessibility of sample from the selected areas. Accurate determination of the sample size is critical for the validity and reliability of the data.

For the purposes of this study, Cochran's formula was employed to determine the sample size for the unknown population (Cochran, 1963). Based on this formula, a statistically significant sample size was derived to ensure that the results are valid and can be generalized across the population of pregnant women in Iringa municipality. Moreover, the sample size was proportionally distributed across four hospitals in Iringa Municipality to ensure representation of diverse respondents, thus capturing a range of experiences with iron and folic acid supplementation and iron-rich diet. The use of Cochran's formula ensures that the sample is large enough to minimize bias while being cost-effective and feasible for the study's resources.

This careful consideration guarantees that the findings will be both reliable and reflective of the population. Optimal selection of the sample for the study is illustrated below;

The study population comprised respondents from four health centres. Optimal selection of the sample for the study is illustrated below;

Sample Size $(n) = \frac{Z^2 * (P) * (1-P)}{d^2}$

Where:

n = Sample size required

Z = Standard normal deviation value (1.96 for 95% confidence level)

P = Percentage picking choice (It assumes a normal distribution of 50% when calculating sample size = 0.5)

d = marginal error of 9.8% as value of 0.098

Substituting in the Formula

$$n = \frac{1.96^2 * (0.5) * (1 - 0.5)}{0.098^2}$$

$\frac{3.8416*0.5*0.5}{0.009604} = \frac{0.9604}{0.009604}$ = **100 respondents**

Therefore, the sample size were 100 pregnant women from the selected four health facilities in Iringa Municipality.

3.3.2 Study Population

The target population of this study were pregnant women in their last month of gestation period. This is because they are directly involved in the use of iron and folic acid supplementation and iron-rich diet. Thus, they were expected to have important information about the subject under the study. Health workers were included as key informants.

3.4 Sampling technique

Both purposive and convenience sampling techniques was used to sample the respondents from the selected health facilities.

3.4.1Convenience sampling

Convenience sampling is a non-probability sampling method where units are selected for inclusion in the sample because they are the easiest for the researcher to access. In this study, it was used to select respondents during their attendance on clinic from four health facilities

(Ngome, Mkwawa, Ipogolo and Frelimo). This allows every woman to have a chance of being involved in the study and therefore easy to generalise the findings on the whole population. The number of respondents was equal to all the four health facilities as elaborated in Table 1 below.

Table 1: Distribution of Sample Size

Municipality	Health facility	Number of Respondents
Iringa Municipality	Ngome	25 Respondents
	Mkwawa	25 Respondents
	Ipogolo	25 Respondents
	Frelimo	25 Respondents
Total		**100 Respondents**

Source: Research survey, 2023

3.4.2 Purposive sampling

Purposive sampling technique was adopted to select health service providers at antenatal clinics who were key informants. This sampling method was chosen because it allows the researcher to deliberately select participants who have specific characteristics or knowledge relevant to the research topic. In this case, key informants were selected because they possess extensive experience and expertise regarding the knowledge, attitudes, and practices related to the use of IFAs and iron-rich diet among pregnant women in Iringa Municipality.

The rationale for using purposive sampling is that health service providers, such as doctors, nurses, and midwives working in antenatal clinics, are in direct contact with pregnant women and are likely to have valuable insights into the factors influencing the use of IFAs and iron-rich diet among pregnant women. These informants can offer rich, detailed information based on their professional experience and interaction with pregnant women, making them ideal candidates for the study. Purposive sampling ensures that the data collected are highly relevant to the research question, as it targets individuals with specific knowledge and experience, rather than selecting participants randomly.

Purposive sampling allows for the inclusion of a diverse range of perspectives from healthcare providers with varying roles and experiences within the antenatal care system. This approach ensures that the study captures a broad understanding of the challenges and practices related to the use of IFAs and iron-rich diet, leading to more comprehensive and insightful findings.

3.5 Types and Sources of Data

Both primary and secondary sources of data were collected based on the objectives of the study.

3.5.1 Primary data

Primary data are data collected by the researcher himself /herself for a specific purpose and thus happen to be original in characteristics. In this study qualitative data were collected from pregnant women on the use of IFAs and iron-rich diet and, health workers from the health centres.

3.5.2 Secondary data

Apart from primary sources of data, information is collected by viewing other document sources which are potential for this study. Secondary data are those data which have been collected by someone else and already pass through statistical processes. Under this study organisation reports, hospital reports, government reports, online document reports and research reports were the richest sources for secondary data.

3.6 Data collection methods

3.6.1 Interviews

Interviews are used to get in depth information. The method were used to gather information from key informants particularly four health officers from the selected health facilities on assessing KAP on the use of IFAs and iron-rich diet among pregnant women in Iringa Municipality.

3.6.2 Questionnaires

The questionnaires contained both close-ended and open-ended questions. In the open-ended questions, respondents gave their own views while in close-ended questions they chose among the given choices of answers. Questionnaires as a method of data collection were preferred because they were easily completed by literate respondents who could understand and answer the questions on their own.

3.7 Data Analysis

Data analysis involves the collection and examination of data using statistical techniques and logical methods. Qualitative data were analysed using content analysis techniques. Data were organised and summarised into different themes based on description of views and ideas which are expressed by the respondents to reflect the research objectives.

3.8 Ethical Consideration

This research bonds to the research ethics and makes sure that participants rights and freedom are considered. The researcher cites an introductory letter from the University of Iringa so as to be well identified by the research participants. Confidentiality of the participants was adhered to. The researcher respected the rules and regulations of the study area. The researcher also considered the purpose of research, and methods which were used in the study are clearly elaborated to create awareness of what was needed.

4. RESULTS AND DISCUSSIONS

4.1 Demographic Characteristics of the Respondents

This part analyses the distribution of respondents according to their personal characteristics of respondent's age, sex, marital status and education level. The demographic variables are a primary basis for characteristics of the respondents as assessing knowledge on the use of IFAs and iron-rich diet among pregnant women.

The findings in Table 2 show that majority 36% of the respondents were aged between 35 and 44 years, 34% were between 25 and 34 years and 30% were between 15 and 24 years. The findings regarding the age distribution of respondents indicate a relatively balanced representation across three key age groups. Notably, all of the respondents were at higher risk for complications during pregnancy, emphasizing the importance of addressing their health needs, as they were in the active reproductive age The data underscores the necessity for comprehensive strategies that address the specific health concerns pertinent to each age group, particularly in relation to micronutrient supplementation and anaemia prevention.

The findings in Table 2 show that 27% respondent had primary education, 48% respondent had secondary education while 9% of the respondents had university education and 16% had diploma. The mean educational attainment can be derived from the distribution of education

levels. Since the data are categorical, a precise numerical mean cannot be calculated; however, we can analyze the educational levels by their frequency and relative percentages. These findings indicate a predominance of respondents with secondary education, the level of education among pregnant women has a significant impact on both maternal health behaviors and pregnancy outcomes. Research suggests that higher levels of education are often associated with better health literacy, improved access to healthcare, and healthier pregnancy outcomes. Specifically, pregnant women with secondary and higher education levels tend to have better knowledge of prenatal care, nutrition, and the importance of antenatal visits, which leads to better pregnancy outcomes

The findings in Table 2 show that majority 50% of respondents were self-employed, 27% of respondents were farmers, while 16% were employed in government and other organizations. And 7% of respondents had no activity. This distribution suggests that most respondents are engaged in either self-employment or farming, highlighting the predominance of informal and agricultural work within the study population. However, MoHCDGEC *et al.* (2018) highlighted various problems closely related to pregnant women who do not adhere to IFAs while continuing to work such as physical health problems, or social situations that may interrupt the continuity of work or career path. Specifically, in the traditional Tanzania culture, some women work until marriage, and afterward, they are expected to take on the responsibility of maintaining the home, evenly during pregnancy.

The findings in Table 2 show that most 53% of respondents were married, 45% of the respondents were single and 1% of respondents were divorced and widowed. This marital status distribution indicates that most respondents are either married or single, with very few falling into other categories, which may have implications for understanding family support structures in the study population. Marital status plays an important role in the health and support structures available to pregnant women. The findings have shown that 56% were married often have better access to social and economic support, which can lead to improved maternal health outcomes. Single women, on the other hand, may experience more challenges, such as lack of support or higher levels of stress, which can negatively affect pregnancy outcomes.

Table 2: Distribution of age by respondents

Age	Frequency (n=100)	Percent (%)
15-24	30	30

25-34	34	34
35-44	36	36
Total	**100**	**100**
Education level		
Primary Education	27	27
Secondary Education	48	48
Diploma education	16	16
Bachelor (University Education)	9	9
Total	**100**	**100**
Occupation		
Farmer	27	27
Self employed	50	50
Employed	16	16
None	7	7
Total	**100**	**100**
Marital status		
Married	53	53
Single	45	45
Divorced	1	1
Widow	1	1
Total	**100**	**100**

Source: Research Findings, (2023)

4.1 Awareness on the Use of IFAs

Results in Table 3 revealed that most of the respondents 87% were aware of IFAs, while 13% were not aware of IFAs. This implies that knowledge on the use of IFAs during pregnant period was taken into consideration though there was some women who are still not aware about that. Moreover, during interviews with healthcare at Ngome Health centre, one of the Clinical Officers said that,

> Healthcare providers consistently awareness to pregnant women about IFAs. Furthermore, they are advised to eat a balanced diet such as taking more fresh fruit, vegetables and drink milk so as to prevent the low level of blood in the body. These IFAs are also very good for women's health and their unborn baby (Interview held on 24/08/2023).

In addition to formal healthcare channels, informal support networks such as family members and community groups also play a role. Mirmiran *et al.* (2016) found that family influence is significant in promoting adherence to IFAs, especially where formal health education might be less accessible. By emphasizing both the dietary and supplemental sources of iron and folic acid, family support can enhance adherence and dietary practices among pregnant women.

The results of this study show that women in Iringa Municipality were aware of the use of IFAs during pregnant period, and their uptake might be influenced by other factors. The findings are in line with a study done by Yamamoto *et al.* (2018) who found that 70.4% of pregnant women knew about IFAs, only 29.4% were not aware. Further reinforcing these findings, a study conducted in rural Kenya by Kamau *et al.* (2019) demonstrated that awareness campaigns and community health education can increase IFAs awareness by up to 90%, significantly improving adherence rates. This study noted that women who received information on IFAs during antenatal visits were not only more likely to take supplements regularly but also to adopt complementary practices, such as consuming iron-rich foods. Healthcare providers are critical in this awareness-building process. The findings of this study are consistent with broader literature emphasizing the need for targeted IFAs education during and prior to pregnancy, early awareness and adherence to IFAs can contribute to healthier pregnancies, and increased IFAs use are associated with improved pregnancy outcomes. This body of research collectively underscores the importance of expanding IFAs awareness efforts to address remaining gaps, especially among those less informed or who may lack consistent access to antenatal care.

Table 3: Pregnancy women's awareness on the use of IFAs

Responses	Frequency (n=100)	Percent (%)
Aware	87	87
Not aware	13	13
Total	100	100

Source; Research Findings, 2023

4.2 Pregnancy women's awareness on sources of Iron-rich diet

Results in Table 4 revealed that most of respondents 85% are aware of iron-rich diet, while 15% were not. And 40% of respondents mentioned green vegetables and fruits as sources of iron-rich diet. On the other hand, 25% mentioned fish and sardines, 20% of the respondents mentioned meat, eggs, and liver, and minority 15% were unsure about specific sources. These findings highlight green vegetables and fruits as the most recognized sources of iron-rich diet among respondents, followed by fish, sardines, meat, eggs, and liver. The distribution suggests that respondents commonly associate plant-based sources with iron and folic acid but have a lower awareness of animal-based sources.

The data imply a reasonably high level of awareness among respondents (mean awareness = 85%) regarding diet that contain iron-rich. However, there is still a gap, as 15% of respondents lack this knowledge. This indicates the need for targeted education, especially around diverse

sources of iron-rich diet, given that many respondents primarily identified plant-based sources over animal-based sources. Improving knowledge of these dietary sources can play a critical role in promoting balanced nutrition, particularly in reducing risks related to iron-deficiency anaemia and supporting prenatal health through adequate IFAs intake.

Moreover, during interviews with healthcare at Ipogolo health centre, one of the Clinical Officer said that,

> Awareness of these diets is crucial. Iron-rich diet are essential nutrients that play a big role in preventing anaemia and birth defects. Unfortunately, not everyone knows the best sources. From what we've seen here at Ipogolo, many women recognize green vegetables as good sources, but they often overlook important sources like fish, sardines, meat, and liver. This lack of awareness can impact their health and the health of their babies. We encourage them to include a variety of these foods in their diets, but more education is definitely needed to ensure that all women understand the importance of these nutrients (Interview held on 25/08/2023).

Furthermore, during interviews with healthcare at Mkwawa Health centre, one of the Medical Officer said that,

> Many women come to us with basic knowledge about nutrition, but when it comes to specific sources of iron and folic acid, there is often a gap. For example, while they may recognize that green vegetables are good for their health, they frequently lack understanding about how to incorporate other sources, like legumes or fortified foods, into their diets. Additionally, some women may have misconceptions about what constitutes a balanced diet during pregnancy. Our role is not only to provide medical care but also to educate them on these critical nutrients. It's vital to improve their knowledge, as this can significantly influence their health and the health of their babies (Interview held on 25/08/2023).

The study by Mohannad *et al.* (2012) examines how maternal education and socioeconomic status impact pregnant women's nutritional knowledge and practices, particularly regarding iron-rich foods and iron supplementation. The findings indicate that women with higher levels of education and better socioeconomic conditions tend to have more awareness about the importance of iron in pregnancy and are more likely to follow recommended practices for iron supplementation. The study emphasizes the need for targeted educational interventions to address gaps in knowledge, particularly in lower socioeconomic groups, in order to improve maternal nutrition and reduce the incidence of iron deficiency anaemia during pregnancy.

Moreover, Fiedler *et al*. (2015) highlighted that health facilities play a vital role in disseminating nutrition information, especially in antenatal care settings. They found that

antenatal health education significantly increased awareness about the importance of iron and folic acid, with women receiving specific guidance on incorporating varied dietary sources. This supports the findings of this study, which showed that healthcare professionals not only provide supplements but also serve as key sources of nutritional knowledge, addressing gaps in understanding about diverse iron and folic acid sources.

The findings in this study echo the literature that identifies knowledge about a variety of iron and folic acid sources as crucial for maternal health. Given the variability in awareness of specific sources, as seen in Table 4, targeted educational interventions are essential. Increasing awareness about both plant and animal-based sources of iron and folic acid can help pregnant women achieve balanced nutrition, reduce risks of anaemia, and support overall prenatal health. This need for comprehensive nutrition education is reinforced by the healthcare providers' observations, as well as by prior studies, all of which underscore the importance of accessible, reliable information on nutrient-rich foods for pregnant women.

Table 4: Pregnancy women's awareness on sources of Iron-rich diet

Responses	**Frequency(n=100)**	**Percent (%)**
Aware	85	85
Not aware	15	15
Total	**100**	**100**
Sources of Iron-rich diet	**(n=100)**	
Green vegetables**,** fruits	40	40
Fish and sardines	25	25
Meat, eggs and liver	20	20
Declared that they don't know the good source of food of folic acid.	15	15
Total	**100**	**100**

Source: Research Findings, (2023)

4.3 Period of time for awareness on IFAs

The result in Table 5 reveals that most respondents 62% became aware of IFAs during pregnancy, while 31% became aware before pregnancy. And 7% became aware after pregnancy. This pattern suggests that pregnancy itself is a significant period for education and awareness around IFAs, with a notable gap in awareness prior to pregnancy.

The findings imply that for a substantial majority of women, the awareness of iron and folic acid supplements begins only when they are already pregnant, which might limit the effectiveness of preventive health measures. IFAs are crucial even before conception, particularly for reducing risks like neural tube defects and maternal anaemia. Increasing pre-pregnancy awareness could improve health outcomes for both mothers and infants. The data further highlights the importance of antenatal care services as primary sources of information about these essential supplements.

Furthermore, during interviews with healthcare at Frelimo Health centre, one of the Medical Officer said that,

> Most women only become aware of the importance of IFAs during their pregnancies. This trend is concerning because it highlights a significant gap in knowledge prior to conception. It's crucial for women to understand the importance of these nutrients before they become pregnant. By the time they arrive for their first antenatal visit, many are already at risk for deficiencies, which can have lasting impacts on both maternal and fetal health (Interview held on 24/08/2023).

Similar studies emphasize the importance of early awareness of nutritional supplements for pregnant women. Taking results from the finding, in order to reduce incidences of maternal anaemia, the WHO recommends IFAs to all pregnant women in urban and rural areas at all times of pregnancy. According to WHO guidelines, daily 30mg–60mg of iron and 0.4 mg of folic acid supplements are essential to all pregnant women and their uptake should be commenced as early as possible once pregnancy has been confirmed (WHO, 2012).

According to interview done with healthcare at Ipogoro health centre said that,

> We had several cases for pregnant women who suffer from anaemia due to poor knowledge on IFAs. Recently, deficiency in IFAs became a huge problem, nearly in all hospitals this case has been reported. Anaemia in pregnancy is widely associated with poor knowledge on nutrition such as inadequate intake of iron, folic acid and other micronutrients, low income and older maternal age. Other factors are parasitic infestations, chronic infections such as HIV infections, illiteracy, and short pregnancy intervals (Interview held on 25/08/2023).

Under normal circumstances, pregnant women are advised to take adequate amounts of foods rich in energy, protein, vitamins, minerals, dietary fibres and water. Moreover, adequate IFAs ensures the wellness of the developing foetus by reducing incidences of neural tube defects, puerperal sepsis, and congenital heart defects.

Table 5: Period of time for awareness on IFAs

Awareness	Frequency(n=100)	Percent (%)
Before pregnancy	31	31
During pregnancy	62	62
After pregnancy	7	7
Total	**100**	**100**

Source; Research Findings, (2023)

4.4 Source of information about IFAs

The result in Table 6 shows that majority of respondents 55%, reported health workers as their primary source of information about IFAs, 20% of the respondents mentioned family members while 15% mentioned mass media (such as radio, television, or newspapers) as their source. And 10%, mentioned other sources, which may include friends, community groups, or online resources. The findings suggest that health workers are the main source of reliable information on IFAs for most respondents.

This emphasis on healthcare professionals as the primary source implies that information about these supplements are often shared in clinical or antenatal settings, where pregnant women may receive guidance on prenatal health. The role of family members and mass media, while less significant, indicates that there is still some community-level and mass communication impact, though these sources may lack the consistent reliability that healthcare providers offer.

The reliance on health workers also highlights the importance of strengthening healthcare communication, as these professionals serve as trusted figures in disseminating crucial prenatal information. During Interview with healthcare at Ngome Health centre, one of the Clinical Officer said that,

> The majority of women rely heavily on health workers for information about IFAs. We are often the first point of contact for many women when they seek guidance on prenatal nutrition. We provide education during antenatal visits, and this is where they typically learn about the importance of these supplements. However, it's also important to note that family members do play a role in sharing information, albeit to a lesser extent. We sometimes see women discussing what they have learned from health workers with their family members, which can be beneficial. Mass media is another source, but its impact is not as significant, as it may not always

provide tailored or accurate information specific to an individual's health needs (Interview held on 25/08/2023).

Knowledge on IFAs is one of the most affordable and effective global intervention strategies for control of anaemia in pregnancy in order to reduce maternal-child morbidity and mortality. Lack of information concerning IFAs in pregnancy is a leading cause of global burden of disease with iron deficiency anaemia to pregnant women globally (Mulambah *et al.,* 2014). This is attributed to the fact that within hospitals, health workers provide detailed information about different medical conditions and the probability of being the most considerable source was expected. The findings of this study are in line with the study by Kamau (2019) on Maternal knowledge on IFAs and associated factors among pregnant women in rural area that found most pregnant women obtained information of IFAs from health workers 63% and highest level of knowledge was among pregnant women who obtained information from brochures and 87% of pregnant women got information from community health workers.

Table 6: Source of information about IFAs

Place	Frequency (n=100)	Percent (%)
Health workers	55	55
Family members	20	20
Mass media	15	15
Others	10	10
Total	**100**	**100**

Source; Research Findings, (2023)

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Regarding pregnant women's knowledge on IFAs and iron-rich diet usage, the study concluded that respondents were aware of IFAs, and most were informed by health workers during clinics. However, they became aware during three months of pregnancies which is not proper since the supplements should be taken after one month of conceiving in order to prevent a mother from being anemic and neural tube defects to unborn babies.

5.2 Recommendations

In this study recommends that, pregnant women are aware of IFAs and iron-rich diet. To enhance the knowledge of pregnant women regarding the use of IFAs and iron-rich diet, it is essential to implement comprehensive educational campaigns that utilize various media platforms, including social media, community workshops, and radio broadcasts, to reach a wider audience. Training healthcare providers is crucial, ensuring they can effectively communicate the importance of IFAs and iron-rich diet during routine antenatal visits, specifically highlighting its role in preventing anaemia, neural tube defects and health problems. Additionally, developing clear and visually appealing educational materials, such as brochures and infographics, will facilitate understanding and accessibility. Community workshops and peer education programs can further empower women by sharing experiences and knowledge, while mobile health initiatives can provide timely reminders and information.

ETHICAL APPROVAL

This study adhered to the ethical considerations through observing privacy, confidentiality and objectivity of the study to avoid bias. As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

The study followed and adhered to international standard or university standard, whereby respondents' written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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