KNOWLEDGE, ATTITUDES AND PRACTICES ON IRON-FOLATE SUPPLEMENTS USE AMONG PREGNANT AND LACTATING WOMEN LIVING WITH HUMAN-IMMUNODEFICIENCY VIRUS IN DAR- ES-SALAAM

CECILIA N. MSHANGA

A THESIS SUBMITTED IN FULFILLMENT OF REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN HUMAN NUTRITION OF THE OPEN UNIVERSITY OF TANZANIA

2020

CERTIFICATION

The undersigned certifies that she has read and here by recommends for acceptance by the Open University of Tanzania a thesis entitled: **Knowledge, Attitudes and Practices on Iron-Folate Supplements use Among Pregnant and Lactating Women Living with Human-Immunodeficiency Virus in Dar- Es-Salaam,** in fulfillment of the requirements for the Degree of Master of Science in Human Nutrition of the Open University of Tanzania.

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Dr. Elina J. Maseta

(Supervisor)

…….

Date

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DECLARATION

I, **Cecilia N Mshanga**, do hereby declare that, the work presented in this dissertation is my own original. It has never been presented to any other University or Institution. Where other people's works have been used, references have been provided. It is in this regard that I declare this work as originally mine. It is hereby presented in partial fulfillment of the requirement for the Degree of Master of Science in Human Nutrition.

…….

Signature

……..……

Date

DEDICATION

This dissertation is lovingly dedicated to my Mother and the late Father for their support and guidance.

ACKNOWLEDGEMENT

This work has been made possible through the efforts and support of several individuals. However, before all, I would like to thanks the Almighty God for giving me health and strength to accomplish this work. I would like to express my deepest gratitude to my supervisor Dr. Elina J Maseta for her excellent guidance, caring, patience, encouragement, and understanding in developing study design, analysis and successful completion of this study.

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ABSTRACT

Iron and folic acid deficiency during pregnancy are risk factors for anaemia, preterm delivery and low birth weight, and may contribute to poor neonatal health and increased maternal mortality. This study aimed at assessing knowledge, attitudes and practices regarding the use of iron and folic acid supplements among pregnant and lactating women taking ant-retroviral drugs in Dar es Salaam. A cross sectional survey involved 294 pregnant and lactating women in Temeke, Mwananyamala and Amana referral Hospitals in Dar es Salaam between May and July 2018. Data was analyzed using IBM SPSS. The findings revealed that, most of the study subjects were aware of both the benefits of iron and folic acid supplements and the consequences of iron and folic acid in case of any deficiency. Attitude towards use of iron and folic acid supplements among study subjects was also good. Closer to two thirds (60.2%) of the subjects perceived that one is likely to have some micronutrient deficiency when not taking iron and folic acid supplements. Practice on the use of iron and folic acid supplements among study subjects was not satisfactory as only a small portion of the study subjects took these supplementation during pregnant and lactation. The findings revealed that the level of knowledge regarding iron and folic acid supplements use among pregnant and lactating women living with HIV is good. Attitudes towards use of iron and supplements were also good. But the use of iron and folic acid supplements in the study group is low. Community awareness campaigns on the use of iron and folic acid supplements while taking Ant-retroviral drugs is recommended.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Clinic
ART	Anti-retroviral Therapy
ARV	Antiretroviral Drugs
CTC	Care and Treatment Centre
CSW	Commercial Sex Worker
DED	District Executive Director
DMO	District Medical Officer
FGD	Focus Group Discussion
Hb	Hemoglobin
HIV	Human Immunodeficiency Virus
ID	Identity card
IDD	Iodine Deficiency Disorder
IFA	Iron, Folic Acid
IFAS	Iron and Folic acid Supplement
KAP	Knowledge, Attitude and Practice
KI	Key Informant
MTCT	Mother to Child Transmission
MSD	Medical Stores Department
MSM	Men Who Sex With Men
NBS	National Bureau of Statistics
NTD	Neural Tube Defect
OIs	Opportunistic Infections

OUT	Open University of Tanzania
PWID	People Who Inject Drugs
PLHIV	People Living With HIV
PMTCT	Prevention of Mother to Child Transmission
SDGs	Sustainable Development Goals
TACAIDS	Tanzania commission for AIDS
TFNC	Tanzania Food and Nutrition Centre
THMIS	Tanzania HIV and Malaria Indicator Survey
UNICEF	United Nations Children's Fund
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Deficiency of iron and folic acid in pregnancy and lactating women is a worldwide public health problem affecting both developing and developed countries with significant impact on the health of mothers and foetus (Erharbor, 2013). Anaemia is an indicator of nutritional deficiencies that significantly contribute to birth defects, preterm labour and low birth weight. Anaemia caused by deficiency of iron and folic acid is a leading cause of maternal morbidity and mortality, prenatal and perinatal infant loss. In addition, these deficiencies may lead to physical and cognitive losses thus stall social and economic development in developing countries.

In sub-Saharan African countries the magnitude of anaemia in pregnancy is quite alarming, and its prevalence is widely associated with low income, older maternal age, poor nutrition, iron, folic acid and other micronutrients deficiencies. Other factors are parasitic infestations, chronic infections, HIV, illiteracy, and short pregnancy intervals (Okeke, 2011). According to the WHO classification, any prevalence level of anaemia that exceeds 40% in any population group is an indicator of a severe public health problem, for which Tanzania qualifies.

Pregnant women are advised to obtain needed nutrients from a balanced diet (Fawz *et al* 2000). Being HIV positive and pregnant or lactating cause additional demand on the body's nutritional needs of the infected individuals as compared to non-infected persons. In order to prevent micronutrients deficiencies and maintain good nutritional

status, women living with HIV should use iron and folic acid supplements. A prenatal iron and folic acid supplementation is likely to be beneficial and an easy, cost effective means to improve mother and neonatal health. Iron and folic acid supplements also prevent anaemia and maternal mortality and reduce abnormalities such as Neural Tube Defects (NTDs) and foetal deaths.

Apart from iron and folic acid supplements, HIV-positive pregnant and lactating women should consume adequate amount of foods and fluids rich in energy, nutrients, protein, vitamins, minerals, dietary fiber and water. Studies associated with good nutrition from different countries have shown that dietary and micronutrients supplements are the key component of care and support for people living with HIV especially pregnant and lactating women (WHO, 2003).

Acquired Immune Deficiency Syndrome (AIDS) is a disease caused by retrovirus the Human Immunodeficiency Virus (HIV). This disease affects and impairs the natural defense system of the body against diseases and infections. This epidemic disease is a worldwide disaster affecting society economically, politically, socially and culturally (NBS, 2011). The government of Tanzania has made substantial progress in HIV/AIDS prevention, care, treatment and impact mitigation. Progress has been made in resource mobilization, communication, advocacy and community participation. Prevalence of HIV/AIDS in Dar es Salaam, the major economic city and port of Tanzania is around 9% compared to a national prevalence that has stabilized at around 6% (UNAIDS , 2015). Urban HIV prevalence is almost twice as high as rural HIV prevalence across the country, though the epidemic is expected to rise in poorer rural

areas (UNAIDS, 2015). A study by THMIS, (2011) shows that, the prevalence of HIV among women who attend Ante-natal clinics in Dar es Salaam was 6.9%.

1.2 Problem Statement and Justification

Micronutrients deficiency especially Iron and folic acid in pregnancy and lactating, is a worldwide public health problem affecting both developing and developed countries with significant impact on the health of mothers and foetus (Erharbor, 2013). Anaemia is an indicator of nutritional deficiencies that significantly contribute to birth defects, preterm labour and low birth weight. Anaemia caused by deficiency of iron and folic acid is a leading cause of maternal morbidity and mortality, prenatal and perinatal infant loss. In addition, these deficiencies may lead to physical and cognitive losses thus stall social and economic development in developing countries.

In sub-Saharan countries the magnitude of anaemia in pregnancy is quite alarming, and its prevalence is widely associated with low income, older maternal age, poor nutrition, iron, folic acid and other micronutrients deficiencies. Other factors are parasitic infestations, chronic infections, HIV, illiteracy, and short pregnancy intervals (Okeke, 2011).

According to the WHO classification, any prevalence level of anaemia that exceeds 40% in any population group is an indicator of a severe public health problem, for which Tanzania qualifies Various studies have been conducted in Tanzania on micronutrient supplements and anaemia. A study by Ogundipe *et al*, (2012) in northern Tanzania suggests low use of iron and folic acid supplementation for pregnant women despite high number of antenatal care visits per participants. Another

study by Urassa, (2002) revealed a very high prevalence of anaemia in pregnant women in Rufiji District. Hinderaker *et al* (2001) found that anaemia in pregnancy was common in the area of high altitude in rural Tanzania. A study by Margwe (2015) confirms that preventing anaemia is a challenge as pregnant women had low knowledge and negative attitude towards control measures of anaemia in Mbulu district. High parity was found to be a risk factor for anaemia.

Moodley *et al* (2014) suggested that, the increased prevalence of HIV may be explained by the fact that, this infection is associated with low serum folate, vitamin B12, and ferritin levels in pregnancy. Although there is much literature on anaemia in Tanzania, limited data is available, specifically for HIV pregnant and lactating women living in Dar es Salaam. Therefore, the current study will fill this gap by determining Knowledge, Attitudes and Practice regarding use of IFA supplements to among HIV pregnant and lactating women living in Dar es Salaam.

1.3 Objectives of the Study

1.3.1 General Objective

To determine Knowledge, Attitudes and Practice regarding use of IFA supplements among pregnant and lactating women living with HIV in Dar es Salaam.

1.3.2 Specific Objectives

(i) To assess the level of knowledge on iron and folic acid supplements use among pregnant and lactating women living with HIV in Dar es Salaam.

(ii) To identify the attitudes towards use of iron and folic acid supplements among pregnant and lactating women living with HIV in Dar es Salaam.

(iii) To describe practices towards use of iron and folic acid supplements among pregnant and lactating women living with HIV in Dar es Salaam.

(iv) To determine barriers to iron and folic acid supplements use among pregnant and lactating women living with HIV in Dar es Salaam.

1.4 Research Questions

(i) What is the level of knowledge on iron and folic acid supplements among HIV-infected pregnant and lactating women attending PMTCT clinics in Dar es Salaam?

(ii) What are the attitudes towards use of iron and folic acid supplements among HIV-infected pregnant and lactating women attending PMTCT clinics in Dar es Salaam?

(iii) What are the practices towards use of iron and folic acid supplements among HIV-infected pregnant and lactating women attending PMTCT clinics in Dar es Salaam?

(iv) What are the barriers to iron and folic acid supplements use among HIV-infected pregnant and lactating women attending PMTCT clinics in Dar es Salaam

1.5 Significance of the Study

The findings of the study will provide evidence-based information related to knowledge, attitudes and practices of pregnant and lactating women living with HIV towards the use of IFAs in Dar es Salaam City in general. Findings will as well assist

government, through Ministry of Health Community Development Gender Elderly and Children, policy makers and other stakeholders in planning policies and programs that can mitigate iron and folic acid deficiency to HIV pregnant and lactating women.

CHAPTER TWO

LITERATURE REVIEW

2.1 Knowledge of Women on the Importance of Iron and Folic Acid Supplementation

Women of child-bearing age especially those living with HIV need iron and folic acid supplementations before pregnancy and in the first weeks of pregnancy to help prevent anaemia and NTDs. The need for folic acid supplementation is to reduce the occurrence of NTDs (Lumley *et al*, 2007). Data from previous studies have shown that pregnant women have low knowledge and understanding about the importance of folic acid for the foetal development and their practices often indicate this knowledge defect (Zeng *et al*, 2011). In United States, women of child-bearing age who were from poor socio-economic backgrounds knew little about the importance of the recommended daily intake of folic acid and only 25% of the total number of women surveyed reported consuming folic acid supplements daily (Sharp *et al*, 2011).

2.2 Micronutrient Needs of HIV Pregnant and Lactating Women

The HIV infected pregnant women need extra nutrients to meet their body requirements and to support foetal growth and future lactation. They also experience increased energy requirement due to HIV infection. Worse still, because of HIV infection they are likely to have deficiency of iron and folic acid. Pregnancy itself creates high demand of iron. These women may have opportunistic infections or other conditions that may increase food demand or interfere with food intake, digestion and absorption (TFNC, 2009). A breast feeding HIV positive woman needs to meet the increased nutrient demand for lactation as well as due to HIV infection. Requirement

for many nutrients and vitamins like vitamin A, B, C and E, and minerals like iodine, selenium, iron, folic acid and zinc are needed in higher amount during lactation than during pregnancy (Institute of medicine, 2000). Maternal micronutrients deficiencies especially iron and folic acid during lactation can cause a major reduction in the concentration of some of these nutrients in breast milk, with subsequent infant depletion (Allen *et al*, 2003).

Based on categorising of the relation between maternal status or intake of each nutrient and its effect on the nutrient concentration in the breast milk, 'priority' nutrient for lactating women include thiamine, riboflavin, vitamin B6 and B12, vitamin A, and iodine (Popa *et al*, 2013). This is based on the fact that, low maternal intake of IFA supplements, reduce the amount of these nutrients in breast milk, and maternal supplementation can solve this problem.

2.3 Benefits of Iron and Folic Acid Supplementation during Pregnancy and Lactation

Micronutrients have a wide range of functions. More than one micronutrient may support a single function, e.g. antioxidant defense and a single micronutrient may act in more than one role, for example, iron is involved in both oxygen transport and immune function (Fawz *et al*, 2007). Evidence has shown that, the use of IFAS is associated with reduced risk of maternal iron deficiency anaemia and Neural Tube Defects (NTDs) in infants. Daily oral folic acid with 30 to 60 milligram and iron 400 microgram (0.4 mg) is recommended for pregnant women to prevent maternal anaemia and NTDs (WHO, 2013). Interventions providing weekly iron and folic acid supplements to women of reproductive age in Vietnam, the Philippines, and Cambodia

were successful in improving anaemia by using social marketing, community mobilization, and a government-industry partnership to promote the approach of iron supplements (Berger *et al* 2005).

A study in Sweden revealed that, women who were not taking iron supplements had virtually no iron remaining in their bone marrow by late pregnancy, compared with 35% of those who consumed 100 mg of iron daily from 16 week of gestation (Milman *et al*, 2005). In Tanzania, iron and folic acid supplements are provided during pregnancy through the health system; however, women often delay initiation of antenatal care and use of these supplements can be low (NBS, 2011). A study conducted by Ogundipe (2012), shows that iron and folic acid were low among childbearing women in Northern Tanzania.

2.4 The Effects of HIV on Nutrition and Human Health

Human immunodeficiency virus (HIV) is a virus that attacks cells that help the body fight infection, making a person more vulnerable to other infections and diseases. It is spread by contact with certain bodily fluids of a person with HIV, most commonly during unprotected sex (sex without a condom or HIV medicine to prevent or treat HIV), or through sharing injection drug equipment or mother-to-child transmissions.

If HIV left untreated, can lead to AIDS disease. The HIV seeks and destroys immune system through CD4 cells, a type of T lymphocytes (T cells), which are critical to immune system. They are responsible for taking off diseases and most infections including viral infections (WHO, 2015). This virus targets the type of cells that will normally fight off an invader like HIV. As the virus replicates, it damages the CD4

cells and produces more virus to infect more CD4 cells. Despite developments in medical treatment, nutrition remains a key component in managing this condition. The challenges the people living with HIV/AIDS face can be the result of the viral infection itself or from the effects of ART. Some of the side effects from ART that may affect how the body absorbs and utilizes nutrients include fatigue, nausea, and poor appetite (WHO, 2003).

As well, the nutritional needs of people with HIV/AIDS are greater due to their immune system fighting off opportunistic infections that do not normally cause disease in people with healthy immune systems. Medication along with proper nutrition is a major component of maintaining good health and quality of life for people living with HIV/AIDS. The HIV epidemic does not affect the individual health only but affects households, communities and economic growth of countries. Many of the countries facing the burden of HIV also suffer from other infectious diseases, food insecurity and other serious problems and increase of orphans (WHO, 2015).

The role of HIV infection on nutrition was identified early in the epidemic (Trujillo *et al*, 1992). Wasting is one of the most visible signs of malnutrition as person progress from HIV to AIDS. This virus found to affect nutritional status by increasing energy requirements, reducing food intake, and badly affecting nutrient absorption and metabolism, WHO (2003). Inability to meet nutritional needs may lead to decreased immunity and increased susceptibility to opportunistic infections, which can lead to anaemia and further malnutrition. Additionally, nutrient intake can improve antiretroviral absorption and tolerance (Maertens *et al*, 2011). Receiving nutritious foods can help improve quality of life of people living with HIV (Anand *et al*, 2012).

Poor nutritional status in PLHIV speeds the disease progression, increases morbidity, and reduces life span (Hsu *et al*, 2005). For these reasons, nutritional support should be a very important part of a relevant response to HIV and AIDS (PEPFAR, 2006).

The World Health Organization recommends ensuring micronutrient needs are met by increasing access to a diversified diet, fortified foods, and micronutrient supplements, particularly in areas where micronutrient deficiencies are endemic. However, these clinical issues remain common, despite improvements in the treatment and survival of PLHIV.

2.5 Anti-retroviral Drugs use by Pregnant and Lactating Women

World Health Organization called for the elimination of new HIV infections among children by 2015 and keeping their mothers alive. The ART strategy for pregnant women is fully harmonized with the recommended first-line regimen for non-pregnant adults (once-daily tenofovir, lamivudine and efavirenz or emtracitabine). The prevention of mother to child transmission regimen will no longer be determined by the woman's health status. Rather all HIV infected pregnant women, irrespective of CD4 -cell count or clinical stage, will initiate standard first-line ART to reduce the risk of HIV transmission to the child and to her uninfected partners. For good programme and operational reasons, particularly in generalized HIV epidemics, all pregnant and breast-feeding women with HIV should initiate ART as lifelong treatment (WHO, 2013).

CHAPTER THREE

METHODOLOGY

3.1 Study Design

This was cross-sectional study based in a hospital setting. Both qualitative and quantitative techniques were employed in assessment of knowledge, attitudes and practices in the use of iron and folic acid supplements in women attending PMTCT clinics.

3.2 Description of the Study Area

The study was done in three Regional Referral Hospitals namely Amana, Temeke and Mwananyamala in Dar es Salaam. Dar es Salaam was purposely chosen because of its high prevalence of HIV infection. This city has a mix of different groups of people and is also the most populated city in Tanzania. The city has a population of about 4,364,541 people (NBS, 2012). Dar es Salaam is the major commercial, administrative and industrial center of Tanzania. It is located between latitudes 6.36^{o} and 7.0^{o} to the south of Equator and longitudes 33.33 and 39.00 to the east of Greenwich. It is bordered by Indian Ocean on the East and Coast Region on the West.

The total surface area of Dar es Salaam City is 1,800 km^2, comprising of 1,393 km^2 of land mass with eight offshore islands, which is about 0.19% of the entire Tanzania Mainland's area. Economically, the city harbours high concentrations of trade and manufacturing business compared to other parts of Tanzania. Notable businesses include the Magogoni fish market at Kivukoni and clothing shops and agricultural products in Kariakoo area. Kariakoo is also prominent for computer and electronics

shops. The city experiences tropical climatic conditions due to close proximity to the equator and Indian Ocean. Administratively, Dar es Salaam region has five municipalities namely Temeke, Kinondoni, Ilala, Ubungo and Kigamboni. Ubungo and Kigamboni districts were excluded from the study due to the fact that they have no regional referral hospitals.

3.3 Study Population

The study population were pregnant and lactating women living with HIV aged 15 years and above attending PMTCT clinics at the three regional referral hospitals in Dar es Salaam; namely Mwananyamala, Amana and Temeke Hospitals.

3.3.1 Inclusion Criteria

All pregnant and lactating women living with HIV aged 15 years and above attending PMTCT services at one of the three regional referral hospitals in Dar es Salaam were included in the study. Willingness to participate in the study was also another criterion for inclusion in the study.

3.3.2 Exclusion Criteria

Pregnant and lactating women with complications including serious illness that required hospitalization were excluded from the study. Others were HIV positive mothers who were mentally challenged at the time of interview and those who were not fluent in Kiswahili.

3.4 Sample size

The proposed study included a sample of 294 HIV infected pregnant and lactating women. The sample size was calculated using the following formula (Daniel, 1999);

$$n = \frac{(1.96)^2 \text{ x } p(1-p)}{e^2}$$

Where

n = minimum sample size

P = estimated prevalence of iron supplement use (85.5%), an estimated prenatal intake of iron supplements in Dar es Salaam (NBS, 2016)

e = marginal error (0.05 for a 95% confidence level)

$$n = \frac{(1.96)^2 \text{ x } (0.855 \text{ x } 0.145)}{(0.05)^2} = 191,$$

To cater for stigma associated with HIV, error during data collection, refusal and non-respondents 35% was added, making a sample size of 294 respondents.

3.5 Sampling Procedure

Three Regional Referral Hospitals in Dar es Salaam were purposively selected. These were Amana, Temeke and Mwananyamala. Stratification by physiological status was applied in order to identify pregnant and lactating mothers in each of the regional referral hospital. From each stratum 49 pregnant and lactating mothers were randomly chosen to represent the target population in the study area. Different sampling frames for pregnant and lactating women at each hospital at each day of interview were used, so that, each day will have a different sampling frame. All the pregnant and lactating women scheduled for a visit in a certain day constituted the sampling frame. Their names were routinely listed in the appointment register found at the PMTCT clinics.

At the day of interview, the interviewer obtained two lists; one for pregnant and another for lactating women scheduled for a visit on that day. Eight respondents were

interviewed per day from each hospital; only four pregnant women and four lactating women were randomly chosen from their respective lists using their care and treatment center identification number (CTC-ID). Both unwilling respondents and those who did not come for their scheduled visit were replaced by the willing subjects. Interviews were carried out until the sample size for each hospital was reached.

3.6 Recruitment and Training of Research Assistants

Two research assistants were recruited to assist the researcher in data collection. One research assistant had a background in nutrition at a diploma level and the second one a Nurse Midwife. They both received two days training and pre-tested the data collection instruments before embarking in collecting data. The training was important to enable them to understand the study objectives, instruments of data collection, research techniques and ethical practices. After training, the study team was involved in pre-testing of the study tools in which a sample of 10 pregnant and 10 lactating women at Mnazi Mmoja Health Center were interviewed. Pre-testing allowed for refinement of the tools before actual fieldwork began.

3.7 Data Collection Methods

3.7.1 Interview Conducted to Study Subjects

A structured questionnaire was developed in English then translated into Kiswahili for the purpose of data collection in this study. The questionnaire consisted of seven sections. The first part was about general information. The second part consisted socio-demographic and economic characteristics of the respondents. It comprised age, area of resident, level of education, marital status, gestational age, parity, occupation

and general health. The third section comprised general health of the study subjects. The fourth sections sought information on knowledge of micronutrients especially IFA (section B).

The fifths section, collected information on attitudes of mothers on the use of IFA supplements. Section six comprised information on, practices toward use of IFA supplements, section seven sought information on barriers to IFA supplements use among study subjects. The last part of the questionnaire solicited information on other health and lifestyle behaviours such as cigarette smoking and alcohol use among subjects.

3.7.2 Focus Group Discussions and Key Informant Interviews

In order to triangulate information collected by the questionnaire, focus group discussion (FGD) and key informants interview (KI) were used. The FGD team were conducted to gather information on the use and understanding of micronutrients especially iron and folic acid supplements in pregnant and lactating women living with HIV. Gender was not considered since the study subjects were women.

The FGD sessions were conducted in each Hospital and the number of respondents were six to seven women in each group. Various issues related to IFA supplements use were discussed. This included their understanding about IFAS, important of IFAS in their life, availability of IFAS in their clinics and factors that influence and or discourage them from using IFAS. Several FGD sessions were conducted in one hospital until receiving no new information. Each session lasted 60 to 90 minutes. When saturated, the research team shifted to another hospital

Key informant interviews were conducted in each Hospital gathering information on KAP on IFAS use among pregnant and lactating women living with HIV. The KII comprised Nurse Midwives and Medical Doctors conducting PMTCT clinics. The main theme for the interview was availability of IFAS, women KAP on IFAS and barriers towards using IFAS. Each session lasted 60 to 90 minutes.

3.8 Data Analysis

Information was verified by looking for omissions and inappropriate entries on the same day. Problems were corrected immediately to ensure good data quality. Data collected using an interview guide for in-depth interviews were coded and analyzed using IBM SPSS. Descriptive statistics were performed, and statistical significance was determined at p-value <0.05. Means and frequencies were used to describe social demographic data and other related information about IFA supplements in pregnant and lactating women. Filled questionnaires were stored in a locked cabinet until completion of the study. Continuous variables such as subject's age, gestational age and parity were summarized using means and standard deviations.

Categorical variables such as level of education, marital status, occupation, monthly income and area of residence were reported using contingency tables as frequencies and percentages. Association between various independent variables such as socio-economic status, knowledge, attitude and practices on iron and folic acid supplements use were examined using multivariate logistic regression. Variables with p value of 0.05 were used in the multivariate models. Differences were considered significant at $p \leq 0.05$.

3.9 Ethical Considerations

Various ethical procedures were observed during the process of conducting the current study. The study was approved by the Open University of Tanzania (OUT). The Researcher also sought approval from the three municipal authorities namely; DMO-Temeke, DMO-Mwananyamala, DMO-Ilala Municipal, and the medical officers in charge in each of the hospitals. Before commencing data collection, the objectives of the study were explained to the participants and consent was sought from the subjects before enrollment in the study. Before collecting data, participants were given an opportunity to ask questions and interviews commenced after their questions had been answered. Interviews were conducted in privacy and confidentiality was observed at all times. Questionnaires were in the possession of the research team at all times during data collection and at the end of each day the questionnaires were stored in a locked cabinet accessible only to the research team. Data was entered into a password protected computer accessible only to the research team.

CHAPTER FOUR

RESULTS

4.1 Socio-Demographic and Economic Characteristics of the Study Population

A total of 294 pregnant (50%) and lactating (50%) women were interviewed. The mean age of the study women was 28.7 ± 6.7 years ranging from 16-40 years (Table 4.1). A quarter (25%) had not attained any formal education. With regards to household composition, 53.4% (n=157) of the households were headed by males. The mean household size was 4±2.1 (range 1-7) people.

More than half 56.1% (n=165) of the households owned the houses they were living in. The remaining (43.9%) were renting. With regards to water supply 56.8% (n=167) of respondents had tap water supply while 43.2% (n=127) were using borehole water. Furthermore, the majority (94.2%) had electricity as the main source of light. About 94% of the households owned television and 63.3% owned a radio.

4.2 General Health of Study Subjects

All of the respondents were HIV positive and receiving antiretroviral therapy (ART) (Fig 4.1). The findings revealed that, most of the respondents 97.6% were regularly receiving PMTCT care, and none of them was hospitalized due to any kind of problem. About 3.7% (n=11) of the respondents were taking medications other than ARVs such as Amoxylyin, Cotrimoxazole tablets and paracetamol tablets during the survey. Urinary Tract Infections (UTI) were found to be the persistent problem facing most of the respondents (13.6%). Few cases of malaria (7.5%) and flue (2%) were

experienced among the study subjects. A good number of respondents were making scheduled visits to PMTCT clinics (97.6%) with very few (2.4%) having unscheduled visits.

Table 4.1: Social Demographic and Economic Characteristics of the Study Population

Parameter	Answer	Number	Percentage
Age(years) (Mean Age – 28.7±6.7)	16-20	**53**	**18.03**
	21-30	120	40.8
	31-40	121	41.16
Total		**294**	**100**
Education level	i No education	74	25.2
	ii Primary	110	37.4
	iii Secondary and above	110	37.4
Total		**294**	**100**
Marital status	i Single	82	27.9
	ii Married/cohabiting	157	53.4
	iii Divorce/separated/widowed	55	18.7
Total		**294**	**100**
Type of occupation	i Civil servant	42	14.3
	ii House Wife	69	23.5
	iii Business	169	57.5
	iv Casual labourer	14	4.7
Total		**294**	**100**
Monthly income (TZS)	i <200,000	152	51.7
	ii ≥ 200,000	142	48.3
Total		**294**	**100**
Source of light	i Electricity	277	94.2
	ii Kerosene	17	3.8
Total		**294**	**100**
Household assets	i Television	285	96.9
	ii Radio	186	63.3
	iii Motorcycle	51	17.3
	iv Bicycle	11	3.7
Total		**533**	**181**
Household houses	i Owned house	165	56.1
	ii Renting	129	43.9
Total		**294**	**100**
Sources of water	i Tap water	167	56.8
	ii Borehole water	127	43.2
Total		**294**	**100**

Source Field Date, 2019

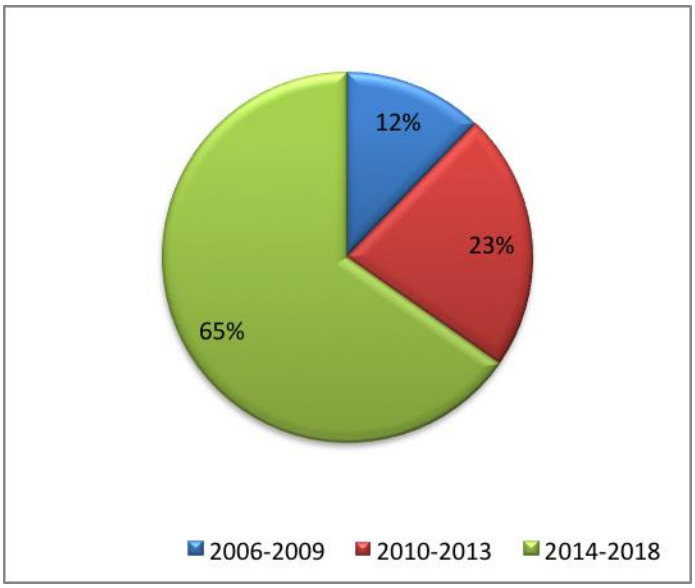

Figure 4.1: Year that the Study Subjects Were Diagnosed having HIV Infection

4.3 Evaluation of the Level of Knowledge on Iron and Folic Acid Supplementations among HIV Infected Pregnant and Lactating Women

Most of respondents (98%) did not know the foods that pregnant women should eat in comparison with non-pregnant women. Furthermore, the majority (74.4%) did not know the foods that lactating women should eat in comparison with non-lactating ones. Fortunately, 92.2% women had heard of word "micronutrient" however, 54.1% (n=135) were unable to mention any micronutrient they knew (Table 4.2). This limited understanding on micronutrients was also reported by subjects who participated in the FGD and Key Informant (KI) sessions respectively.

> *"Micronutrients" is not a new word since we always use it and often hear from our health workers during nutritional education but, honestly we do not know exactly what micronutrients is"*

> *"To make mothers follow the session during health education and nutritional counseling, we go further referring to specific micronutrient supplements such as iron (red tablet) for increasing blood level and folic acid (yellow tablet) for prevention of birth defects instead of using the word micronutrients"*

Almost all respondents (99.6%) reported to have heard about anaemia. About 66% (n=194) knew the causes of anaemia with 28.9% (n=85) mentioning causes such as lack of iron in the diet. Twenty six percent (n=77) mentioned infection such as malaria, hookworm and HIV/AIDS to cause anaemia. About 10% (n=29) mentioned heavy bleeding as a cause of anaemia. Most of the respondents reported to be able to recognize someone with anaemia. Majority (95.9%) reported paleness of the body and 47.9% (n=141) mentioned general body weakness as one of the manifestation of anaemia. Eighty six percent (n=253) of the respondents were aware of the way anaemia could be prevented. Some of the methods mentioned were taking diet rich in iron such as red-meat and spinach (25.2%). Other method was consuming Vitamin–C rich foods (such as oranges) during or right after meals (14.3%). Taking iron supplements as prescribed (26.1%) was also reported as a method of preventing anaemia. About 21% (n=62) of respondents mentioned managing anaemia by treating other infections such as malaria and Hookworms.

Unfortunately, 12.5% were not aware on how to prevent anaemia. With regard to the benefits of iron supplements, 72.4% (n=213) stated that it helps in mental and physical development of the foetus while 27.5% (n=81) stated that it prevents maternal anaemia. Majority of the respondents (93.9%) reported to be aware of the benefits of using folic acid supplement during pregnancy. Some of the benefits mentioned included normal development of the nervous system of the foetus 94.5% (n=278) and prevention of birth defects 93.9% (n=276). About 6.1% of respondents failed to mention any benefit of folic acid supplements. The benefits of using IFA supplements were confirmed by the following statements from subjects who participated in FGD session;

"Being HIV positive, is already a problem to us, therefore prevention of anaemia, birth defects and HIV transmissions to our babies is our responsibility. So we are very careful in taking these supplements even though we are not getting enough supply"

Table 4.2: Evaluation of the Level of Knowledge on Iron and Folic Acid Supplementations among HIV Infected Pregnant and Lactating Women

Knowledge on IFA supplements use	Response		Number	Percentage
Ever heard about anaemia	i.	Yes	293	99.6
	ii.	No	1	0.4
Total			**294**	**100**
Causes of anaemia	i.	Lack of iron in the body	85	28.8
	ii.	Infection	77	26
	iii.	Heavy bleeding	29	10
Total			**294**	**100**
Recognising someone with anaemia	i.	Paleness of the body	282	95.9
	ii.	General body weakness	141	47.9
Total			**294**	**100**
Importance of iron supplements	i.	Help in mental and physical development off unborn baby	213	72.4
	ii.	Prevents maternal anaemia	81	27.5
Total			**294**	**100**
Importance of folic acid supplements	i.	Normal development of nerves system of unborn baby and infants	278	94.5
	ii.	Prevents birth defects	276	93.9
	iii.	Don't know	18	6.1
Total			**572**	**194.5**

4.4 Attitude Toward use of Iron and Folic Acid Supplements among Respondents

The findings indicated that slightly more than half (57.1%) of pregnant and lactating women attending PMTCT clinics did not perceive that their well being as well as their babies depend on the food they consume. Most of the respondents (89.8%) perceived that it is good for them to take any of micronutrients. Closer to two thirds (60.2%) perceived that one is likely to have some micronutrient deficiency when not taking supplements.

About 76.9% (n=226) of the respondents did not perceive of any nutritional problem resulting from micronutrient deficiency (Figure 4.2). These poor attitudes on the use of IFA supplements were also reported by subjects who participated in the FGD and KI sessions:

> *"We all know the consequences of not taking IFA tablets during pregnancy and lactating, however, majority of us are unaware of even the taste of these supplements "These supplements have bad taste which discourages most of our clients from using them"*

> *"Most of our clients do not take these supplements simply because they do not feel sick and therefore they see no reasons of using them". "In some cases the clients have the supplements but do forget taking them as prescribed"*

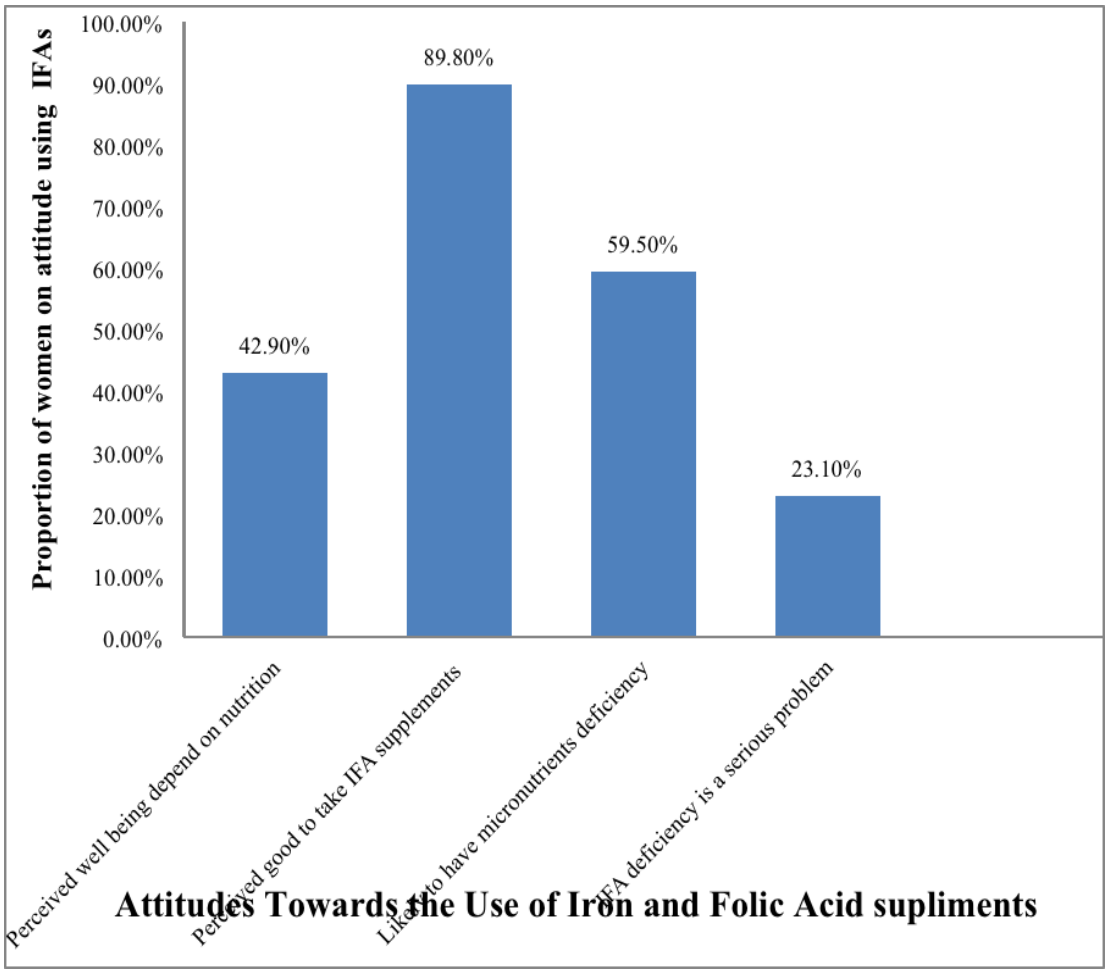

Figure 4.2: Attitudes Towards use of Micronutrient Supplement among Pregnant and Lactating Women Living with HIV

4.5 Practices towards Use of Iron and Folic Acid Supplements

The findings revealed that few (15%) of respondents were using IFA supplements throughout their pregnancy up to few weeks after delivery. About 54.8% (n=161) reported to use IFA supplements whenever they get free supply from their clinics and 30% (n=89) were not using them at all about a quarter (25.8%) of respondents did not know even the taste of iron and folic acid (IFA) supplements despite their physiological status. Close to half (49.3%) of respondents were comfortable in using IFA supplements, while 24.8% (n=73) were not comfortable (Table 4.3). This finding is confirmed by subjects who participated in the FGD and KI sessions;

> *"Although these tablets (IFA supplements) are very important to us, their limited supply discourages our routine use"*

> *"These IFA supplements are like life saver to most of pregnant women especially the ones diagnosed to have low haemoglobin (Hb) level (before and after giving birth), however, most of women are not using them"*

Apart from IFA supplements, all respondents reported to be taking iron rich foods especially animal sources. About 18.4% were eating animal source such as red meat and fish once in a week. 38% (n=113) were eating twice and 43.2% thrice in a week. With regard to food rich in folic acid, food such as green leafy vegetables, beans, bread, cereals and citrus fruits, were reported to be consumed by the study women as they agreed to be able to afford the cost.

Majority (81.6%) were able to consume food rich in folic acid twice every day while 18.4% (n=54) were able to consume folic acid rich foods based on its availability. This practice was also reported by the subjects who participated in FGD and KI sessions;

"We are always advised to use iron and folic acid tablets, so that we can avoid the possibility of low blood level and birth defects but the problem is that, we usually receive advice without supplements"

"The mission for IFA provision is to prevent anaemia and birth defects to pregnant women. However, we are challenged with unreliable supply to our PMTCT clinics"

Table 4.3: Use of Iron and Folic Acid Supplements among Respondents

Practices towards IFAS			**Number**	**Percentage**
Intake of IFAS	i.	Yes always	44	15.0
	ii.	Sometimes	161	54.8
	iii.	Not at all	89	30.3
Total			**294**	**100**
Consumption of animal source food	i.	Once a week	53	18.4
	ii.	Twice a week	113	38.4
	iii.	>three times a week	127	43.2
Total			**294**	**100**
Consumption of folic acid rich foods (e.g greenleaf vegetables, beans, bread, cereals and citrus fruits)	i.	Twice a week	54	18.4
	ii.	> three times a week	204	69.3
	iii.	Based on availability	36	12.3
Total			**294**	**100**
Comfortability in using IFAS	i.	comfortable	145	49.3
Comfortability in using IFAS	ii.	Not comfortable	73	24.8
Comfortability in using IFAS	iii.	Don't know	76	25.9
Total			**294**	**100**

Source: Field Data, 2019

4.6 Factors Associated with Iron and Folic Acid Supplements Use among Pregnant and Lactating Women Attending Prevention of Mother-to-Child-Transmission Clinics using them"

Results from Results from multivariate analysis showed the factors that significantly predisposed subjects to the use of IFA supplements among pregnant and lactating women living with HIV (Table 4.4). Subjects who reported to be comfortable in using IFA supplements were almost 3 times more likely to use IFA supplements than those who reported not being comfortable (OR= 2.86,95% CL:1.22, 6.66; p =0.01). It was also noted that, respondents who reported to have no difficulties in using IFA supplements were almost five times more likely to use them as compared to those who reported to have some difficulties (OR= 4.82, 95% CL: 2.42, 9.58; p<0.0001).

Table 4.4: Factors Associated with IFA use among Pregnant and Lactating Women Attending PMTCT Clinics in Dar es Salaam

Determinant	OR (95% CI)	P value
Education		
i. Secondary or higher	1	
ii. No formal education	0.82 (0.31, 2.13)	0.46
iii. Primary education	1.25 (0.57, 2.72)	0.35
Occupation		
i. Housewives	1	
ii. Civil servant	0.51 (0.12, 2.27)	0.71
iii. Business	0.23 (0.04, 1.24)	0.01
iv. Casual labourers	1.00 (0.27, 3.78)	0.07
Comfort ability in taking IFA		
i. Not comfortable	1	
ii. Don't know	1.29 (0.45, 3.71)	0.53
iii. Comfortable	2.86 (1.22, 6.66)	0.01
Difficulties taking IFA		
i. Difficulties	1	
ii. No difficulties	4.82 (2.42, 9.58)	<0.0001
Encountered barriers in taking IFA		
i. No barriers	1	
ii. Reported barriers	3.17(158,6.38)	0.001

Surprisingly, those who reported experiencing problems such as nausea and bad taste were 3 times more likely to use IFA supplements than those who did not report any problems (OR= 2.90, 95% CL:1.34, 6.29; p=0.01). Regarding occupation, business women were more likely to use IFA supplements (OR= 0.14, 95% CL 0.03, 0.83; p=0.01) compared to housewives, casual labourers and civil servants. Furthermore, education level was not associated with IFA use.

4.7 Barriers Towards use of Iron and Folic Acid Supplements among Study Women

Findings reveal that, 92% of study subjects did not get enough supply of IFA supplements on every PMTCT clinic visits they made. Therefore, some of them 58% were forced to buy IFA supplements from private pharmacies. However, a good number of the respondents (80%) were not able to afford buying the supplements. Few of the respondents (23.2%) were prescribed IFA supplements only in cases of low haemoglobin level. In occasions where IFA supplements were not available in the PMTCT clinics, subjects were instructed to buy from private pharmacies something which was beyond the financial capabilities of most of them. Apart from barriers such as unavailability and unaffordability of IFA supplements, some barriers such as nausea, bad taste and dark colour of stool were reported by subject. Among the group experiencing barriers, (43.5%) experienced nausea and (6.5%) bad taste. This was also supported by the FGD and KI interviews:

> "*We are advised to use these tablets because of its benefit it has to our bodies; however, their taste discourages us from using them".*
> *"Yes! These tablets are offered free of charge in our clinics, however in several cases they are not available hence we are forced to buy from private pharmacies"*

"Due to limited supply of these IFA supplements we advise our clients to buy them from private pharmacies"

4.8 Other Health Behaviours and Lifestyles of the Pregnant and Lactating Women Living with HIV

Apart from using IFA supplements and ARVs among subjects, these women were also engaged in other health and life style behaviours like any other human being. It was noted that, 4.4% (n=13) of study women were using alcohol, mostly taking one to two bottles of beer per day. In addition, 1.4% (n=4) were using one to two glasses of local beer in a day. However, majority (97%) were not taking any kind of alcohol. Fortunately, all respondents were not engaged in cigarette smoking. Furthermore it was also noted that 18% (n=53) among the respondents had a history of using medicines from traditional healers. The remaining (82%) denied using traditional medicines.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

Anaemia among pregnant and lactating women causes a real health threat worldwide, especially in developing countries. The current study aimed at investigating KAP regarding use of IFA among women living with HIV attending PMTCT clinics in Dar es Salaam. The aim of the study was to determine Knowledge, Attitudes and Practice regarding use of IFA supplements among pregnant and lactating women living with HIV in Dar es Salaam.

5.2 Knowledge on Iron and Folic Acid Supplement use among Study Subjects

Knowledge regarding IFA supplements use among pregnant and lactating women living with HIV in this study is good. In the sense that, majority of respondents knew the benefits of IFAS use and the effects of not using the supplement to them and to their babies. This is an exception; a study by Ogundipe *et al*, (2012) shows disagreement with this statement as there is limited knowledge on IFA supplements in Northern Tanzania. This could be partly attributed to limited knowledge on the recommended dose of IFA supplements that should be started before conception until few months after giving birth.

This finding was also in disagreement with work done in Kenya by Kimiywe *et al*, (2017) who revealed that, most women were not using IFA supplements due to their low knowledge on its importance. Despite of the World Health Organization recommendations on IFA supplements use on health conditions and birth outcomes,

few pregnant and lactating women visiting PMTCT clinics in Dar es Salaam reported using IFA supplements. This could be partly due to limited availability of these supplements in PMTCT clinics which was also noted during the current study.

5.3 Attitudes towards Use of Iron and Folic Acid Supplements among Respondents

Most of the respondents perceived that it is good for them to take IFA supplements as they understood its importance to their bodies. However, only a negligible proportion of women took IFA supplements throughout their pregnancy and lactation periods. This could be partly due to poor supply of IFA supplements in their PMTCT clinics. It was also noted that, study subjects who felt nausea after taking IFA supplements were the greater chance of using these supplements due to their benefits. These findings disagree various studies; (Kavishe *et al*, 2009) reported that, 22% of pregnant women who were taking IFA supplements and experienced side effects primarily nausea, were stopping completely taking IFA supplements.; Mgonja (2014) revealed that some women drop or ignore using the medication deliberately simply because they have bad smell or make them uncomfortable. In the current study, majority of study subjects believed that, they are likely to have IFA deficiencies because of inadequate supply of these supplements to them.

5.4 Practices towards Use of Iron and Folic Acids Supplements

In the current study, the number of women taking IFA supplements was low, despite its widely recognized benefits. This could be partly explained by lack of these supplements in PMCT clinics where they are supposed to be dispensed freely. In addition, cost of IFA supplements might discourage its use especially to the

disadvantaged groups. These findings is in agreement with the study by Popa *et al* (2014) who reported that, in their study, less than half of the respondents were using IFA supplements during their pregnancy. However, this statement was in disagreement with the study by Mgonja, (2014) which revealed that IFA supplement were in abundant and the problem was the ignorance of study subject in using them.

In the current study, it was also noted that there is frequent intake of foods rich in iron and folic acid by the study subjects. This could be due to improved understanding on the benefits of IFA rich foods during pregnancy as well as lactation. Moreover, increased use of IFA rich foods might be brought about by shortage of IFA supplements in most of the health facilities. In the current study, it was noted that majority of the study subjects did not meet the WHO (2018) recommendations that pregnant women should start taking iron supplements (30mg a day) when they have their first prenatal appointment and folic acid (400 μg a day) as early as possible (ideally before conception) to prevent birth defects.

5.5 Factors Discouraging Iron and Folic Acid Supplement Use

While it is clear that pregnant and lactating women with HIV status will especially benefit from IFA supplementation. This study revealed that, most of pregnant and lactating women with positive HIV status were not using IFA supplements effectively. This could be due to poor supply of these supplements in their PMTCT clinics. The current study noted some minor side effects such as nausea and bad taste, when they use IFA supplements. However, the group experiencing these side effects on using IFA was also found to have significantly greater chance of using IFA supplements

than those not facing problems. This might be the outcome of counseling and health education given by health providers on importance of ARVs plus these supplements to their health and their future babies'. These findings agrees with the study in Kenya by Kimiywe *et al*, (2017) which revealed that few women reported to continue taking IFA supplements despite side effects. In addition, un-availability or limited financial support to purchase the supplements after receiving prescriptions from healthcare providers was one of the barriers to the use of antenatal IFA supplements in the women interviewed in the current study. Ogundipe *et al*, (2012) confirms the current study on low intake of IFA supplements due to their unavailability. This was also supported by Popa et al, (2014) who reported that, the proportion of women in their study group taking folic acid was still low, despite its widely recognized benefits, but could be explained by the lack of reimbursement for the cost of folic acid, which must be bought over the counter at any time it is prescribed, during pregnancy or before conception.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The use of IFA supplements for pregnant and lactating women living with HIV in Dar es salaam, Tanzania was low. Hence does not meet WHO recommendations for the prevention and treatment of anaemia during pregnancy, despite the high knowledge they have about the importance of these supplements. Socio-demographic factors including maternal age, level of education, marital status and HIV status were not significantly associated with use of supplements. Business women, women who felt comfortable in using IFA supplements and those who reported barriers were all significantly associated with use of supplements. Attitude towards use of IFA supplements among study subjects was good but few study subjects felt nausea and bad taste on using these supplements. On the other hand, practice on the use of IFA supplements among study subjects was not satisfactory. Only a small portion reported using the supplements throughout their pregnancy up to few weeks after delivery.

6.2 Recommendations

The study proposes the following**;**

(i) The fact that IFA supplements intake was low in the study group the researcher recommends, more awareness campaigns on the use of IFA supplements while taking ARVs. This should be done to the general community and specifically to pregnant and lactating women living with HIV.

(ii) Following limited access to IFA supplements in PMTCT clinics, calls for Government of Tanzania through Ministry of Health Community Development, Gender, Elders and Children together with Tanzania Food and Nutrition Centre (TFNC) to implement its policy on IFA supplements availability to the clients at all the time they visit PMCT clinics.

(iii) Following poor attitude toward use of IFA supplements to most of study subjects calls for health care personnel for provision of health and nutritional education on the importance so that clients could keep on taking them despite its limitations.

(iv) With regard to the taste and smell of the supplements and nausea as a result of using IFAS, the study suggests the manufacturer to minimize these aspects so as to encourage their use. This would attract more users.

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APPENDICES

Appendix I: Questionnaire

Questionnaire on Knowledge, Attitude and Practices on Iron-Folate Supplement use among Pregnant and Lactating women living with HIV in Dar es salaam

General information

CTC ID No _____

Date of interview _____/_____/_____ (dd/mm/yyyy)

Name of interviewer _____

Hospital of recruitment (i) ☐ Amana (ii) ☐ Mwananyamala (iii) ☐ Temeke

Physiological status (i) ☐ Pregnant (ii)☐ Lactating

If pregnant, gravidity _____If lactating, parity _____

Date of birth? _____/_____/____ (dd/mm/yyyy)

Section one: Socio–demographic and economic characteristics of the study subjects

1. What is your level of education?

   (i) ☐ No formal education (ii) ☐ Primary incomplete (iii) ☐ Primary Complete (iv) ☐ Secondary incomplete (v) ☐ Secondary complete (vi) ☐ Above secondary education (vii) ☐ others (specify)-------

2. What is your marital status? (i) Single ☐ (ii)☐ Married (iii) ☐ Divorced/separated (iv) ☐ widowed
3. Do you have a membership in any association for people living with HIV and AIDS?(i) ☐Yes (ii) ☐ No
4. How many people live in your household?
5. What is your relationship with the head of your household? (i) ☐ Self (ii) ☐ Husband/partner (iii) ☐ Son (iv) ☐ Daughter (v) ☐ Other (please specify)
6. What is your occupation?(i) ☐ Housewife (ii) ☐ Civil servant (iii) ☐ Businesswoman (iv) ☐ Casual labourer(v) ☐ Other (please specify)
7. What is the level of your monthly household income in Tanzanian Shillings? (i) ☐ <100,000 (ii) ☐100,000-200,000 (iii) ☐ 200,000-500,000 (iv) ☐ >500,000 (v) ☐ others (specify)
8. How many family members depend on your household income for living?
9. How much does your household spend on food per day in Tanzanian Shilling?
10. Does your household own a house? (i) ☐ Yes (ii) ☐ No
11. Does the house where you live have water supply? (i) ☐ Yes(ii) ☐ No
12. Does the house where you live have electricity? (i) ☐ Yes (ii) ☐ No
13. Does your household own a TV? (i) ☐ Yes (ii) ☐ No
14. Does your household own a car? (i)☐ Yes (ii) ☐ No
15. Does your household own a radio? (i) ☐ Yes (ii) ☐ No
16. Does your household own a motorcycle? (i) ☐ Yes (ii) ☐ No
17. Does your household own a bicycle? (i) ☐ Yes (ii) ☐ No

Section B: General health of the study subjects

18. Which year was you diagnosed with HIV? ___

19. Have you made unscheduled visit to a clinic in the past one month? (i) ☐ Yes (ii) ☐ No
20. Have you been hospitalized in the past one month? (i) ☐ Yes (ii) ☐ No
21. Are you currently taking any medications other than antiretroviral drugs? (i) ☐ Yes (ii)☐ No
22. If yes. Which medication?
23. Have you experienced any episodes of distress in the past one month? (i) ☐ Yes (ii) ☐ No
24. If yes. Please explain to me what you experienced

Section C: Knowledge about nutrition in general and micronutrient supplementations

How should a pregnant woman eat in comparison with a non-pregnant woman to provide good nutrition to her baby and help him grow? Please mention four practices she should do. a……

b……..

c……..

d……

25. How should a lactating woman eat in comparison with a non-lactating woman to be healthy and produce more breast milk? Please mention four practices she should do:

    a…….

    b…….

    c……

d……

26. Have you ever heard of micronutrients? (i) ☐ Yes (ii)☐ No
27. Do you know any micronutrient? (i) ☐ Yes (ii) ☐ No

28. If yes. Mention any three of them

    i…….

    ii……

    iii……

29. Most women would benefit from two types of supplements, or tablets, during pregnancy. Which are they**?**☐ (i) Iron supplements (ii) ☐ Folic acid supplements (iii) ☐ Don't know or don't remember (iv) ☐ Other (specify)
30. Can you tell me why it is so important to take folic acid supplements during pregnancy*?*(i) ☐ For normal development of the nervous system of the unborn baby **(** brain, spine and skull) (ii**)** ☐ To prevent birth defects/abnormalities the nervous system of the unborn baby brain, spine and skull (iii) ☐ Don't know or don't remember) (iv) ☐ Other (specify)
31. Have you heard about anaemia? (i) ☐ Yes (ii) ☐ No (iii) ☐ don't know or don't remember
32. Can you tell me how you can recognize someone who has anaemia? (i) ☐ Less energy/weakness (ii) ☐ Paleness/pallor (iii) ☐ Spoon nails/bent nails (koilonychi) (iv) ☐ More likely to become sick (less immunity to infections) (v) ☐ Other (specify)
33. What causes anaemia? (i) ☐ Lack of iron in the diet/eat too little, not much (ii) ☐ Sickness/infection (malaria, hookworm infection, other infection such as

HIV/AIDS) (iii) ☐ Heavy bleeding during menstruation (iv)☐ Don't know (v) ☐ Other (specify)

34. Can you tell me why it is so important to take iron supplements during pregnancy? (i) ☐ For normal mental and physical development of the unborn baby (ii) ☐ For prevention of iron-deficiency anaemia (iii) ☐ Don't know or don't remember) (iv) ☐ Other(specify)

35. When a pregnant woman is undernourished, she is at risk of having a low- birth-weight baby, meaning that the baby is small or has a low birth weight. What are the health risks for these babies? (i) ☐ Slower growth and development (ii) ☐ Risks of infections/being sick (iii) ☐ Risks of dying (iv) ☐ Risks of being undernourished/having micronutrient deficiencies (v) ☐ Risks of being sick once adult/developing chronic diseases in adulthood (heart disease, high blood pressure, obesity, diabetes) (vi) ☐ Don't know or don't remember) (vii) ☐ Other (specify)

36. How can anaemia be prevented? (i) ☐ Eat/feed iron-rich foods/having a diet rich in iron (ii) ☐ Eat/give vitamin-C-rich foods during or right after meals (iii) ☐ Take/give iron supplements if prescribed (iv) ☐ Treat other causes of anaemia (diseases and infections) seek health care assistance (v) ☐ Continue breastfeeding (for infants 6–23 months old (vi) ☐ Don't know or don't remember (vii) ☐ Other (specify)-------

Section D: Attitudes toward use of iron and folic acid supplements among pregnant lactating women attending PMTCT clinics

37. Do you think there are relationship between health and nutrition? (i) ☐ Yes (ii) ☐ No (iii) ☐ Don't know
38. If yes. Which one/s
39. How good do you think it is for you to take any of the micronutrients? (i) ☐ Good (ii) ☐ Not good (iii) ☐ Not sure
40. How likely do you think you are to have any of the micronutrients? deficiency? (i) ☐Not likely (ii)☐ Not sure or don't know (iii)☐ Likely
41. How serious do you think it is for you to have any of the micronutrients deficiency? (i) ☐ Not serious (ii)☐ Not sure or don't know (iii)☐ Serious
42. How do you feel after taking iron and folic acid supplement tablets (i) ☐ comfortable (ii) ☐ Not comfortable (iii) ☐ Don't know

Section E: Practices toward use of iron and folic acid supplements among pregnant and lactating women attending PMTCT clinics

43. What are the benefits of you taking micronutrients while pregnant or breastfeeding? Mention
44. Are there any challenges you are experiencing in using micronutrient supplements (i) ☐ Yes (ii) ☐ No
45. If yes, mention.

    i……..

    ii…….

    iii……

46. How difficult is it for you to take any of the micronutrients supplements? (i) ☐ Not difficult (ii) ☐ difficult
47. Do you take iron and folic acid supplement tablets as instructed with health worker?(I) ☐ Yes always (ii) ☐ sometimes (iii) ☐ Not at all
48. Other than iron and folic acid supplement tablets do you consume animal foods? (i) ☐Yes (ii) ☐ No
49. If yes, how often in a week? (i) ☐Once (ii) ☐ twice (iii) ☐ three time (iv) ☐ every day
50. Can you afford to to consume food rich in folic acid such as Greenleaf vegetable e.g. spinach, citrus fruits e.g. orange, beans, bread and cereals? (i) ☐ Yes (ii) ☐ sometime ☐ (iii) Not at all

Section F: Barriers to iron and folic acid supplements use among study subjects

51. Do you get supply of iron and folic acid tablets each visit of your clinic? (i) ☐ Yes (ii)☐ No
52. Do you usually take iron and folic acid supplements? (i) ☐ Yes (ii) ☐ No
53. Do iron and folic acid supplements available at you clinic every visit? (i) ☐ Yes (ii) ☐ No (iii) ☐ Don't Know/no answer
54. If no, were else can you get such supplements (i) ☐ Pharmacy (ii) ☐ Hospital (iii) ☐ Don't know
55. Can you afford to buy iron and folic acid supplements? (i) ☐ Yes (iii) ☐ No
56. Are there any barriers encountered in using iron and folic acid supplements? (i) ☐ Yes (ii) ☐ No

57. If yes which one (i) ☐ Nausea (ii) ☐ Bad taste (iii) ☐ block stool (iv) ☐ others (specify)

Section G: Other health behaviors and lifestyle

58. Have you ever smoked cigarettes? (i)☐ Yes, currently smoking (go to 60) (ii) ☐ Yes, But quitted (iii) ☐ No
59. How many cigarettes do you smoke per day?
60. Have you ever drunk alcohol? (i) ☐ Yes, currently drinking (go to 63) (ii) ☐ Yes, but quitted (iii) ☐ No
61. What type of alcohol do you drink? (i) ☐ Local brews (ii) ☐ Beers (iii) ☐ Wines (iii) ☐ Whiskey (iv) ☐ Others (please specify)
62. How many drinks do you take per day? (Litres)
63. Are you using any drugs not prescribed by your doctor for treatment of your illness?(i) ☐ Yes (ii) ☐ No
64. What drugs are you using that are not prescribed by your doctor for treatment of your illness?

    Mention……
65. Have you ever used medicines from traditional healers such as local herbs?
66. (i) ☐ Yes (ii) ☐ No (finish the interview)
67. Are you currently using medicines from traditional healers such as local herbs? (i) ☐ Yes (ii) ☐ No

Thank you for your cooperation

Appendix II: Interview Guideline for Key Information

1. In your opinion, could you elaborate generally the availability of folic acid and iron supplement in PMTCT Clinic?

2. Do you think pregnant women take folic acid and iron supplement as per instruction? Please explain

3. What kind of education do you provide to pregnant and lactating women attending to your PMTCT clinic concerning folic acid and iron supplementation?

4. What are the barriers to folic acid and iron supplements use among HIV infected pregnant and lactating women attending in your PMTCT clinics?

Appendix III: Interview Guideline for Focus Group Discussions

1. What do you know about iron and folic acid supplements?
2. Do you think iron and folic acid supplements are important to your life? If yes can you explain how important is?
3. Can you comment on availability of iron and folic acid supplements tablets in your clinic?
4. What factors that influence and or discourage you from using iron and folic acid Supplements as advised in your clinics?

Thank you