Knowledge of Pregnant Women on the Use of Iron and Folic Acid Supplements and Diet in Iringa Municipality, Iringa Region

ABSTRACT

This study aimed to document on knowledge of Iron Folic Acid (IFA) supplement and diet among pregnant women in Iringa Municipality. Interviews and questionnaires were used for data collection. Qualitative data were analysed using content analysis. Results show that most of respondents were aware of IFAs and diet, and most were knowledgeable on foods rich in IFA, and of the respondents who claimed to be aware of IFAs and diet were informed by health workers during clinics visits. The findings further show that 87% of respondents who were aware of IFAs and diet were also aware of the benefits of IFAs and diet to both maternal and foetal health. However, only 76% were adhering to the recommended supplementation regimen, primarily due to complications associated with taking IFAs that include nausea, loss of appetite, and misconceptions about side effects. The study concluded that most of the respondents were aware of IFAs and diet through health workers during clinics during three month 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. Based on the study findings, it is recommended 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. BACKGROUND

Iron and Folic Acid (IFA) supplementation and 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), 2021). 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). In Tanzania, the prevalence of anaemia among pregnant women remains high, despite public health interventions aimed at mitigating this condition. This persistent prevalence highlights the need for effective approaches to IFA supplementation, especially in regions with limited healthcare resources, which can exacerbate nutrient deficiencies and health disparities (Ministry of Health, Community Development, Gender, Elderly, and Children (MoHCDGEC), 2018).

WHO provides specific guidelines for IFA supplementation, 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 (WHO, 2016). 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 IFA supplements can all influence whether women receive and adhere to these supplements (Darnton-Hill *et al*., 2005).

According to National Nutrition Survey (2018), in Tanzania adherence to iron and folic acid supplementation and diet remains a challenge, particularly in rural areas where logistical constraints can limit supplement availability and accessibility. Studies indicate that barriers such as limited infrastructure, long distances to health facilities, and inconsistent supply chains hinder access to essential prenatal supplements for many women in these areas (Bintabara *et al*., 2017; Kimiywe *et al*., 2018). Without sufficient intervention, these gaps in access contribute to a cycle of maternal and infant health risks, underscoring the need to address these

disparities through targeted health policies and programs that improve availability and education about supplements (Massawe & Urassa, 2020). Addressing these issues is crucial for enhancing maternal and infant health outcomes in underserved communities.

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 IFA supplementation are part of broader maternal and child health initiatives, which are designed to enhance both health outcomes and socio-economic development (MoHCDGEC, 2018). Tanzania's health policy framework supports the distribution of IFA supplements through maternal health programs, with the aim of addressing and reducing the health risks associated with iron and folic acid 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 IFA supplementation and diet. Studies show that when pregnant women and their communities are well-informed about the benefits of IFA supplements and 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 iron and folic acid in maternal and fetal health, helping women understand the importance of consistent supplementation. WHO (2016) highlights the need to integrate IFA supplementation 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 IFA supplements 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 (WHO, 2021). It is

against this background the study thought to document on knowledge of IFA supplement and diet among pregnant women in Iringa Municipality.

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 and Diet

The role of education in improving the knowledge and uptake of Iron and Folic Acid (IFAs) and diet among pregnant women has been widely emphasized in various studies. Effective nutrition education can significantly influence pregnant women's understanding and practices regarding IFA, which is essential for maternal health and for preventing complications such as iron deficiency anemia. 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 IFA supplementation and education (Aghamolaei *et al.,* 2018). This initiative, which ran from 2015 to 2020, has demonstrated the benefits of structured nutrition programs on increasing IFA awareness and uptake. Through the integration of IFA education into community health services, NI's work exemplifies how government-backed education efforts can reduce anemia 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 IFA among pregnant women. Their research suggests that women who receive regular, targeted nutrition education are more likely to incorporate IFA into their routines. This education not only fosters knowledge but also helps pregnant women understand the critical consequences of not adhering to IFA recommendations, potentially lowering the risks associated with iron-deficiency anemia and maternal morbidity.

Aghamolaei *et al.,* (2018) further argue that community-focused health education has the potential to bridge information gaps effectively. Their findings indicate that when IFA education is delivered at the community level through trained health volunteers and extension workers, it reaches more women and results in better knowledge retention and behavioral change. These community resources play an essential role in dispelling misconceptions and addressing cultural beliefs that may deter women from taking IFA.

Healthcare providers are also central to educating pregnant women about dietary sources of iron and folic acid. Kassa *et al.,* (2019) and Alimoradi *et al.,* (2021) emphasize the importance

of healthcare professionals in guiding pregnant women on incorporating iron-rich foods, such as meat, leafy vegetables, and beans, into their daily meals. These studies highlight that alongside IFA supplements, a diet rich in iron and complemented by vitamin C for absorption can better support pregnant women's iron needs. Furthermore, Kassa *et al,* (2019) found that guidance provided during antenatal care increases the likelihood of IFA adherence, underscoring the role of healthcare systems in integrating nutritional counselling into maternal health services.

The influence of educational resources also plays a notable role in improving IFA awareness. According to Alimoradi *et al*. (2021) and Kassa *et al.* (2019), materials such as books, pamphlets, and websites endorsed by credible health organizations are valuable tools. These resources not only detail iron-rich foods but also provide recipes and meal-planning strategies tailored to pregnant women's nutritional needs. When easily accessible and endorsed by health authorities, these materials enhance self-efficacy among pregnant women in managing their nutrition independently.

Finally, community-based programs and peer support groups contribute significantly to disseminating information about IFA and iron-rich foods. According to Mirmiran *et al.* (2016) and Aghamolaei *et al.* (2018), such programs offer cooking demonstrations, group workshops, and discussions that focus on the nutritional needs during pregnancy. These sessions allow women to learn hands-on strategies for incorporating IFA into their diet and provide social support, which can encourage positive nutritional practices.

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 IFA supplements and diet. By addressing knowledge gaps through these combined efforts, there is potential to reduce anemia prevalence, improve maternal health, and promote healthier pregnancy outcomes.

2.1.2 Women's Awareness on, and the use of IFAs and Diet

Awareness of the correct use of IFAs and diet is crucial for pregnant women, as it plays a vital role in preventing iron deficiency anemia (IDA) and associated health risks. Studies consistently show that a lack of awareness is a major barrier to the effective use of IFAs and diet, contributing to higher rates of morbidity and mortality among pregnant women globally.

Kassa *et al.*, (2019) and Alimoradi *et al.*, (2021) 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 and diet intake.

World Health Organization (WHO) (2017) has documented that over 30% of women in low- and middle-income countries suffer from anemia, largely due to inadequate knowledge of the best intake for IFAs and diet. This lack of awareness, coupled with socio-economic challenges, contributes significantly to the low uptake of IFAs and diet, thereby exacerbating health issues related to anaemia. Anaemia, as the WHO report indicates, is preventable through regular IFAs and diet, but without proper knowledge, many women do not understand its importance, leading to a lower quality of life and higher risk of health complications during pregnancy.

According to Balasubramanian *et al.*, (2016), educating pregnant women on the health benefits of IFAs and diet can markedly reduce the incidence of IDA, preventing many cases of anemia-related mortality and morbidity. Their research highlights that lack of awareness is one of the primary reasons women do not take IFA supplements consistently. In particular, many pregnant women remain unaware of the critical role IFA plays in ensuring a healthy pregnancy, and this lack of knowledge is compounded by limited information on the risks of poor adherence. Therefore, promoting awareness and understanding of IFAs and diet benefits are crucial in reducing preventable health risks among pregnant women.

A study by Titaley & Dibley (2015) further emphasizes that women in rural areas face additional barriers to IFA use, largely due to restricted access to health education. Rural residents often lack access to reliable health information and face logistical challenges, such as high costs, limited availability of supplements, and long travel distances to healthcare facilities. These factors make it difficult for women to access and consistently use IFAs and diet, with rural areas exhibiting some of the lowest rates of IFA adherence. Additionally, socioeconomic factors, such as lower income levels and education, hinder the uptake of IFAs and diet among these populations

Various literatures reveal that awareness on the best uses of IFAs and diet are the major key to pregnant women. For example, Kassa *et al*. (2019) and Alimoradi *et al*. (2021) argued that Iron

deficiency anaemia is the number one cause of lost disability-adjusted life years in pregnant women and is estimated as the largest cause of morbidity and mortality for this group globally. Furthermore, WHO (2017) 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 and diet hence decreased wellbeing and increased morbidity and mortality. Awareness of IFAs and diet 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 and diet, 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 and diet among pregnancy women

Effective use and adherence to IFAs and diet 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 and diet, which can significantly contribute to reducing iron deficiency anemia 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 and diet (Kamau *et al.,* 2018).

On the other hand, nutritionists and dietitians are also valuable sources of information for pregnant women seeking guidance on iron-rich foods (Aghamolaei *et al.,* 2018). These professionals can provide personalised dietary advice, suggest meal plans that include a variety of iron-rich foods, and address any dietary concerns or restrictions (Mirmiran *et al.,* 2016). In this regard, Ghaffar and Pongpanich, 2012 routine antenatal is a key passage point for pregnant women. 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.

Furthermore, Gebreamlak *et al,* (2017) argued that good compliance and adherence with the use of IFAs and diet among women, used the supplements for four days per week with the higher level of compliance was present in women who received health education, had attended secondary school (Gebreamlak *et al.,* 2017). Therefore, it is obvious and clears that, utilising the best source of information, pregnant women can gain knowledge and practical strategies to

incorporate a variety of iron-rich foods into their diets, promoting optimal iron intake for their healthy pregnancy.

A key factor in improving adherence to IFAs and diet are routine antenatal care. According to Ghaffar and Pongpanich (2012), 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 anemia. These routine visits provide a direct link between the women and essential resources, reinforcing the importance of regular supplementation and improving maternal health.

Moreover, Gebreamlak *et al*. (2017) found that compliance with IFAs and diet was significantly higher among women who attended secondary school and received consistent health education. Women who followed the recommendations of health education programs, particularly those involving regular supplementation and dietary adjustments, demonstrated improved adherence. These findings highlight the importance of both education and access to proper health information in ensuring the effective use of IFAs and diet among pregnant women.

Further supporting this, Motevalli *et al.* (2020) found that health communication strategies that include community-based educational programs can effectively improve knowledge about IFAs and diet. These programs can be enhanced by using local resources, such as community health workers, peer groups, and social media platforms, which are known to increase the reach of health education. The inclusion of culturally appropriate materials and local languages helps ensure that the information is understandable and relatable to diverse groups of pregnant women, including those in rural areas where access to healthcare may be limited.

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 and diet (Alimoradi *et al.,* 2021). These resources may include lists of iron-rich foods, 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.

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 and diet 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 of Diets rich in IFA

Under normal circumstances, pregnant women are advised to consume adequate amounts of foods rich in energy, protein, vitamins, minerals, dietary fibers, and water to avoid disturbances in iron metabolism and anemia (WHO, 2003). 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 (O'Brien *et al.,* 2005). Pregnancy significantly increases the body's nutritional requirements (Marangoni *et al*., 2016), 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 diet to improve pregnancy outcomes and reduce the risk of maternal anemia and dietary problems. Iron plays a vital role in the production of hemoglobin 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 (Hisam *et al.,* 2014).

According to Othman *et al*. (2016), dietary education is essential for pregnant women to ensure that they can consume balanced amounts of iron from both food sources and supplements. Othman highlights that awareness of iron-rich foods 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. Furthermore, studies have shown that despite the availability of dietary supplements, women's adherence to consuming iron-rich foods remains low.

As Aghamolaei *et al*. (2018) pointed out, dietary practices in pregnancy are often influenced by cultural beliefs, socio-economic factors, and access to resources. In many low- and middle-income countries, rural women, in particular, face barriers such as limited access to diverse

foods, low income, and inadequate knowledge about nutrition, which affect their ability to consume adequate amounts of iron and folic acid through diet alone (Titaley and Dibley, 2015).

Research by Gebreamlak *et al*. (2017) found that women who received health education about the importance of iron-rich foods were more likely to incorporate these into their diets, especially when they were provided with practical strategies, such as recipes and cooking tips for iron-rich meals. Women with access to nutrition education, including community-based programs or health workers, demonstrated improved knowledge about iron and folic acid consumption. This suggests that tailored nutrition education programs are critical in raising awareness and ensuring better dietary practices during pregnancy.

Additionally, folic acid deficiency during pregnancy can lead to serious birth defects, including neural tube defects. A study by Azizi *et al.* (2019) found that women who consumed folate-rich foods such as citrus fruits, fortified grains, and dark leafy vegetables, alongside supplements, experienced better pregnancy outcomes, including a lower risk of congenital disabilities. It is crucial that pregnant women are not only aware of the importance of folic acid but also know which foods are rich in this nutrient.

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 and folic acid-rich foods, 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 and folic acid-rich foods, pregnant women can make informed decisions that contribute to better health outcomes for themselves and their babies.

2.3 Conceptual Framework

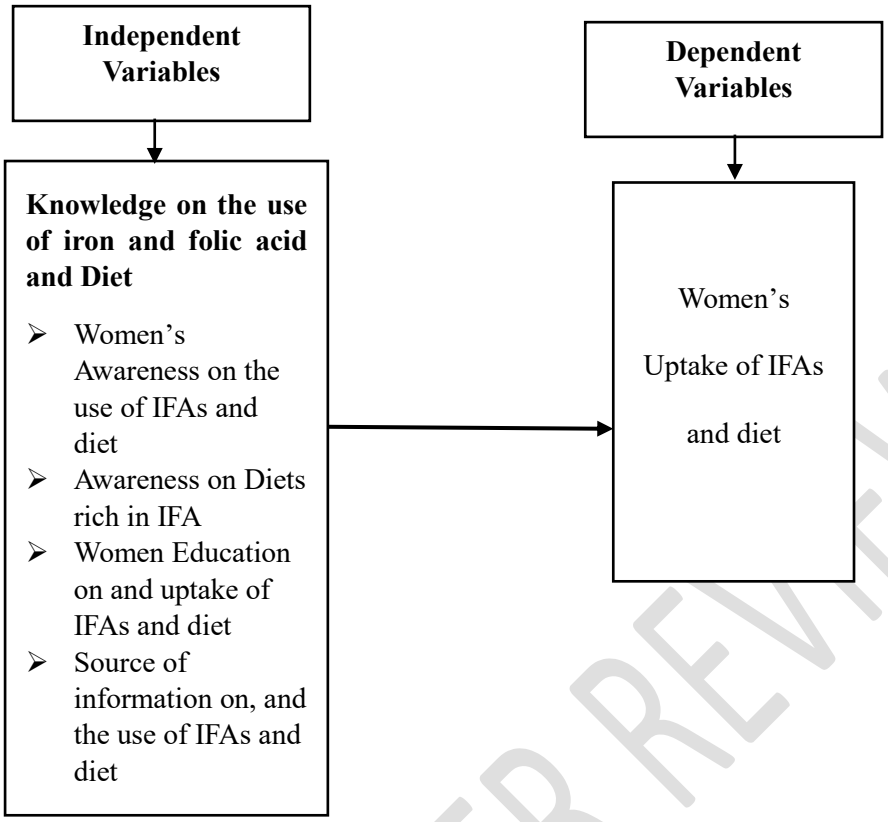

Figure 1: Conceptual Framework. Source; Researcher, 2023

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 (NBS, 2022).

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 (Sukamolson, 2016).

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 (Creswell, 2013). 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 diet among pregnant women. The qualitative data provided depth and context.

3.3 Study Population and Sample Size

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 was 100 pregnant women from the selected four health facilities in Iringa Municipality. The choice of this sample size was justifiable as it complies with Kothari and Gaurav (2014) and that a minimum sample of 30 cases is enough for statistical analysis in a study. They also argue that, what is required is not a large number of sample but rather a quality which was obtained from the sample. With regard to that accuracy, reliable and sufficient information was adhered to.

3.4 Sampling Technique

Both purposive and convenience sampling techniques was used to sample the respondents from the selected Health centres.

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 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 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 diet, leading to more comprehensive and insightful findings.

3.5 Data collection and Analysis

Interview and questionnaires were used as tools for data collection. Interview was used to gather information from key informants particularly health officers on the knowledge of pregnant women on the use of IFAs and diet in Iringa Municipality. While questionnaires had 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. Moreover, data analysis was done using statistical techniques (Calzon, 2021). Qualitative data were analysed using content analysis techniques where responses were summarized and grouped into themes based on the study variables.

4. RESULTS AND DISCUSSIONS

4.1 Awareness on the Use of IFAs and Diet During Pregnancy

Results in Table 2 revealed that most of the respondents (87%) were aware of IFAs and diet while very few (13%) were not aware of IFAs and diet. This implies that knowledge on the use of IFAs and diet 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,

> We always create 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 IFA supplements are also very good for women's health and their unborn baby (Interview held on 24/08/2023).

This statement aligns with evidence from Aghamolaei *et al.* (2018), who observed that antenatal clinics serve as essential contact points where pregnant women receive both

supplements and dietary guidance, contributing to improved maternal and fetal health. 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 and diet, 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 and diet 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 and diet, only 29.4% were not aware. Further reinforcing these findings, a study conducted in rural Kenya by Kamau *et al.* (2018) demonstrated that awareness campaigns and community health education can increase IFAs and diet awareness by up to 90%, significantly improving adherence rates. This study noted that women who received information on IFAs and diet 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, as shown in a study by Gebreamlak *et al.* (2017), which found that women who received health education during antenatal care visits had markedly higher levels of IFAs and diet knowledge and adherence. According to Gebreamlak *et al*. (2017) health education provided by skilled personnel fosters trust and understanding, leading women to be more consistent with IFAs and diet intake.

The findings of this study are consistent with broader literature emphasizing the need for targeted IFAs and diet education during and prior to pregnancy. As emphasized by Galloway *et al.* (2012), early awareness and adherence to IFAs and diet can contribute to healthier pregnancies, and increased IFAs and diet use are associated with improved pregnancy outcomes. This body of research collectively underscores the importance of expanding IFAs and diet awareness efforts to address remaining gaps, especially among those less informed or who may lack consistent access to antenatal care.

Table 2: Awareness of and, Use of IFAs and Diet

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

Source; Research Findings, 2023

4.2 Awareness on sources of Diets rich in IFA

Results in Table 3 revealed that most of respondents (85%) are aware of diet rich in IFA, while (15%) were not. The fact that (40%) of respondents mentioned green vegetables and fruits as sources of diet. On the other hand, (25%) mentioned fish and sardines, while (20%) 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 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 foods that contain iron and folic acid. 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 and folic acid, 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 anemia and supporting prenatal health through adequate folic acid intake.

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

> Awareness of these diets is crucial. Iron and folic acid are essential nutrients that play a big role in preventing anemia 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).

According to Jufar *et al*. (2014), awareness of dietary sources of iron and folic acid is essential for reducing the prevalence of iron deficiency, particularly among women of reproductive age in developing countries. This study highlighted that iron deficiency anemia is a common issue in maternal health, often exacerbated by limited awareness of nutrient-rich food sources. The findings in Table 3 support this need, showing that while 85% of respondents are aware of some sources of iron and folic acid, a significant portion (15%) remain unaware. Of those aware, 40% identified green vegetables and fruits, 25% indicated fish and sardines, and 20% recognized meat, eggs, and liver as sources.

These results imply that while general awareness exists, there is variability in knowledge about specific food sources, suggesting a need for more comprehensive nutritional education. Educating women on iron-rich and folic-acid-rich foods, along with encouraging regular supplementation, is essential to improve maternal and fetal health outcomes, prevent anemia, and address deficiencies, as noted in similar findings by Jufar *et al.* (2014).

A study by Wirth *et al.* (2017) found that education about the nutritional value of both plant and animal sources of iron and folic acid significantly improved maternal adherence to recommended dietary practices. The research showed that women who were informed about the benefits of a varied diet, including iron-rich foods, were more likely to incorporate diverse sources into their meals, reducing anemia risk. This aligns with the clinical insights provided by healthcare workers at Ipogolo and Mkwawa Health Centers in the present study, who noted that women often recognize vegetables as iron sources but lack awareness about other nutrient-dense options.

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 3, 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 anemia, 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 3: Awareness on sources of Diets rich in IFA

Responses	**Frequency(n=100)**	**Percent (%)**
Aware	85	85
Not aware	15	15
Total	**100**	**100**
Sources of foods rich in iron and folic acid	**(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 Women Education on Period of time for awareness on uptake of IFAs and diet

The result in Table 4 reveals that most respondents (62%) became aware of IFAs and diet during pregnancy, while (31%) became aware before pregnancy. And only (7%) became aware after pregnancy. This pattern suggests that pregnancy itself is a significant period for education and awareness around iron and folic acid, 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 and diet are crucial even before conception, particularly for reducing risks like neural tube defects and maternal anemia. 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 and diet 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. For instance, Kram *et al.* (2019) found that in low-resource settings, most women become aware of iron and folic acid supplements during antenatal visits, with less than 30% aware before pregnancy. The authors suggest that outreach initiatives and educational programs targeted at women of childbearing age can improve pre-pregnancy knowledge, ultimately leading to better pregnancy outcomes.

The findings of this study are in line with the study by Kamau (2019) on Maternal knowledge on iron and folic acid supplementation and associated factors among pregnant women in rural areas that found most pregnant women obtained information of IFAs and diet 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.

Taking results from the finding, in order to reduce incidences of maternal anaemia, the WHO recommends IFAs and diet 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, 2018).

However, strict adherence to IFAs and diet are required for better outcomes, evidence suggests that IFA uptake and diet during pregnancy reduces the chances of iron-deficiency anaemia to a great extent (Kiwanuka *et al.,* 2017). Moreover, adequate IFAs and diet ensures the wellness of the developing foetus by reducing incidences of neural tube defects, puerperal sepsis, and congenital heart defects. 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 and diet. Recently, deficiency in IFA 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 and diet ensures the wellness of the developing foetus by reducing incidences of neural tube defects, puerperal sepsis, and congenital heart defects.

Table 4: Period of time for awareness on uptake of IFAs and diet

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 and Diet

The result in Table 5 shows that majority of respondents (55%), reported health workers as their primary source of information about IFAs and diet, highlighting the significant role healthcare professionals play in educating about nutritional supplements. Family members were mentioned (20%) of respondents as a source of information, while (15%) mentioned mass media (such as radio, television, or newspapers) as their source. And only 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 iron and folic acid supplements and diet for most respondents.

This emphasis on healthcare professionals as the primary source implies that information about these supplements and diet 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 iron and folic acid. 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).

The findings are in line with those found by Gebre and Etana, (2015) who assessed factors associated with adherence to iron-folic acid supplementation among urban and rural pregnant women in the North Western zone of Tigray, Ethiopia. They found that iron deficiency is the leading nutrient deficiency in the world affecting the lives of more than 2 billion people due to lack of right information and access to it, accounting to over 30% of the world's population.

Knowledge on iron and folic acid supplementation and diet are 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 and diet 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 study results were in line with a study by Swapna (2017), where most of the mothers (64%) had information about anaemia from health workers.

Indeed, the detailed information about IFAs and diet, and related tablets are currently regularly provided through all public health facilities during antenatal care, free of charge for daily use throughout pregnancy. Additionally, Aghamolaei *et al.* (2019) observed that health workers are central to promoting the consumption of IFAs and diet. They found that women who received counselling from healthcare providers had better adherence to supplementation guidelines. The health workers' role in promoting the use of IFAs and diet was seen as critical in overcoming barriers related to access and knowledge, especially in rural or underserved areas.

Table 5: Source of information about IFAs and diet

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 iron and folic acid supplements usage, the study concluded that respondents were aware of folic acid, and most were informed by health workers during clinics. However, they became aware during three month of pregnancy 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 diet. To enhance the knowledge of pregnant women regarding the use of IFAs and 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 diet during routine antenatal visits, specifically highlighting its role in preventing anaemia, neural tube defects and health problems.

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).

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