FOLATE INTAKE AND ACCESS TO FOLIC ACID SUPPLEMENTATION AMONG ADOLESCENT PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT HURUMA SUB COUNTY HOSPITAL, ELDORET KENYA

BY

BIRGEN CAROLYNE JEPCHUMBA

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTERS IN PUBLIC HEALTH IN HUMAN NUTRITION (MPH)., DEPARTMENT OF HUMAN NUTRITION, SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES

MOI UNIVERSITY

ELDORET

2020

DECLARATION

DECLARATION BY THE CANDIDATE

I the undersigned declare that this thesis is my original work and to the best of my knowledge has not been presented for a degree in any other Institution. No part of this thesis may be reproduced without the prior written permission of the author and /or Moi University

INVESTIGATOR

Birgen Carolyne Jepchumba

SPH/PGH/33/13

Signature …… Date: ……

DECLARATION BY THE SUPERVISORS

This thesis has been submitted for examination with our approval as Moi University supervisors:

Prof. Grace A. Ettyang (PhD)

Associate Professor in Human Nutrition

School of Public Health

Moi University

Eldoret

Signature …… Date: ……

Dr. Alice Kaaria

Lecturer

School of Medicine

Moi University

Eldoret

Signature …… Date: ……

DEDICATION

I dedicate this work to my husband who has given me invaluable support financially and morally. May God bless you abundantly.

ABSTRACT

Background: Adequate intake of micronutrients among pregnant women can prevent serious birth defects, reduce the risk of premature and low birth weight infants and support maternal health. Adolescent pregnancy poses a higher risk because of double burden of meeting their own dietary folate intake needs and the foetus. Folate deficiency results in increased occurrence and recurrence of neural tube defects including spinabifida, placenta abruption, pre-eclampsia, spontaneous abortion, stillbirth, preterm delivery and low birth weight. Most research on folate intake has been done internationally with more focus on the general women population and little data on adolescents. There is need to do more research locally and consequently find out whether pregnant adolescents meet the required threshold.

Objective: To determine the prevalence of inadequate folate intake, extent of access to optimal Folic acid supplements and identify the barriers to dietary intake and uptake of folic acid supplementation among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital.

METHODS: Study population was adolescent pregnant women attending Ante natal Clinic (ANC). Descriptive cross sectional study design was used. Data on maternal characteristics was collected using a structured questionnaire of both open and close ended questions. A Food Frequency Questionnaire (FFQ) was used to collect data on folate intake. Focus Group Discussion (FGD) with health providers was used to get perceptions on potential barriers to folic acid use and supplementation. Nutrient calculator was used to estimate nutrient intake. Adequacy of intake was based on comparison to Estimated Average Requirement (EAR). Descriptive and inferential statistics were analyzed using SPSS version 24. Percentages, frequency distribution, measures of central tendency and dispersion were used to describe data. Chi square was used to determine the factors associated with inadequate intake. Qualitative data was analyzed thematically and presented using descriptive narrations aided by NVIVO version 11.

Results: A total of 220 respondents were enrolled in the study. The average age was18 (17, 19).Slightly more than half of the respondents were married and had primary level of education at 129(58.6%) and 118(53.9%) respectively. Majority of the respondents 158(71.8%) were earning between Kshs.1000 -3000 monthly. Half of the respondents 115(52.3%) were in the first trimester of pregnancy. The prevalence of inadequate folate intake was 167(75.9%).Majority of the respondents 161(74.2%) reported cost of folate rich food as expensive. Side effects of folic supplements were significantly associated with supplement use ($\chi 2(101.6)=3$ $P=0.01$) ($P<0.05$). Nutrition education was a significant factor affecting adequate folate intake (OR: 95% CI: 1.497: 1.007-2.931).Barriers to ideal supplements included lack of Access to information, inadequate supply of supplements, inconsistent supply and adherence as reported in the FGD with the health providers.

Conclusion: The study found that the prevalence of inadequate folate intake was high at 75.9% and that there was lack of an ideal supplementation programme.

Recommendations: Better structures to enhance policies on micronutrient supplementation and proper timing of nutrition education for better practices by the mothers.

.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ANC	-	Antenatal Clinic
DFE	-	Dietary Folate Equivalent
EAR	-	Estimated Average Requirements
FFQ	-	Food Frequency Questionnaire
FGD	-	Focused Group Discussion
FIGL	-	Forminoglutamic
ITNs	-	Insecticide Treated Nets
KDHS	-	Kenya Demographic Health Survey
KVMDSA	-	Kenya Vitamin and Mineral Deficiency Status and Actions
LBW	-	Low Birth Weight
NTDs	-	Neural Tube Defects
NCPD	-	National Council on Population and Development
PMTCT	-	Prevention of Mother to Child Transmission
RBC	-	Red Blood Cell
RDA	-	Recommended Dietary Allowance
SDGs	-	Sustainable Development Goals
TTI	-	Tetanus Toxoid Injection
UNICEF	-	United Nations Children Fund
UNU	-	United Nations University
USA	-	United States of America
VMDs	-	Vitamin and Mineral Deficiencies
WAHO	-	West Africa Health Organization
WHO	-	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Access –the means to be able to obtain supplements, use them as required to achieve the intended outcome

Adolescent pregnant women – these are expectant women who are aged between 13 and 19 years.

Supplement – a product that contains 1 or more ingredients e.g. minerals that are taken as a pill, capsule, tablet or liquid in order to prevent a deficiency, diseases or abnormality associated with that particular deficiency.

Supplementation– the process of using additions (supplement) either in the form of pills, capsule tablet or syrup in order to prevent deficiency, diseases or abnormality associated with folate deficiency

Estimated Average Requirement (EAR) – Established by approximating the level of intake for a nutrient at which the needs of 50 percent of the population will be met.

Recommended Dietary Allowance (RDA) - Average daily dietary intake level which meets nutrient requirement of nearly all (97 to 98 percent) healthy persons in a particular life stage.

Folate Intake – This is folate taken naturally in food

Folic Acid Supplementation – The use of Folic acid during pregnancy

Nutrition Education – Knowledge on proper dietary practices in order to achieve optimum nutrition and well being

ACKNOWLEDGMENT

I owe this work to a number of people whose support has been tremendous.

I thank God for His care; I give Him all the glory.

My sincere gratitude to the invaluable support by my supervisors Prof. G.A. Ettyang and Dr. Alice Kaaria through guiding my work and giving in sight and constructive criticisms. Without your guidance this work wouldn't have been a success. Thank you.

My appreciation goes to the School of Public Health for nurturing my studies and giving me the opportunity to pursue my passion.

I am also indebted to the Departmental lecturers for their assistance whenever I needed it. Your guidance and encouragement gave me the will to work hard.

My gratitude to the staff of Ministry of Health, Huruma Sub County Hospital for their courteousness and support during data collection.

Finally I appreciate my study participants for their consent and willingness to undertake the study and to my classmates for the encouragement in this journey of pursuit of excellence.

CHAPTER ONE

INTRODUCTION

1.1Background Information

Micronutrient malnutrition is an important public health problem worldwide, mainly in vulnerable population groups such as pregnant and lactating women. Folate and vitamin B12 deficiencies have been acknowledged as the most common causes of macrocytic anaemia. The global prevalence of anaemia is estimated globally, 41.8% pregnant women and close to one third of non-pregnant women (30.2%) are anaemic (Okubatsion et al., 2016).

Adequate folate intake is crucial in preventing occurrence of acongenital anomaly (anencephaly, myelomeningocele, meningocele, oral facial cleft, structural heart disease, limb defect, urinary tract anomaly and hydrocephalus, spinabifida) termed as Neural Tube Defects (NTDs) (Rati et al., 2015). At conception, poor maternal folate status increases the risk of neural tube and other birth defects whereas later in pregnancy, low folate levels are associated with haematological problems such as nutritional anaemia and possibly pre-eclampsia according to De Regil et al. (2010).

According to Katalin et al. (2010) folate deficiency results in increased occurrence and recurrence of neural tube defects. In most cases, populations that have adverse outcomes in pregnancy being high, have their women part of population consuming diets low in vitamins and minerals inclusive of folate. It further notes that widespread cell division is a main feature of the development of embryo and foetus, therefore a low or reduced folate level during pregnancy results in impaired growth and replication of the cells. This deficiency is mostly either as a result of low dietary intake or due to increased metabolic requirement by a specific gene defect or defects.

Increased risks of preterm delivery, infant low birth weight, and foetal growth retardation are associated with low concentrations of dietary and circulating folate.

Pregnant adolescents are particularly vulnerable due to a double burden characterized by rise in metabolic demands to meet foetal requirements for growth and development as well as the need to meet the needs for the growing adolescent hence posing a major challenge (Marshall et al., 2012). According to MOH (2017), adolescent girls face a high risk of dying from pregnancy or child-birth. The ministry found out that 8.9% (43) of the women who died were young mothers aged below 20 years and 62.8% (27) of them were having their first. Consumption of 400 μg (RDA for pregnancy) folate per day during the periconceptional period has been recommended as a public-policy strategy by some governments to reduce the number of neural tube defect-affected pregnancies according to the report by UNICEF, WHO, UNU (2012). Unfortunately, usual folate intakes of women typically fall well below this amount.

Supplementation with folic acid after the 1st month of pregnancy plays an important role in other aspects of maternal and foetal health despite the fact that it will not prevent NTDs. (WHO, 2012). Intake of folate after the crucial 1st trimester where the neural tubes in most cases are closed is necessary in order to improve the outcome of pregnancy (Katalin et al., 2010).

Internationally, countries like the USA, Norway and the Netherlands, have folic acid supplementation report among pregnant women standing at 43%, 35%, and 72.4%, respectively **(**WHO, 2007). A study in Northern Tanzania tried to find out supplementation with folic acid and iron during pregnancy. The finding on the use of folic acid supplementation was reported by 3,758 women which represents 17.3% of the total population under study. Most studies acknowledge that IFA supplementation

programme has been in place for the longest time possible. Sununtnasuk et al. (2015) notes that most low- and middle-income countries, have had the distribution of IFA tablets through ANC as the first national anaemia programme that generally begun three or four decades ago. However, while many countries have had ANC-based IFA distribution programmes for decades, the coverage rates of all but a handful of these programmes are strikingly low. The study also found out that IFA supplements were most commonly taken by women age 20-34 which amounted to 71%.The age bracket of women consuming IFA tablets poses the need to find out why the pregnant adolescents do not form part of this bracket yet they are the most vulnerable group. The studies reviewed show that folic acid is very important micronutrient in pregnancy.

As a public health measure to improve pregnancy outcomes, WHO gave guidance due to a request by the Member States of WHO on the use of daily iron and folic acid supplementation in terms of the effectiveness and safety among pregnant women. This was also geared towards supporting the efforts to achieve Sustainable Development Goals i.e. goal two of achieving food security and improved nutrition and also goal three of promoting healthy lives and wellbeing at all ages. (WHO, 2020).

1.2 Statement of the Problem

Adolescent pregnancy is on the rise evidenced by NCPD (2020) that 1 out of 5 girls aged 15-19 years is pregnant and KDHS (2014) findings that one-quarter of women are giving birth by age 18 and nearly half by age 20. A total of 18% of adolescents aged 15-19 are already mothers or pregnant with their first child. Adolescent pregnancy is a challenge as it increases the risk of maternal complications due to double burden characterized by increase in micronutrient demand for both the

developing foetus and the growing mother. Both mothers' age at the time of the birth of the child and the child's birth is linked to neonatal mortality correlating babies born to the youngest mothers with the highest neonatal mortality rates.

At conception, poor maternal folate status increases the risk of neural tube and other birth defects e.g. spina bifida whereas later in pregnancy, low folate levels are associated with haematological problems such as nutritional anaemia and possibly pre-eclampsia. (De-Regil et al., 2010).

There is a global prevalence of 18.6 per 10,000 live births NTDs. (Blencowe et al., 2015) and Kenya Vitamin and Mineral Deficiency Status and Actions (KVMDSA) (2011), reported an estimated number of 2000 annual neural tube birth defects which is unacceptably high. With the risk of folate deficiency on pregnancy, there is still a high prevalence of folate inadequacy e.g.in China, Cheng et al. (2009) reported an inadequate folate intake prevalence of 97%, Guamanian adolescents,80% and in Kenya 55.2% (Eshipala et al., 2012)

Most studies acknowledge that IFA supplementation programme has been in place for the longest time possible. Sununtnasuk et al. (2015) notes that most low- and middle-income countries, have had the distribution of IFA tablets through ANC as the first national anaemia programme that generally begun three or four decades ago however, the coverage rates of all but a handful of these programmes are strikingly low hence the need to assess the extend of access to supplements.

Data on dietary folate intake among adolescents has been done more internationally with less literature presenting the local scenario. Most studies have also focussed on the general women population with less data on folate intake among adolescents.

There is need to therefore do more research on this locally and consequently find out the dietary folate intake as well as the extend of access to supplementation.

1.3 Justification of the Study

Adolescence is a critical period of growth in the life cycle. A period that can either reinforce or negatively impact on the growth of the adolescent mother. The foetal outcome at this stage greatly depends on the mother's health and nutritional status of the adolescent. The need for folic acid increases during times of rapid tissue growth which during pregnancy includes an increase in red blood cell mass, enlargement of the uterus, and the growth of the placenta and foetus (Bailey, 2000).

There is a high rate of teenage pregnancy necessitating the need to focus on adolescents. According to KDHS (2014), childbearing begins early notably one-quarter of women giving birth by age 18 and nearly half by age 20. A total of 18% of adolescents aged 15-19 are already mothers or pregnant with their first child. Adolescent girls face an average risk twice as high of dying from pregnancy or child-birth compared to women 20 to 34 years old according to Uganda Demographic and Health Survey 2016. Given the high rates of teenage pregnancy and double nutritional needs of a growing foetus and the young mother, there is need to focus on this vulnerable group

A study by Sununtnasuk et al. (2015) reports that IFA supplements were most commonly taken by women aged 20-34 which amounted to 71%. The age bracket of women consuming IFA tablets poses the need to find out why the pregnant adolescents do not form part of this bracket yet they are the most vulnerable group. While many countries have had ANC-based IFA distribution programmes for decades, the coverage rates of all but a handful of these programmes are strikingly

low (Sununtnasuk et al., 2015) hence there is need to look at accessibility of the services at the ANC in terms of supplements availability and challenges faced in the implementation of the programme. Huruma sub county hospital records high numbers of adolescent pregnant women and is located in a peri urban region with many as low income earners hence making it suitable for the study.

Most studies on folate intake have focused on the general women population in determining their folate consumption and use and adherence of folic acid supplementation. There is less research on folate intake the most vulnerable population i.e. the pregnant adolescents hence less data on folic supplementation locally, the available data on folate consumption and supplementation is majorly from the international community with few data on the local scenario here in Kenya. Therefore there is need to find out the dietary folate intake and access to folic acid supplementation of pregnant adolescents to assess whether they meet the required threshold. This will also add to baseline data which can be used in formulating appropriate policy recommendations on folate supplementation, dietary fortification and any other measure taken to control the situation

1.4 Research Objectives

1.4.1 Broad Objective

To assess the prevalence of inadequate dietary folate intake and identify the barriers likely to limit access to supplementation among adolescent pregnant women attending ANC Huruma Sub County Hospital.

1.4.2 Specific Objectives

1. To determine the prevalence of adequate folate intake among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital.

2. To assess availability and access to folic acid supplements among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital.
3. To determine the barriers to intake and uptake of folic acid supplementation among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital.

1.5 Research Question

Is there adequate intake and access to Folic Acid supplementation among adolescent pregnant women attending ANC in Huruma Sub County Hospital?

1.6 Limitations of the Study

The study required the participants to recall food consumed in the past 30 days which was subject to recall bias. This was however mitigated by further probing the participants.

CHAPTER TWO

LITERATURE REVIEW

Folic acid is crucial for proper brain function and plays an important role in mental and emotional health. It aids in the production of DNA and RNA, the body's genetic material, and is especially important when cells and tissues are growing rapidly, such as in infancy, adolescence, and pregnancy. Folic acid also works closely with vitamin B12 to help make red blood cells and help iron work properly in the body (Lamers, 2011). Widespread cell division is a main feature of the development of embryo and foetus, therefore a low or reduced folate level during pregnancy results in impaired growth and replication of the cells. This deficiency is mostly either as a result of low dietary intake or due to increased metabolic requirement

The formation of the neural tube and its closing in the embryo happens between the 17th and 30th day after conception. The neural tube later becomes the baby's spinal cord, brain and skull. A neural tube defect (NTD) occurs when the neural tube fails to close. A clear causal relationship has been established between adequate folic acid intake and a reduced NTD occurrence. (Conlin et al., 2006)

Folate deficiency results in increased occurrence and recurrence of neural tube defects, including cleft palate, spina bifida, and brain damage. Neural tube defects are birth defects caused by abnormal development of the neural tube; a structure that eventually gives rise to the brain and spinal cord**.** In addition to this, increased risks of preterm delivery, infant low birth weight, and foetal growth retardation are associated with low concentrations of dietary and circulating folate. Pregnant women need more folic acid to lower the risk of neural tube birth defects.

Pregnant adolescents are particularly vulnerable due to a double burden due to a rise in metabolic demands to meet foetal requirements for growth and development as well as the need to meet the needs for the growing adolescent poses a major challenge. A total of 18% of adolescents aged 15-19 are already mothers or pregnant with their first child. The trend is that teenage pregnancy has remained unchanged in the last 5 years (KDHS, 2014). Adolescent pregnancy and motherhood remains a major health and social concern because of its association with higher morbidity and mortality for both the mother and the child coupled with other adverse social consequences.

19% of female adolescents aged 14 to 18 years and 17% of women aged 19 to 30 years do not meet the EAR of folate in the United States (Bailey et al., 2010).A study by Morimoto et al. (2006) among University female students in Brazil found out that the prevalence of inadequate nutrients namely folate, zinc, copper and calcium in comparison to Estimated Average Requirements was found out to be low. It found out the prevalence of inadequacy to be at 99% folate, 47% zinc, 33% copper and 95% calcium.

Findings by Abdelrahim (2009) showed a folate deficiency of 57.7% in South Sudan. Another study in Ethiopia by Haidar et al. (2010) reported that 46.1% of the women under study had severe folate deficiency (≤ 4 ng/mL) and 21.2% of the sample had marginal folate deficiency (> 4–6.6 ng/mL) whereas only 32.7% had optimal levels of serum folate. The study further noted that there is need for sustainable folate intake through dietary diversification and appropriate public health interventions. A prevalence of 55.2% folate inadequacy was found in Kenya (Eshipala et al., 2012). Odiwuor et al. (2017) did a research in in Migori Kenya and reported that 13.5% of

women under study met the RDA for folic acid intake. Data on prevalence of inadequate folate intake is scanty in the local scenarios.

There is a global prevalence of 18.6 per 10,000 live births NTDs. (Blencowe et al., 2015). According to Kenya Vitamin and Mineral Deficiency Status and Actions (KVMDSA) (2011), there is an estimated number of 2000 annual neural tube birth defects which is unacceptably high. A study in Northern Tanzania on folic acid supplementation found out that the use of folic acid supplementation was reported by 3,758 women which represent 17.2% of the total population under study. The RDA of folate in pregnancy is 400 μg folate per day during the periconceptional period unfortunately; usual folate intakes of women typically fall well below this amount.

2.1 Importance of Adequate Folic Intake

Rapidly dividing cells in the foetus and elevated urinary losses increases the requirement for folic acid during pregnancy (WHO, 2012).Supplementation with Folic Acid before conception period unequivocally leads to a decrease in neural tube defects incidence (Regan et al., 2009).Closure of neural tube at 28 days of pregnancy a stage where pregnancy will not have been detected requires that folic intake still be recommended because supplementation with folic acid after the 1st month of pregnancy plays an important role in other aspects of maternal and foetal health despite the fact that it will not prevent NTDs. (WHO, 2012).

A study by Regan et al. (2009) showed that 1-2 births per 1000 births present open neural tube defects. These are the most significant anomalies in the foetus resulting in long term morbidity. Patients with spina bifida experience a lifelong medical and financial implications that impact on their families too. Use of folic acid supplements showed a reduction in the NTDs prevalence by at least 60% which occurred to both

mothers who had experienced NTDs in previous pregnancies and those who had not had such risk factors.

In a study by Hibbard, he found out that approximately 10% of gravidas had abnormal formiminoglutamic (FIGLU) excretion and 5% had megaloblastic marrow. He was using an indirect method, by looking at the excretion of FIGLU where individuals deficient in folate, inhibited the conversion of histidine to glutamic acid and the excretion of FIGLU into the urine increased, particularly after histidine loading.

He found out that young gravidas i.e. ≤20 years had the highest prevalence of abnormal FIGLU excretion and in women with multiple pregnancies (e.g., twins or triplets).

Worldwide public-health campaigns have been done recommending use of folic acid supplements before conception daily in a bid to reduce the risk of neural tube defects, however many women have not followed these recommendations. Mandatory fortification of flour in the USA, Canada, and Chile, led to a substantial improvement in folate and homocysteine status, and NTDs occurrence reduced by between 31% and 78%(Lancet, 2006)The neural tube closes after one month, but the continued supplementation is recommended for longer because of the possibility of the neural tube rupturing after closure. (Conlin et al., 2006)

Folate in conjunction with Vitamin B12 is also important in the prevention of macrocytic anaemia hence important in treatment of patients with haematological alterations (Alejandro & Aldo, 2018)

Adequate folate intake is important in maintaining one-carbon transfer reactions, including synthesis of nucleic acids and amino acid metabolism. Re-synthesis of

methionine from homocysteine is highly dependent on folate. Deficiency of folate is majorly as a result of inadequate dietary intake. Megaloblastic anaemia is the primary sign of folate deficiency. As a result of the folate deficiency, homocysteine concentration of the blood is elevated. This is related to cardiovascular disease. Low folate intakes are also associated with the development of certain types of cancer, including colorectal, prostate, and breast cancer. Folate plays a vital role in mechanisms that mediate the transfer of one-carbon moieties required for DNA synthesis, stability and integrity, and repair. (Young-Nam, &Young-Ok, 2018).

2.2 Effects of Inadequate Folate Intake

Neural Tube Defects (NTDs) in infants

This is a group of birth defects which include anencephaly and spina bifida . Spina bifida is a malformation of spine and anencephaly is characterized by a malformed skull and brain. They are the major congenital malformations of the central nervous system that result from a failure of the neural tube to close at upper or lower ends during 21 to 28 days after pregnancy occurs. Low maternal folate levels during the critical preconception period and in the very early stages of pregnancy present the single greatest risk. (Nutrition International 2020). Folate plays a critical role in the synthesis of DNA and other critical cell components hence it is important during phases of rapid cell growth (Lamers, 2011).

Infant deaths of more than10% worldwide are as a result of secondary congenital anomalies caused by nervous system anomalies. Neural tube defects (NTDs) are the most common major congenital anomalies of the central nervous system, posing as an important public health problem in terms of mortality, morbidity, social cost and

human suffering. The incidence of NTD ranges from 0·5to 14 per 1000 live births (Gomes et al., 2016)

Insufficient folate intake increases the risk of giving birth to infants with NTDs. Rati Jani et al. (2015) notes that an elevation of blood homocysteine is an indication of metabolic effect of folate deficiency. In line with this, spontaneous abortion and pregnancy complications e.g. placental abruption and preeclampsia has been strongly associated with the presence of maternal homocysteine resulting in an increasing risk of poor pregnancy outcome, decreased birth weight and gestation duration. According to Newnham et al. (2002), Pregnancy is characterized by different stages that represent a continuum, the timing of a nutritional deficiency impacts differently on the overall outcome of pregnancy and on the nature and having the potential to affect cell numbers or differentiation in the developing embryo

According to Theunissen et al. (2003), the role of folate in DNA synthesis and cell replication shows that folate influences foetal growth and gestation duration. It also interferes with maternal erythropoiesis, growth of the uterus, mammary gland and the placenta. Other deficiencies and outcomes of inadequate intake of folate include infant low birth weight, antepartum haemorrhage, foetal congenital defects, and perinatal mortality. According to Scholl et al. (2000), low infant birth weight, preterm delivery, and foetal growth retardation is associated with inadequate maternal folate status

2.3 Barriers to Adequate Folate Intake

2.3.1 Lack of Adequate Nutritional Knowledge

Lack of adequate knowledge of exactly what is needed nutritionally or the means of how to find out is a common shortcoming of the adolescents (Prinat, 2003). Findings

in a study by Ajen (2013) found out that only 26.5% of the women had knowledge on the sources of folate rich foods.

A study in Kenya by Kamau et al. (2018) found out that nutritional knowledge was associated with adherence to taking IFAS supplements. There is a strong association between knowledge and use of folic supplements as recommended. Women in the high knowledge level group are more likely to have achieved a full level of compliance and similarly women in the low knowledge level group are more likely to have no compliance (Melisa et al., 2006)

A study by Lenka et al. (2017) found out that women believed that supplements are an easier and more reliable source of nutrients than food intake alone, and rely on dietary supplementation as an insurance policy during pregnancy. Taking supplements during pregnancy served as a comforter of some sought that the mother and foetus were well taken care of and growing healthy.

A study by Mgamb et al. (2015) in Kenya found that 73% had heard about folic acid but only 50% could mention one or more of the benefits of folic acid to women of reproductive age and pregnant women.

A study by Conlin et al. (2006) sought to assess the knowledge of pregnant women on folic acid. It found out that 96% of the women under survey gave data on knowledge of folic acid recommendations. 73% of the women knew that folic acid was crucial in the prevention of spinabifida. 27% of the women responded that they were not sure. The study found out that a strong association existed between the level of knowledge and level of compliance. Women within high knowledge level group were more likely to achieve a full compliance level and similarly women in the low knowledge level

group were more likely to have no compliance. The study overly deduced that only 30% of the women were able to achieve full compliance of folic acid intake.

2.3.3 Bioavailability

Bioavailability of folate refers to the proportion of folate that is utilized and/ or stored or available for utilization and/ or storage, it is proportion of folate which is digested/absorbed and metabolized through normal pathways. 50-67% of folate in foods is bio available basing on intestinal-absorption data.

A study by Gomes et al. (2016) recommended that a lot needed to be done in relation to dietary advice. Public health efforts should be geared to incorporating practical advice on storage and cooking in order to increase the bioavailability of folate and as result increase folate intake and help in achieving adequate folate status.

Public Health should also focus on recommendations on dietary pattern. A comprehensive dietary pattern may result in to a decrease of NTDs risk and some heart defects even among those who do not use folic acid. Other micronutrients naturally present in the diets may also contribute to a decrease in the risk of NTD occurrence. Promotion of a healthy diet has several health benefits such as a high intake of nutrients present in fruits and vegetables in the preconceptional period reduces the risk of off-spring affected by orofacial cleft.

2.4 Folic Acid Supplementation

There is a recommendation of daily oral iron and folic acid supplementation as part of antenatal care in a bid to reduce the risk of low-birth weight among others. The target group is all pregnant adolescent and adult women who receive a daily supplement of folic acid: 400μg (0.4 mg) for the entire duration of pregnancy, supplementation

starting at the earliest stage when pregnancy is confirmed, as part of an integrated antenatal care and in all population settings. (WHO, 2012)

In Kenya, supplementation composition of 60mg Iron (ferrous fumarate) is recommended. This is equivalent to 200mg ferrous Sulphate and 400 (0.4 mg) Folic Acid. The frequency should be only one combined IFAS tablet daily. The duration of taking the IFAS supplement should be from conception to delivery. (Iron and Folic acid supplementation (IFAS) Dialogue guide for health care providers. Ministry of Health, 2013)

The supplemental dose was increased to 400 µg (0.4 mg) of folic acid per day following publication of several studies supporting the use supplements before conception of this nutrient in the prevention of neural tube defects. This dose was deemed to provide more folic acid than required to produce an optimal haemoglobin response in pregnant women. If supplementation is started after the first trimester of pregnancy it will not help prevent birth defects, (WHO, 2012), whereas later in pregnancy, low folate levels are associated with haematological problems and possibly pre-eclampsia that is according to De Regil et al. (2010). The study is not interventional but seeks to find out dietary folate intake and access to folic acid supplementation from conception to delivery.

Mgamb et al. (2015) sought to find out folate deficiency and utilization of folic acid fortified flour in Pumwani Hospital Kenya and found that only 13% of the study participants reported that they were using folic acid supplements.

A study by Queen Mary University (2014) did a 13 year study in antenatal clinics from 1999 to 2012 and found out that only 6% of the adolescent pregnant women took folic acid supplements during pregnancy. It also deduced that more women took

folic acid once they become pregnant with an increase from 45% to 62% for the period under study.

A study by Nilsen et al. (2008) showed that women who had used folic acid or multivitamin supplements during pregnancy had a significantly lower risk of developing placental abruption than women who had not used such supplements. It also deduced that this association was stronger when the abruption was preterm (<37 weeks of gestation).

To achieve adequate folate intake in a bid to prevent NTD is quite challenging. This is because the critical period required for adequacy is the first six weeks of the gestation period. This critical time in most cases happen when most women are not aware that they are pregnant, including planned pregnancies with the probable exception of pregnancies that are medically assisted. Recommendation suggested by Sandra et al, in a bid to curb deficiencies is that food fortification with folic acid is necessary in order to provide adequate intakes. The study saw supplementation as a solution for this deficiency, but not an effective way because most women are often unaware of their pregnancies during the target period hence not achieving the intended purpose of preventing NTDs before conception and during early stages of the pregnancy. (Gomes et al., 2016)

Before supplementation is made, normally assessment of the folate is recommended to be done to determine the folate status. Two methods are used i.e. Red blood cell (RBC) folate or serum folate concentration. RBC folate is a better measure of long-term folate status than serum concentrations because it reflects tissue folate stores. A RBC folate level of 906nmol/L has been associated with significantly decreased risk for pregnancies affected with neural tube defects. Metabolically, increased folate

intake first increases serum folate concentrations then increases erythrocyte concentrations.

One of the crucial measures to prevent and/or treat micronutrient malnutrition during pregnancy is providing supplements in the form of pills and tablets (WHO, 2012) this is widely practised in many countries .Supplements containing vitamin and minerals as per the formulation of the United Nations Multiple Micronutrient Preparation (UNIMAPP) according to UNICEF, UNU, WHO 2011 can fulfil the increased maternal micronutrient needs in pregnancy. Supplements containing other micronutrients in addition to iron and folic acid may have comparable benefits in reducing maternal anaemia and also benefit intrauterine growth as well as postnatal outcomes (Shankar et al., 2008).

The provision of supplements containing various vitamins and minerals has been shown to reduce micronutrient deficiencies in mothers, increase mean birth weight and reduce the incidence of low birth weight and small for gestational age (SGA) births (Shrimpton et al., 2009). However, other trials have not found any significant impact of this intervention on birth length, gestational age and the risk of preterm delivery or a reduction in stillbirths, perinatal mortality and neonatal mortality (Ronsmans et al., 2009).

A study in South Australia by Conlin et al. (2006) to find out compliance to recommended use of folic acid deduced that full compliance with supplementation recommendations in relation to dose and timing was achieved by 30% of women partial compliance 43% and no use of supplements by 27% of the study population. This showed very low compliance to use of folic supplements before and during

conception and through the entire pregnancy. It recommended that food fortification would go a long way in helping curb the problem of deficiency.

2.4.1 Access to Folic Acid Supplementation

Internationally, countries like the USA, Norway and the Netherlands, have folic acid supplementation report among pregnant women standing at 43%, 35%, and 72.4%, respectively **(**WHO, 2007).

A study in Kenya by Kamau et al. (2018), found out that 32.7% of the study respondents complied with IFAS use and only 8% of the pregnant women using the supplements for a period of more than 90 days. Similar reports of low use of supplements were made in a study by Juma et al. (2015) in Machakos County which reported the use of supplements at 18%. Guided by the WHO guidelines of 2012, Kenya established IFAS programme to specifically address anaemia in pregnancy with the aim of achieving 80% coverage by 2017 (Ministry of Health, 2013). This has however not been achieved with the statistics being way lower than the projected values.

A study in Northern Tanzania tried to find out supplementation with folic acid and iron during pregnancy corresponds with the recommendations of WHO, and to explain the extent to which socio-demographic factors, woman's health and her partner affect access and use of folic acid supplementation. The finding on the use of folic acid supplementation was reported by 3,758 women which represents 17.3% of the total population under study despite the recommendations by WHO and the high prevalence of adverse health conditions and birth outcomes as a result of not using the supplements.

A study by Canfield et al. (2002) in Texas found out that among case mothers(those at risk of NTDs based on personal history) and not pregnant, 32.7% reported regular use of supplements containing folic acid, and 25.2% of non-pregnant control mothers (those who are not risk of NTDs based on folate status) reported use of folic acid supplements. 57.1% of women with some little or no college education reported use of folic acid supplements in comparison to those who had college education presented at 20.2%.The study further found out that 40.9% of women who reported having received advice on use of folic acid were actually using it. Those who had not received advice on folic acid had only 22.2% of the women using folic acid.

These statistics substantiate the fact that folic acid supplementation has not achieved the intended goals of WHO. However, the developed countries are doing better than the developing countries though the rates like in Norway and USA are still below half percent.

Suggested scheme for daily iron and folic acid supplementation in pregnant women

Supplement composition	Iron: 30–60 mg of elemental iron and Folic acid: 400 µg (0.4 mg)
Frequency	One supplement daily
Duration	Throughout pregnancy. Iron and folic acid supplementation should begin as early as possible
Target group	All pregnant adolescents and adult women
Settings	All settings

T**his is according to WHO2012**

2.5 Barriers to Use of Folic Acid Supplementation

A study by Kamau et al. (2018) found out that adherence affected uptake of IFAS with the vulnerable women adhering the least. The factors that were associated with poor adherence included side effects at 12%, forgetfulness on the requirement to take the supplement daily, age, literacy level, socioeconomic status, the cost of IFA tablets cost, parity and quality of counselling on IFAS uptake. The major side effects reported included nausea (23%) and epigastric pain (5%) which resulted in some of the respondents stopping the usage of the supplements.

The rate of adherence to routine supplementation regimens in pregnancy is reported to be about 50% according to Nguyen et al. (2008). He attributed this to the fact that it could be due to gastrointestinal side effects associated with intake of supplemental iron which is given in combination with folic acid. The gastrointestinal side effects that are very common include constipation and nausea.

According to Nilsen et al. (2006) & Timmermans et al. (2008), the use and adherence to supplementation varies greatly. They postulated the fact that the socio-demographic and health factors influences adherence. According to a study in Northern Tanzania by Ogundipe et al. (2012), the use of folic supplements before or during pregnancy correlated to health care factors. It further went on to stipulate that socio-demographic correlated to supplementation. Some of the socio-demographic that affected the uptake of supplements included marital status; maternal age in years; parity and education level. As opposed to what may be assumed as the norm, the study found out that sick women were less likely to be prescribed or used folic acid and iron supplements. Ogundipe et al. (2012) further went on to deduce that chronic and infectious diseases could be an indicator of poor access to health care, a factor greatly

contributing to lower utilization of antenatal care services and consequently affecting the use of folic acid and iron supplements.

2.5.1 Folate Deficiency and HIV/AIDS

Folate deficiency is linked to a number of disorders including anaemia and carcinogenesis which poses a challenge in handling HIV infected as it increases morbidity and mortality. (Mason et al., 2000). A study by Akanmuetal (2008) reported a significant association between low plasma folate level and falling values of CD4 cell count of the subjects studied. It concluded that a deficiency of folate occurred at early stages of HIV infection and that it was necessary to introduce folate prophylaxis as soon as HIV infection is confirmed. This will not only delay disease progression but also reduce an early occurrence of anaemia. This is a very critical consideration in pregnancy considering the high cell division that may further worsen folate deficiency and consequently affect the foetus

2.7 Research Gap

From all these studies it is evidently clear that folic acid is a very important micronutrient in pregnancy. However, most of the research on dietary folate intake and supplementation has been done internationally with little literature presenting the local scenario. In addition; most studies have focussed on the general women population with little data on adolescents. There is a tendency to concentrate on pregnancy outcome with little research on the adolescent pregnant women. This therefore; prompting the need to do more research on the adolescent pregnant women locally.

2.8 Conceptual Framework

The study developed a model that showed the relationship between folate intake, access to supplementation, barriers to adequate folate intake and access to folic acid supplementation and adequacy of the folate intake. It conceptualized that dietary folate intake and access to folic acid supplementation could be affected by variables i.e. barriers which ultimately would influence intake and access to supplementation and consequently result into either adequate or inadequate intake.

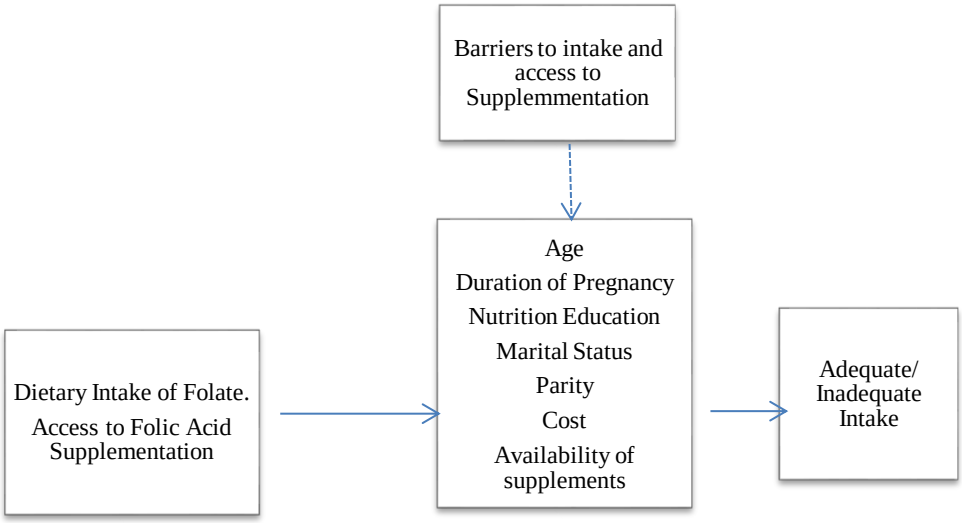


Figure 2.1: The relationship between Dietary Intake of Folate, Access to Folic Acid Supplementation, barriers to adequate folate intake and access to folic acid supplementation and adequacy/inadequacy of the folate intake

Source: Modified from model on changing micronutrient intake through (voluntary) behaviour change – the case of folate (2012)

CHAPTER THREE

METHODS

3.1 Study Setting

This study was conducted in Huruma Sub County Hospital which is located in Turbo constituency in Uasin Gishu County. It is a peri-urban location with many residents as low income earners. The study focused on the low income earners in line with KDHS 2014 findings that 26% of female teenagers from the poorest households are more likely to have begun childbearing compared to 10% of female teenagers from the wealthiest households.

3.2 Study Population

Adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital.

3.3 Inclusion Criteria

All adolescent pregnant women attending Huruma Sub County Hospital clinic and willing to participate in the study were included.

3.4 Exclusion criteria

Pregnant adolescents presenting with complicated medical conditions.

3.5 Study Design

A descriptive cross sectional study was conducted at the hospital for the designated period.

3.6 Sample Size Determination

To arrive at the sample, the following formula for determining sample size used by Daniel, 1999 was used.

$n= Z^2 P (1-P) / d^2$

Where;

n= sample size,

Z= Statistic for a level of confidence, (1.96)

P= expected prevalence, (17.3% folic acid supplementation use in Tanzania)

$(1.96)^2 *0.173(1-0.173) /0.05^2$

=219.8

≈220

3.7 Sampling Procedure

Systematic sampling was used to select the participants. Adolescent pregnant woman entering the clinic and willing to participate in the study was identified alternately and interviewed until the sample size was achieved by using alternate sampling achieved as in the following formula:

K (sampling unit) = population size/sample size

The approximate expected number of adolescents attending ANC was 120 per month. The total inflow for the 3 months the study took place made 360.

Therefore; 360/220 = 1.6 ≈ 2 hence every 2nd adolescent entering the facility and willing was interviewed. The participants were selected at entry but their responses sought after receiving the ANC service

The study purposefully sampled 4 health workers to participate in the FGDs. This included 2 facility managers and 2 health workers i.e. a medical officer in charge, 1 nursing officer in charge, 1 nurse and 1 nutritionist working in the MCH clinic.

3.8 Data Collection Tools

3.8.1 Quantitative

3.8.1.1 Questionnaire

A structured questionnaire consisting of both open and close ended questions was used to collect data. The researcher trained adequately in order to translate the questions to Kiswahili for those participants who were non-English speaking.

3.8.1.2 Food Frequency Questionnaire

Food Frequency Questionnaire (FFQ) was used to collect data on folate intake.

3.8.2 Qualitative

3.8.2.1 Focus Group Discussion

Focus Group Discussion (FGD) with health providers was used to get perceptions on potential barriers to folic acid intake and supplementation. FGD involved 2 facility managers and 2 health care providers. FGD was to obtain in depth data on access and availability of supplements at the facility.

3.9 Data Collection Procedures

Adolescent pregnant women were recruited into the study, their consent sought after which an interview was conducted on those who accepted. The researcher asked the women the questions as in the questionnaire while filling their responses.

Names were not included in the questionnaire to maintain the confidentiality of the participants responding to questions.

3.10 Data Management and Analysis

Nutrient calculator was used to calculate the mean daily nutrient intake with adequacy of nutrient intake based on Estimated Average Requirement. The nutrient calculator is software that interprets the given amounts and sizes of foods to give mean daily nutrient intake based on EAR. The software has been developed in Moi University College of Health Sciences and has been used on local foods. Descriptive and inferential statistics were analyzed using SPSS version 24. Percentages, frequency distribution, measures of central tendency and dispersion were used to describe data. Chi square was used to determine the factors associated with inadequate intake. Qualitative data was analyzed thematically and presented using descriptive narrations aided by NVIVO version 11.

The questionnaires were locked safely in a cabinet. The analyzed data was not shared with anyone apart from the university supervisors for academic purposes only.

Dissemination of results will be done through organized seminars in the university and any other institution, once through, the work will be published

3.11 Ethical Considerations

Ethical clearance was obtained from IREC before field work commenced. Permission was also sought from the MOH in charge to allow research take place in the institution. All the study participants were reassured on the confidentiality of the information given. Names or any personal identifiers were not recorded. They were also informed on their ability to withdraw from the study whenever they felt so.

CHAPTER FOUR

RESULTS

4.1 Socio-Demographic Information

A total of two hundred and twenty (220) questionnaires were administered to a group of adolescent pregnant women attending antenatal clinics at Huruma Sub County. Among them, 118(53.6%) had primary level of education and 129(58.6%) were married. Majority of them 184(83.6%) lived in rental houses and 158(71.8%) earned between Ksh.1000-3000. (Table 4.1 below)

Table 4.1: Socio-demographic characteristics of the adolescent pregnant women attending ANC at Huruma Sub County Hospital

Variable	n=220 (%)
Level of Education	
None	4(1.8)
Primary	118(53.6)
Secondary	97(44.1)
Tertiary	1(0.5)
Marital Status	
Single	91(41.4)
Married	129(58.6)
Type of housing	
Rented	184(83.6)
Owned	36(16.4)
Monthly Income	
<1000	57(26)
1000-3000	158(71.8)
4000-9000	5(2.3)

4.2 Prevalence of Adequate Folate Intake

Majority of the respondents had taken inadequate amounts of folate based on the EAR i.e.

= or > 400µg was classified as adequate and < 400µg was classified as inadequate. 76% of the respondents had inadequate intake of folate with only 24% presenting with adequate intake as shown in Fig. 4.1 below.

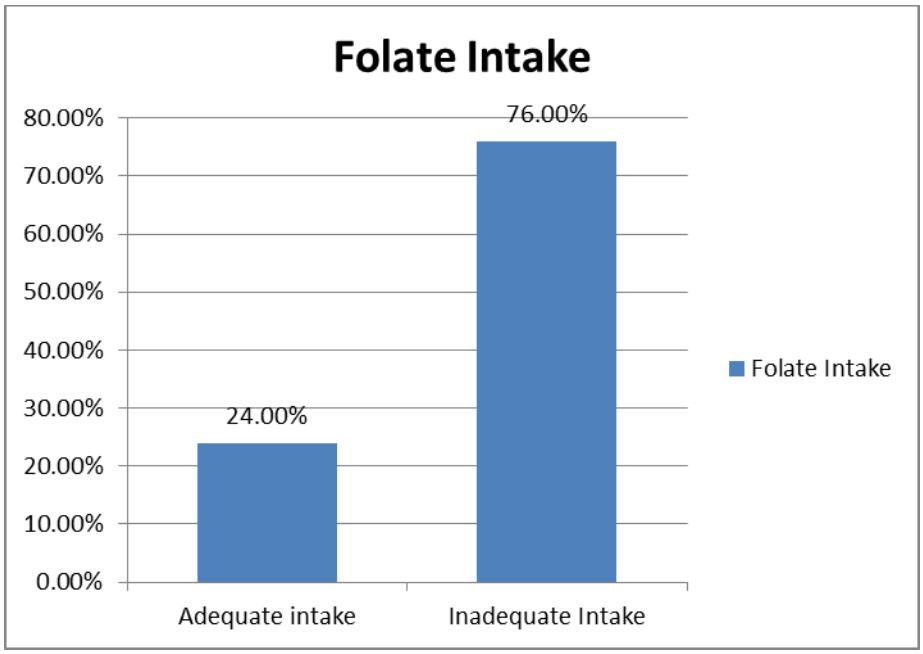


Figure 4.1: Folate Intake

4.3 Access to Supplementation

The FGDs discussions were written down, coded in to themes and sub themes and tabulated as shown in Table 4.2 below and subsequently presented in a narrative form. The data was analyzed with the aid of Nvivo version 11.

Table 4.2: Focus Group Discussion Themes and Sub-Themes

	THEMES	**SUB THEMES**
1.	Access	Access to information
		Inadequate supplements
		Inconsistent supply
2.	Ideal supplementation	Adherence
		Cost implication
		Follow up system
		Side effects

Theme #1: Access

Access to Information:

Only the nutritionist responded to have taken the initiative to talk to the women on the importance of folic supplementation during clinic checkups as noted in the below verbatim

....."After regular check-ups, we take time to talk to the women on the importance of supplementation, taking them, adherence and health implications of low folate in the body to the mother and the unborn baby"(Nutritionist)

....."Most of them are often not aware of the health repercussions of not taking the folate supplements and adequate folate diet" (Nutritionist)

Inadequate supplements

The participants gave a picture of inadequate supply of the supplements to the health facilities from the government chemists. For example some of the verbatim quotes from the participants stated the following:

……"The period that the supplements can serve depends on the influx of client which is normally high in most cases. In most cases the drugs are inadequate. It can last for a month only". (Medical Officer)

....."Sometimes the patient's influx is very high and the supplies will be inadequate. A pregnant mother may be able to get it on one visit but lack on subsequent visits due to shortage" (Nursing Officer)

Inconsistent supply

The participants reported that supply was a major issue and for the period under study, they had not received supplies from the government chemists as reported below:

....."We receive the drugs at times in good time but most of the times the supplies come in 2 months later or more than that. Depends on the availability of funds in the ministry i.e. the government chemists and the most pressing needs at a particular time" (Medical officer)

...."In this period for example, we have had to do without supplements for a period of more than six months". (Medical officer)

....."The supplies are normally not in good time. The supplies may come in 2 to 3 months later. At times we may stay for half year before we receive our next consignment". (Nursing officer)

....."For almost half a year, we have not had supply of any kind of supplements from the government chemists hence a very big challenge as you can only prescribe but will really never know whether the client will purchase it or not".(Nutritionist)

Theme #2: Ideal supplementation

Adherence

The study found out that there was a challenge in adhering to intake of supplements in this particular age group. This was vividly captured as in the following statements:

....."From previous experience, most adolescents may have not accepted the state they are in and adherence to the supplementation regimen is always a challenge". (Nutritionist)

....."Being an adolescent poses the challenge of immaturity and rebellion and that alone may result in the adolescent not taking the supplement as prescribed". (Nutritionist)

....."The adolescents are still growing and most of the time rebellion is a common thing. Most of them are brought by relatives against their wish hence getting them to understand the importance of going to the hospital and taking the supplements is always an uphill task".

(Nurse)

Cost

The study found out that there could be cost implication in terms of the pregnant women buying drugs and also the cost that is involved in trying to follow up to find out if the supplements are being adhered to as it should as illustrated in the following statements:

....."The other challenge is that the adolescents are still dependant on the parents or the relatives for upkeep and daily provision, so in cases where we do not have the supplies we prescribe for them to get outside the hospital. In such cases, it becomes a challenge because there are other pressing needs and financial constraints which will hinder the adolescents from accessing the prescribed supplements". (Nurse)

....."It's almost impossible to have follow up as it will be costly". (Nurse)

....."the number of staff employed in the facility is small compared to influx of patients We do not have the manpower and capacity for follow up to ensure adherence"(Medical officer)

……."We do not have the manpower and capacity for follow up to ensure adherence". (Nursing officer)

Follow up system

All the participants were in agreement that follow up on the use of supplements was never there and the main reason they gave was because they found it expensive as illustrated below:

....."We do not have a follow up system all the way to their respective homes to ensure compliance. We only depend on the honesty of the women when they come on subsequent visits to know whether they did take the drugs or not". (Nutritionist)

....."No there is no follow up. We work on the belief that the client will be honest when they come for subsequent check-ups". (Nurse)

....."Follow up is expensive and the number of staff employed in the facility is small compared to influx of patients" (Medical officer)

……"We believe that once the client has been counseled on the importance of supplementation, she will be honest to self and do as required". (Nursing officer)

Side effects

The nutritionist reported that side effects of taking the supplements played a role adhering to intake.

……."*The other challenge is that is that most complain of the side effects such as the taste and nausea hence creating the inconvenience of having to stick to* taking*the supplement daily"*.(Nutritionist)

4.3.1 Behavioural and Clinical Characteristics of the Adolescent Pregnant Women attending ANC at Huruma Sub County Hospital

Most respondents 199 (90.5%) got regular check-up services whenever they visited the health facility while 51(23.2%) got prevention of mother to child transmission (PMTCT) services. One hundred and eighty one (82.3%) respondents got Tetanus Toxoid Injection (TTI) services while 193 (87.7%) got Insecticide Treated Nets (ITNs). Also, 180 (81.8%) got health education. A small proportion of eleven (5%) respondents reported to be issued with supplements i.e. blood boosters (Fig 4.2 below)

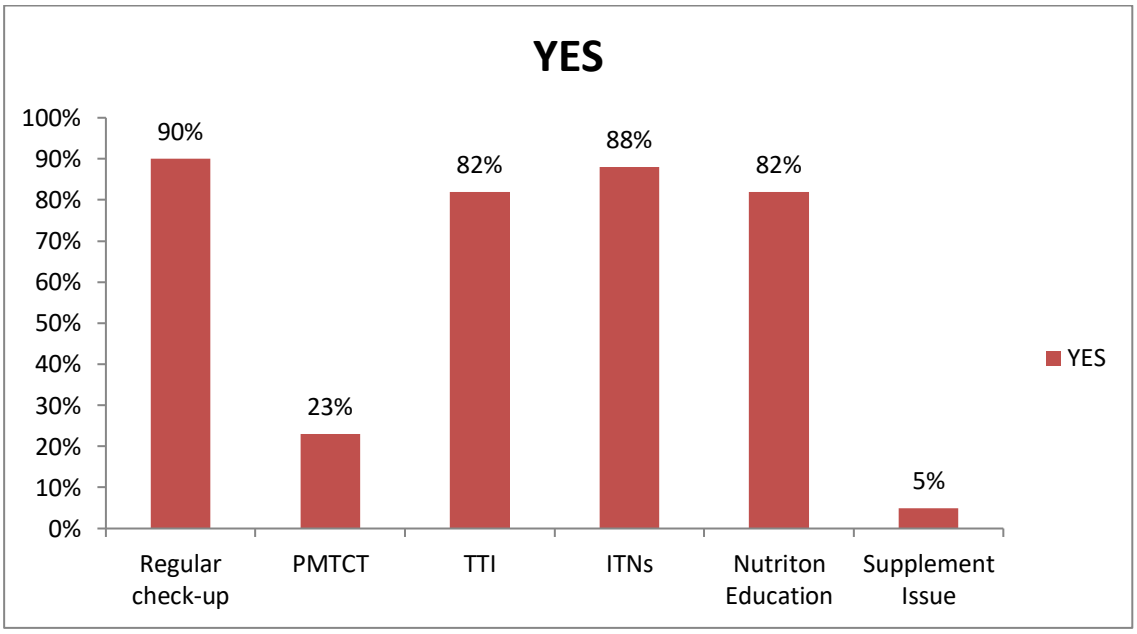


Figure 4.2: Behavioural and Clinical Characteristics of the Adolescent Pregnant Women attending ANC at Huruma Sub County Hospital

4.5 Barriers to Intake and Uptake of Folic Acid

4.5.1 Maternal Characteristics and Folate Intake of Adolescent Pregnant Women attending ANC at Huruma Sub County Hospital

Monthly income was insignificantly associated with folate intake with a p-value of 0.548. Age was also not significantly associated with folate intake with a p-value of 0.75. Majority of the respondents were in the age group of 17 to 19 years. Gestational age was insignificantly associated to folate intake with a p-value of 0.864 Those in the first trimester had the highest number of respondents with inadequate folate intake as in Table 4.3 below.

Table 4.3: Maternal characteristics and dietary folate intake of adolescent pregnant women attending ANC at Huruma Sub County Hospital

	Dietary folate intake		**Chi-square**	**P-value**
	Adequate n (%)	Inadequate n (%)		
Monthly Income				
<1000	8(3.6)	20(9.1)		
1000-3000	55(25)	133(60.5)	0.320	0.572
4000-9000	1(0.5)	3(1.4)		
Age				
Age 13-16	2(0.9)	8(3.6)	0.96	0.757
Age 17-19	51(23.2)	159(72.3)		
Gestation of pregnancy				
First trimester	26(11.8)	89(40.5)		
Second trimester	24(10.9)	69(31.4)	0.293	0.864
Third trimester	3(1.4)	9(4.1)		
Mean MUAC(sd)	53(23.6,48.36)	167(23.6,51.1)	-	0.146

P<0.05

4.5.2 Behavioural and Clinical Factors Associated with Dietary Folate Intake of Adolescent Pregnant Women Attending ANC at Huruma Sub County Hospital

Regular check-up and PMTCT services were not significantly associated dietary folate intake and similarly those given Tetanus Toxoid Injection (TTI), Insecticide Treated Nets (ITNs) and use of supplements. Health education was however significantly associated with dietary folate intake as shown in Table 4.4 below.

Table 4.4: Behavioural and Clinical factors associated with dietary folate intake of adolescent pregnant women attending ANC at Huruma Sub County Hospital

Characteristic	Dietary folate intake		Chi-square	P-value
	Adequate n(%)	Inadequate n (%)		
Regular check up Yes No	50(22.7) 3(1.4)	145(65.9) 22(10)	2.25	0.13
PMTCT Yes No	9(4.1) 45(20.5)	38(17.3) 128(58.2)	0.79	0.37
TTI Yes No	41(18.6) 12(5.5)	138(62.7) 29(13.2)	0.74	0.39
ITNS Yes No	51(23.2) 2(0.9)	142(64.5) 25(11.4)	0.11	0.75
Nutrition education Yes No	51(23.2) 2(0.9)	160(72.7) 7(3.2)	4.68	0.03
Supplements use Yes No	4(1.8) 49(22.3)	10(4.5) 157(71.4)	0.97	0.81

P<0.05

4.5.3 Factors associated with Folate Intake (Multivariate Analysis)

Multivariate analysis was done to test on factors associated with folate intake controlling supplement use. The study found out that those who did not receive nutrition education were likely to have inadequate folate intake. (OR: 95% CI: 1.497: 1.007-2.931) as shown Table 4.5.

Table 4.5: Multivariate Analysis of Factors Associated with Folate Intake

Variable	B	SE	Sig.	OR	95%CI for OR	
					Lower	Upper
No Nutrition Education	0.404	0.263	0.049	1.497	1.007	2.931
Supplement use	-0.041	0.132	0.757	0.960	0.741	1.244
Constant	0.756	0.632	0.231	2.130		

4.5.3 Supplement Issuance and User Knowledge on Supplementation

Eleven (5%) respondents reported to be issued with supplements i.e. blood boosters whenever they visited the Health facility, out of this 18.2% used the supplements very often. On user knowledge on supplementation, 30.9% reported that daily usage is recommended and only

11.8% of the respondents reported that usage of supplements before pregnancy is recommended as in table 4.6 next page.

Table 4.6: Supplement Issuance and User Knowledge on Supplementation

Variable	N=220 (%)
Supplement issued	
Yes	11(5)
No	209(95)
Frequency of usage for those issued	
Very often	2(18.2)
Rare	9(81.8)
Recommended Frequency of usage	
Daily	68(30.9)
Thrice a week	46(20.9)
Once/twice a week	24(10.9)
Never	82(37.3)
Recommended stage of folic supplementation	
Before pregnancy	26(11.8)
0-3 months	77(35.)
4-6 months	68(30.9)
6-9 months	49(22.3)

4.5.4 Supplementation Usage

Cross tabulation on the cost of supplement, side effects versus usage of supplements was conducted. 144 of the respondents reported that the supplements was expensive and 123 reported to have experience side effects as shown in Table 4.7 below

Table 4.7: Factors Associated with Supplements Use

	Supplement use				
	Daily	Thrice a week	Once/twice a week	Never	Total
Cost					
Expensive	47	37	14	46	144
Affordable	12	6	8	21	47
Cheap	0	10	18	1	29
Total	59	53	40	68	220
Side effects					
Yes	61	33	26	3	123
No	10	20	6	61	97
Total	71	53	32	64	220

A chi Square test on cost of the supplements and Side effects experienced after taking the supplements was done to find out the effect on usage. Side effects were significantly associated with supplements use. However the cost was not significantly associated with folic supplements use as shown in Table 4.8 below.

Table 4.8: Chi Square Test of Association

	df	**Chi-square**	**Sig**
Cost	8.33	6	0.22
Side effects	101.629781	3	0.01

P<0.05

CHAPTER FIVE

DISCUSSION

5.1 Prevalence of Adequate Dietary Folate Intake among Adolescent Pregnant Women

Majority of the respondents 167(75.9%) had taken inadequate amounts of folate and 53 respondents (24.1%) had taken adequate amounts of folate based on EAR. The high prevalence of inadequate intake could be attributed to the socio economic status of the pregnant adolescents of whom most were found to be low as in the study. This is in line with a study by Freisling *et al. (*2006) which found out that the dietary intake of these nutrients is varied between different socio-economic status groups with the disadvantaged women being more likely to have micronutrient deficiencies.

The study found out that the prevalence was higher than studies done in South Sudan by Abdelrahim (2009), Ethiopia by Haidar et al. (2010) and Eshipala et al. (2012) in Kenya. South Sudan had a prevalence of 57.7% folate deficiency and Ethiopia reported a prevalence of 46.1% as severe folate deficiency (≤ 4 ng/mL) and 21.2% as marginal folate deficiency (> 4–6.6 ng/mL).A prevalence of 55.2% folate inadequacy was found in Kenya. A study done in United States found out that 19% of female adolescents aged 14 to 18 years and 17% of women aged 19 to 30 years do not meet the EAR of folate in the United States (Bailey et al., 2010). This prevalence was way lower in comparison to the study findings. This very low prevalence of inadequate intake could be attributed to better socio economic status, better government policies such as food fortification with folate and better access to health facilities in the United States.

The prevalence of inadequate intake (75.9%) was lower compared to studies done in China, Brazil and Kenya. Odiwuor et al. (2017) did a research in in Migori Kenya and reported that 13.5% of women under study met the RDA for folate intake translating to a deficiency of 86.5%. A study in China by Cheng et al. (2009) found out that inadequate folate intake among expectant women based on the Estimated Average Requirement (EAR) was as low as 97% and a study by Morimoto et al. (2006) among University female students in Brazil found out that the prevalence of inadequate nutrients namely folate, zinc, copper and calcium in comparison to Estimated Average Requirements was 99% folate, 47% zinc, 33% copper and 95% calcium. This difference could be attributed to regional and geographical differences.

The study findings were similar to those of a study of Guamanian adolescents, by Pobocik*et al*. (2003) which found out that the adolescents were at a risk of inadequate intake at 80% below the EAR.

5.2 Access to Folic Acid Supplementation

The study deduced that accessibility to supplementation regimen was still low. The study found that only 5% of the women under study had accessed supplementation. The findings were similar to those of a study in Queen Mary University (2014) which found out that only 6% of the adolescent pregnant women took folic acid supplements during pregnancy.

The study reported 5% use of supplements which was lower compared to two studies done in Kenya. Mgamb et al. (2015) sought to find out folate deficiency and utilization of folic acid fortified flour in Pumwani Hospital Kenya and found that only 13% of the study participants reported that they were using folic acid supplements. Kamau et al. (2018) found out that 32.7% of the study respondents complied with

IFAS use and only 8% of the pregnant women used the supplements for a period of more than 90 days. Similar reports of low use of supplements were made in a study by Juma et al. (2015) in Machakos County which reported the use of supplements at 18%. The lower prevalence than the other studies done in Kenya could be attributed to the findings in FGD that there was unavailability of supplements at the health facility for longer periods i.e. inadequate and inconsistent supply of supplements to the health facility. The health facility had been running without supplements for a period of over a half year. Guided by the WHO guidelines of 2012, Kenya established IFAS programme to specifically address anaemia in pregnancy with the aim of achieving 80% coverage by 2017 (Ministry of Health, 2013). This has however not been achieved with the statistics being way lower than the projected values.

The findings were however way lower compared to a study done in Northern Tanzania which found out that use of folic acid supplementation stood at 17.2% despite the recommendations by WHO and the high prevalence of adverse health conditions and birth outcomes as a result of not using the supplements.

The study findings was still lower compared to findings in South Australia by Conlin et al. (2006) which found at that compliance to recommended use of folic acid and full compliance in relation to dose and timing was achieved by 30% of women under study. Partial compliance was at 43% and no use of supplements presented at 27% of the study population. The better compliance rates compared to that in this study could be attributed to better access to health facilities and better economic status in South Australia.

Supplementation is also critical to cases reported to be HIV infected. The study did not find significance association between PMTCT services and inadequate intake.

However, other studies have shown significant association between folate deficiency and fast progression of HIV infection (Aknam et al 2008). This is critical in ensuring that optimum outcome from pregnancy is experienced.

5.2.1 Knowledge on Intake of Folate and Use of the Supplements

Some of the other factors that affected access to supplementation included inadequate access to information. Most respondents did not know the right time to take the supplements. Only 26(12.1%) respondents said that folate supplements should be taken before pregnancy. From the FGD, the respondents deduced that information was only given at the health facility with no follow up to assess the reception of the same. There were no other platforms to provide knowledge on the importance of adequate nutrient and folate supplements intake. A study by Mgamb et al. (2015) in Kenya found that 73% had heard about folic acid but only 50% could mention one or more of the benefits of folic acid to women of reproductive age and pregnant women.

Nutrition education was significantly associated with inadequate dietary folate intake ($P<0.05$) hence a predictor to inadequate intake. Timing of nutrition education is hence critical in ensuring proper impact on adequate intake of dietary folate is achieved among adolescent pregnant women. The study also found out that during the counselling sessions at the hospital, most pregnant women had very little knowledge on the effects of inadequate nutrient intake. Most participants did not know enough about what foods are high in folate and had never spoken with anyone before about folate. Several of the study participants had little knowledge on NTDs, pregnancy issues and their risk for pregnancy complications. This was similar to findings by Kamau et al 2018 that nutritional knowledge was associated with adherence to taking IFAS supplements

Study findings on knowledge assessment of pregnant women on folic acid by Conlin et al. (2006) corroborates the findings on this study on the significance of Nutrition Education to adequate folate intake. Conlin et al 2006 found out that a strong association existed between the level of knowledge and level of compliance. Women within high knowledge level group were more likely to achieve a full compliance level and similarly women in the low knowledge level group were more likely to have no compliance.

5.3 Barriers to Intake of Folate and use of Folic Acid Supplementation

The study found out that161 respondents (74.2%) felt it was expensive to buy the folate rich foods. These findings were similar to a study by Amy S. Kloeblen et al 1999 which found out that many pregnant women had basic misperceptions concerning folate e.g. that to follow a high folate diet is difficult, expensive, time-consuming and less effective than vitamin supplementation.

Side effects due to folic supplements use was a barrier to folic acid supplementation. The association was significant ($P<0.05$).From the FGDs, the Nutritionist reported that side effects of taking the supplements played a role adhering to intake hence a barrier to uptake of the supplements. This was similar to study findings by Kamau et al 2018 which reported that adherence affected uptake of IFAS and side effects on use of supplements played a role in adherence amongst other factors such as forgetfulness on the requirement to take the supplement daily, age, literacy level, socioeconomic status, the cost of IFA tablets, parity and quality of counselling on IFAS uptake.

30.6% respondents reported daily usage of supplements. This was lower compared to a study by Nguyen P et al. 2008 which reported that the rate of adherence to routine supplementation regimens in pregnancy is reported to be about 50%. However, the

two studies were in agreement that presence of side effects could be as a result of Nausea, Constipation and Cramps attributable to gastrointestinal side effects associated with intake of supplemental iron which is given in combination with folic acid similar to findings by Kamau et al 2018 which found out that the major side effects reported included nausea and epigastric pain and as a result some of the respondents stopping the usage of the supplements.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The study found out the following:

- The prevalence of adequate intake was low.
- Access to supplementation has not been achieved as evidenced by the availability of the supplements at the Health facility. Very few respondents issued with supplements at the Health facility and the FGD findings showed that supplement supply to the Health facility was not constant
- Lack of adequate nutrition education to the pregnant women was a barrier to supplementation programme. Nutrition education was only given at the health facility with no follow up to assess reception and practise of the same. There were no other platforms to provide knowledge on the importance of adequate nutrient and folate supplements intake
- Side effects was a barrier to usage of supplements with nausea on the lead that resulted in most respondents stopping the usage of the supplements

6.2 Recommendations

Recommendations emanating from the study are as follows:

1. There is need to have better structures to enhance supply of supplements to the Health facility at all times.
2. There is need to put in place measures to mitigate effects of supplement use to ensure access to supplementation is achieved at all times.

6.3 Recommendations for Further Studies

Further studies to be done on impact of nutrition education before conception and early stages of pregnancy in pregnant adolescents on birth outcome to establish a clear relationship.

REFRENCES

Abdelrahim, I.I., Adam, G.K., Mohmmed, A.A., Salih, M.M., Ali, N.I., Elbashier, M.I., & Adam, I. (2009). Anaemia, Folate and Vitamin B12 deficiency among pregnant women in an area of unstable malaria transmission in Eastern Sudan.

Aknamu, A., Osunkalu, V., Adediran A., Adeyemo T., Ernest O., & Coker H. (2008).Plasma folate studies in HIV-positive patients at the Lagos university teaching hospital, Nigeria.

American College of Obstetricians and Gynecologists. (2011). Frequently Asked Questions, FAQ001, Pregnancy, Nutrition during Pregnancy.Retrieved May 15, 2012.

Anzaku, A.S. (2013). Assessing folic acid awareness and its usage for the prevention of neural tube defects among pregnant women in Jos, Nigeria. J Basic ClinReprodSci 2013;2:13-7.

Apolline, I., Jean-François, B., & Henk, J.B. (2010). Neural Tube Defects, Folic Acid and Methylation

Ashworth, C.J., &Antipatis, C. (2001).Micronutrient programming of development throughout gestation. Reproduction; 122:527–535.

Bailey, L.B., and Gregory, J.Fr. (2006).Folate.Present Knowledge in Nutrition. B. Bowman and R. Russell. Washington, DC, International Life Sciences Institute. I: 278-301.

Barbour, R.S., Maclead, M., Mires, G., & Anderson, A.S. (2012). Uptake of folic acid supplements before and during pregnancy: focus group analysis of women's views and experiences. J.HumNutr. Diet.25, 140.147

Canfield, M. A.,Anderson, J. L., &Waller, D. K.(2000-2001). Folic acid awareness and use among women with a history of a neural tube defect pregnancy-Texas.

Carmel, R. (2005). Folic Acid.Modern Nutrition in Health and Disease.

De-Regil, L.M., Fernandez-Gaxiola, A.C., & Dowswell T. (2010). Effects and safety of periconceptional folate supplementation for preventing birth defects.

Elizabeth, P.M. & Nicola, J. (2012). Charting the future Empowering girls to prevent early pregnancy

Florence, O.O., Judith, K. & Judith, W. (2017). Efficacy of nutrition counselling on energy and micronutrient intake of pregnant women in Migori County, Kenya.

Gibson, A., Woodside, J.V., Young, I.S., Sharpe, P.C., Mercer, C., &Patterson, C.C. (2008). Alcohol increases homocysteine and reduces B vitamin concentration in healthy male volunteers-a randomized, crossover intervention study. QJM 101(11): 881-887.

Haidar, J.B., Melaku, U.C., & Pobocik, R.S. (2010). Folate deficiency in women of reproductive age in nine administrative regions of Ethiopia: an emerging public health problem.

Hannah, B., Vijaya, K., Sowmiya, M., Matthew, W.D. & Bernadette, M. (2015). Estimates of global and regional prevalence of neural tube defects for 2015: a systematic analysis

Juma, M.O., & Konyole, S.O. (2015).Predictors of optimum antenatal iron-folate supplementation in a low resource rural set-up in eastern Kenya.J Public Health Epidemiol. 2015; 7:337–45.

Kamau, M.W., Waithira, M., & Kimani S. (2018). Compliance with Iron and folic acid supplementation (IFAS) and associated factors among pregnant women: results from a cross-sectional study in Kiambu County, Kenya.

Katalin, F., Cristiana, B., Irene, C., Maria, H., Berthold, V.K., & Tamas, D. (2010). Perinatal folate supply: relevance in health outcome parameters

Keen, C.L., Clegg, M.S., Hanna, L.A., Lanoue, L., Rogers, J.M., Daston, G.P.,.Uriu-Adams, J.Y. (2003).The plausibility of micronutrient deficiencies being a significant contributing factor to the occurrence of pregnancy complications. J Nutr; 133:1597S–1605S

Kelly, L., Lisa, A., Valerie, T., & Deborah, L. (2006).One-Third of Pregnant and Lactating Women May Not Be Meeting Their Folate Requirements from Diet Alone Based on Mandated Levels of Folic Acid Fortification.The Journal of Nutrition

Kenya Demographic and Health Survey (KDHS) 2014.

Kenya National Micronutrient Survey 2011:http://statistics.knbs.or.ke/nada/index.php

Klaus, K., & Hans, V., (2012).Interaction between iron/folic acid and malaria.

Lamers, Y. (2011).Folate recommendations for pregnancy, lactation, and infancy. Ann Nutr Metab 59(1): 32-37. Pubmed

Mason, J.B., & Choi S.W. (2000). Folate and carcinogenesis: Developing a unifying hypothesis, Enzyme Regulation.

Melissa, L. C., Alastair, H., MacLennan & Jessica, L. B. (2006). Inadequate compliance with periconceptional folic acid supplementation in South Australia

Ministry of Health. (2013). National Policy Guidelines on Combined Iron and Folic Acid (IFA) Supplementation for Pregnant Mothers in Kenya. Nairobi: Division of nutrition

MoPHS. (2012). National Nutrition Action Plan 2012-2017. Division of Nutrition.

National Council on Population and Development. (2020). Teenage pregnancy situation in Kenya

Newnham, J., Moss, T., Nitsos, I., Sloboda, D., & Challis, J. (2002). Nutrition and the early origins of adult disease. Asia Pac J ClinNutr; 11:S537–S542.

Nilsen, R., Vollset, S., & Gjessing, H. (2006). Patterns and predictors of folic acid supplement use among pregnant women: the Norwegian Mother and Child Cohort Study. Am J ClinNutr; 84:1134–41.

Nilsen, R.M., Vollset, S.E., & Gjessing, H.K. (2006). Patterns and predictors of folic acid supplement use, among pregnant women: the Norwegian Mother and Child Cohort Study. American Journal Clinical Nutrition, 84:1134–1141

Nutrition International. (2020). Preventing Neural Tube Defects in Low and Middle Income Countries and the importance of Representative Organizations. Knowledge Brief.

Okubatsion, T.O., Waithira, M., Eunice, O., Wakasiaka, S., & Michael, H. (2016). Prevalence and Factors Associated with Anaemia among Pregnant Women Attending Antenatal Clinic in the Second and Third Trimesters at Pumwani Maternity Hospital, Kenya

Pardo, V.R.A., Lay-Son, R.G., Aranda, ChW., Dib, M.M., Espina, M.P., Munoz,…K.M.J. (2007). Awareness and knowledge of the use of folic acid in the prevention of neural tube defects: a survey of women living in Santiago, Chile. Rev Med Chile. 2007; 135:1551-7.

Perinat, J. E. (2003). Improving Nutrition in Pregnant Adolescents: Recommendations for Clinical Practitioners

Picciano, M. (2003). Pregnancy and lactation: physiological adjustments, nutritional requirements and the role of dietary supplements. J Nutr; 133:1997S–2002S

Rader, J.I., & Schneeman, B.O. (2006). Prevalence of neural tube defects, folate status, and folate fortification of enriched cereal-grain products in the United States. Pediatrics 117(4): 1394-1399. Pubmed

Rader, J.I., Weaver, C.M., & Angyal, G. (2000). Total folate in enriched cereal-grain products in the United States following fortification. Food Chem.; 70:275–89.

Rati, J., Nisha, S., Shobha, U., Padmini, G., Neha, L., Jere, H., & Erick, B. (2015). Folate status and intake of tribal Indian adolescents aged 10 to 17 years.

Regan, L.B., Kevin, W. D., Jaime, J.G., Johanna T.D., Margaret, A.M., Elizabeth, A.Y..Vicki, L.B. (2009). Total folate and folic acid intake from foods and dietary supplements in the United States: 2003–2006

Sandra, G., Carla, L., & Elisabete Pinto. (2016). Folate and folic acid in the periconceptional period: recommendations from official health organizations in thirty-six countries worldwide and WHO

Scholl, T.O. & Johnson, W.G. (2000). Folic acid: influence on the outcome of pregnancy. Am J ClinNutr.; 71: suppl: 1295S–303S.

Scholl, T.O., & Johnson, W.G. (2000). Folic acid: influence on the outcome of pregnancy. American Journal Clinical Nutrition 71(5 Suppl): 1295S-1303S. Pubmed

Seck, B.C., & Jackson, R.T. (2008). Determinants of compliance with iron supplementation among pregnant women in Senegal. Public Health Nutr, 11: 596–605

ShiWuWen, Y., Marc, R., Ruth, R.W., Qiuying, Y., Graeme,N.,.. Mark, C.W. (2016). Folic Acid Supplementation in Pregnancy

Shils, M., Shike, A., Ros Bailey, R.L., Dodd, K.W., Gahche, J.J., Dwyer, J.T.,...Yetley, E.A.(2010). Total folate and folic acid intake from foods and dietary supplements in the United States: 2003-2006. American Journal Clinical Nutrition 91(1): 231-237.

Shipala, E.K., Wafula, S.W., Ettyang, G.A., & Were, E.O. (2012). Nutrient intake among pregnant teenage girls attending ante-natal clinics in two health facilities in Bungoma South District, Western Kenya. East Afr. Med. J. 2012; 89:94–99

Sunil, S., Robert, E., Black, I. K., Arup, D., Usha, D., & Mahdi, R. (2014). Effect of Iron/Folic Acid Supplementation on the Outcome of Malaria Episodes Treated with Sulfadoxine-Pyrimethamine

Timmermans, S., Jaddoe, V.W., Mackenbach, J.P., Hofman, A., Steegers-Theunissen, R.P. & Steegers, E.A (2008). Determinants of folic acid use in early pregnancy in a multi-ethnic urban population in The Netherlands: The Generation R study. Prev Med, 47: 427–432.

Viteri, F., & Berger, J. (2005). Importance of pre-pregnancy and pregnancy iron status: can long-term weekly preventive iron and folic acid supplementation achieve desirable and safe status? Nutr Rev; 63:S65–S76.

WHO. (2020). Intermittent iron and folic acid supplementation in adult women and adolescent girls

WHO. (2012). Guideline: daily iron and folic acid supplementation in pregnant women. Geneva: World Health Organization; 2012.

WHO, UNICEF & UNU.(1999). Composition of a Multi-Micronutrient supplement to be used in pilot programmes among pregnant women in developing countries.

World Health Organization (2007). Department of Making Pregnancy Safer: Standards for Maternal and Neonatal Care.

APPENDIX I: CONSENT FORM

Title of the Study

Folate Intake and Access to Supplementation among Adolescent Pregnant Women Attending Antenatal Clinics at Huruma Sub County Hospital,

Researcher:

CarolyneBirgen

Moi University

School of Public Health

P.O. BOX 4606, Eldoret

Contact: +254 718 965 483

Purpose of the Study

The study intends to establish adequacy of dietary folate intake and access to ideal supplementation among the adolescents. Folate plays a critical role in pregnancy and in addition to this adolescence pregnancy adds to a double burden scenario where the young mother has to meet nutritional needs for the growing infant and herself. This will provide more information on what needs to be done to improve the situation.

Specific objectives

1. To determine the prevalence of inadequate folate intake among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital
2. To determine the extent of access to ideal Folic acid supplements among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital
3. To identify the barriers to intake and uptake of folic acid supplementation among adolescent pregnant women attending antenatal clinic at Huruma Sub County Hospital

Procedures

Study participants will be interviewed on their food consumption patterns using a food frequency questionnaire. More information e.g. on socio economic status will be asked by the researcher. Anthropometric assessment of MUAC, weight and height will also be taken.

Benefits

There will be no direct benefits from the study it is purely for academic purposes

Risks

There will be no perceived risks

Confidentiality

All information given in the study will be kept confidential and will solely be used for the purpose of the study

Participation

Participants will participate voluntarily and be free to withdraw anytime from the study.

Statement of the consent

I agree to participate in the study. I have both read and have been explained the purpose of the study and understood clearly.

Signature of participant: ……..……..

Date: ……..

Signature of the researcher: ……..

APPENDIX II: IDHINI YA MAKUBALIANO

Mada la utafiti

Folate Intake and Access to Supplementation among Adolescent Pregnant Women Attending Antenatal Clinics at Huruma Sub County Hospital,

Mtafiti:

Carolyne Birgen

Moi University

Shule ya Public Health

ANWANI: 4606, Eldoret.

Contact: +254 718 965 483

Umuhimu wa utafiti huu

Utafiti huu unalenga kujua utumizi wa vyakula vyenye madini ya folate kwa kiwango kinachohitajika na kupatikana kwa madini ya folic acid kwa vijana waja wazito.

Folate huchangia pakubwa katika uja uzito. Ujauzito wa vijana una changamoto zake kwa sababu mwili wake bado unahitaji madini ili kukua inavyohitajika na pia mtoto mchanga tumboni mwa mama anahitaji vyakula na madini kwa kiwango kinachohitajika ili akuwe vizuri.

Lengo la utafiti

1. Kutathmini kiasi cha uwepo wa upungufu wa matumizi ya folate kati ya vijana wenye ujauzito kakita kliniki ya Huruma Sub County.
2. Kutathmini uwezo wa kupatikana kwa madini ya folic acid kwa kiwango kinachohitajika kwa vijana wenye ujauzito katika kliniki ya Huruma Sub County.
3. Kutambua vizuizi vinavyopatikana katika utumuzi wa vyakula na madini yenye folate kwa vijana wenye ujauzito katika kliniki ya Huruma Sub County

Mtindo wa utafiti

Mshiriki ataulizwa maswali kuhusu vyakula anavyotumia kila mara na kiwango anachotumia. Mtafiti pia atachukua vipimo kama urefu na kilo wa kila mshiriki. Maswali za ziada kuhusu hali ya maisha yamshiriki pia yataulizwa

Manufaa

Utafiti huu hautakuwa na manufaa wowote kwa mfano fedha kwa mshiriki ila ni kwa matumizi ya masomo pekee.

Athari

Hamna athari zozote kutokana na utafiti huu

Siri

Ujumbe wote katika utafiti huu utawekwa kwa siri na kutumika tu kwa nia ya utafiti huu pekee

Ushiriki

Washiriki wote watashiriki kwa iari yao tu bila kulazimishwa.

Idhini la makubaliano

Nakubali kushiriki katika utafiti huu. Nimesoma na kuelezwa lengo kuu la utafiti huu na nimeelewa kswa kikamilifu.

Sahii ya mshiriki: ……..……..……..

Tarehe: ……..

Sahihi ya mtafiti: ……..

APPENDIX III: QUESTIONNAIRE
SERIAL NO: ----------

Demographic data

1. Age……
2. Highest level of education

   None ☐

   Primary ☐

   Secondary ☐

   Tertiary ☐

3. Marital status

   Single ☐

   Married ☐

   Separated ☐

   Widowed ☐

4. What type of housing do you live in?

   Rented ☐

   Own ☐

5. How much is your monthly income?

   <1000 ☐

   1000-3000 ☐

   3001-9000 ☐

   >10,000 ☐

6. How many live and still births if any have you had? (parity)

   ……

7. Which month are you in (Age of pregnancy)?

……

8. Where do you reside?

……..

Access

1. How many times have you visited the ANC clinic?

……

2. How near is the health centre to you?

100m-1 km ☐ 1-5km ☐ beyond 5km ☐

3. What services do you get whenever you visit the health facility?

(i) …….

(ii) ……..

(iii)……..

4. How often do you get the intended services?

Once ☐ 2-3 times ☐ more than 4 times ☐

5. a) Are you issued with any supplements whenever you visit the facility?

Yes ☐ No ☐

b) Can you list them?

(i) ……..

(ii) ……

(iii)……

(iv)……

6. Are all these supplements always available?

Yes ☐ No ☐

7. If No, how often does it happen?

Very often ☐ rarely ☐ never ☐

User Knowledge on supplementation

1. a) Have you taken any medications during this period of pregnancy?

Yes ☐ No ☐

b) If yes please list them

(i) …….

(ii) …….

(iii)…….

2. How often do you use the supplements?

Daily ☐ thrice a week ☐ once/twice a week ☐ never ☐

3. At what stage should you take folic supplementation?

Before pregnancy ☐ 0-3 months ☐ 4-6 months ☐ 6-9 months ☐

4. What is the value of taking the supplement?

(i) ……

(ii) ……

(iii)…….

5. Barriers

i. What cost is involved in accessing the folate rich foods?

ii. Have you received nutrition education on importance of adequate intake?

Yes ☐ No ☐

iii. Do you experience any side effects after consuming the supplements?

…

If yes list them……

iv. Does any of the side effects cause you to stop use of supplements?

Yes ☐ No ☐

ANTHROPOMETRIC DATA

Subject no. …….

Weight ……..

MUAC ……..

Height …….

APPENDIX IV: FOOD FREQUENCY QUESTIONNAIRE (FFQ)

Food item	**How often do you consume the listed foods**						**How much do you consume the foods whenever you have them**			
	Never	**Daily**	**Once/week**	**2/3times/week**	**4/5times/week**	**Once/month**	**¼**	**½**	**¾**	**1 plate**
Starches										
Brown Rice										
Brown Bread(slices)										
Brown Chapati										
Seeds										
Simsim										
Sunflower Seeds										
Pumpkin Seeds										
Peanuts										
Vegetables										
Spinach										

Brocolli										
Pumpkin leaves										
Cabbage										
Fruits										
Oranges										
Grape fruits										
Strawberries										

APPENDIX V: FOCUS GROUP DISCUSSION (FGDs) GUIDE

1. Do you receive the drugs on time?
2. Are the supplied drugs in adequate amounts?
3. How often do you counsel the women on the benefits of Folate supplementation
4. Are there any structures in place to monitor compliance among the women who receive the medication?
5. What challenges do you face regarding the pregnant adolescents that receive supplementation?

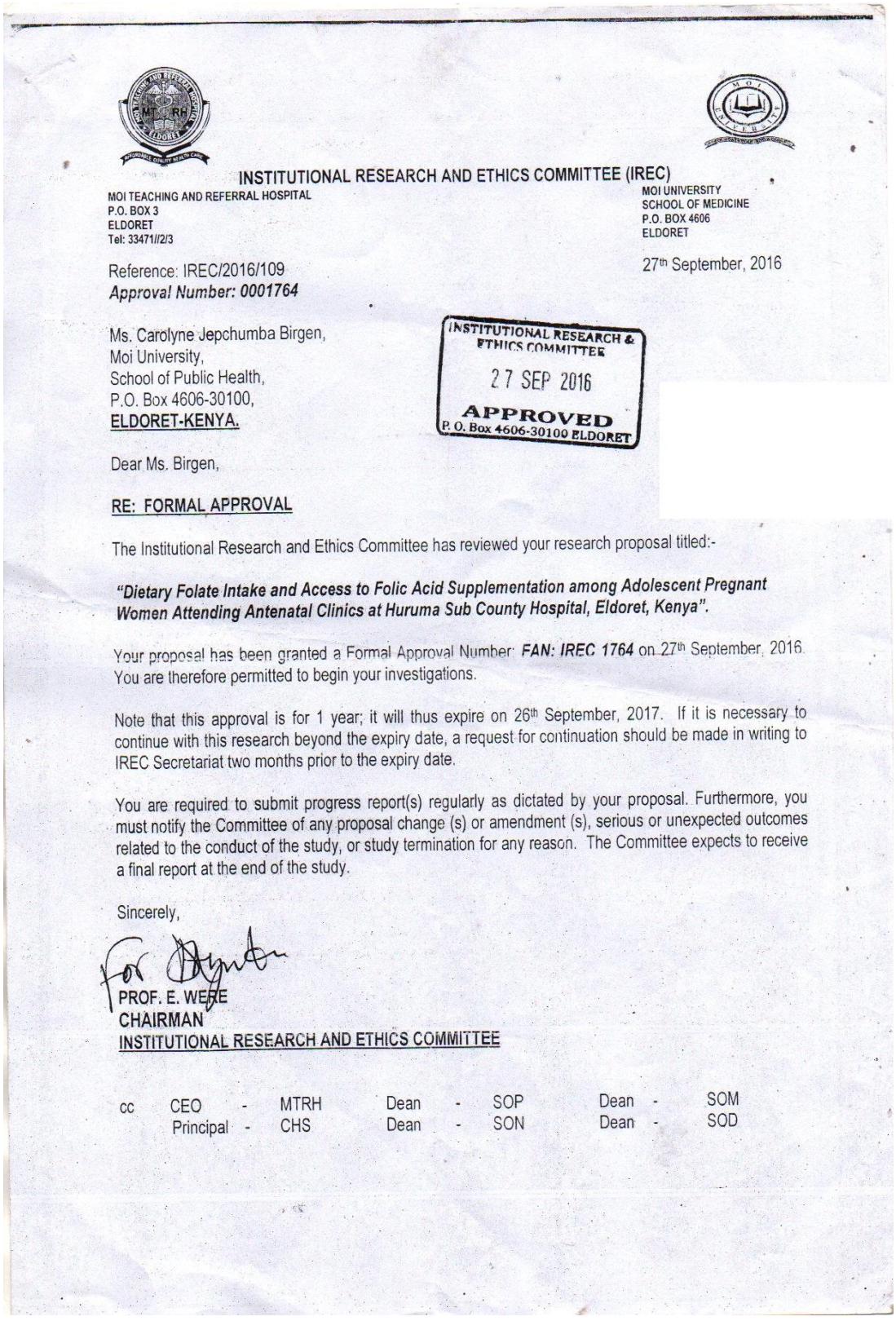
APPENDIX VI: BUDGET

ITEM REQUESTED	**UNIT**	**QUANTITY**	**UNIT COST**	**TOTAL COST**
Questionnaire development and printing	Copies	250	10	2500
Training of research assistants	Days	1	10,000	10000
Allowances for 1 research assistants	Days	40	500	20000
Transport for researcher	Days	10	500	5000
Data analysis and typesetting	copies	10	5000	50000
TOTAL				**87,500**

APPENDIX VII: TIME PLAN

	April 2016	May 2017	March-May 2018	June-sep2018	Jan2019	Aug 2019
Proposal Writing						
Proposal correction						
Data collection						
Data analysis						
Thesis writing & submission for examination						
Graduation						

APPENDIX VIII: LETTER OF APPROVAL FROM IREC



INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

MOI UNIVERSITY
SCHOOL OF MEDICINE
P.O. BOX 4606
ELDORET

Reference: IREC/2016/109
Approval Number: 0001764

27th September, 2016

INSTITUTIONAL RESEARCH & ETHICS COMMITTEE
27 SEP 2016
APPROVED
P. O. Box 4606-30100 ELDORET

Ms. Carolyne Jepchumba Birgen,
Moi University,
School of Public Health,
P.O. Box 4606-30100,
ELDORET-KENYA.

Dear Ms. Birgen,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee has reviewed your research proposal titled:-

"Dietary Folate Intake and Access to Folic Acid Supplementation among Adolescent Pregnant Women Attending Antenatal Clinics at Huruma Sub County Hospital, Eldoret, Kenya".

Your proposal has been granted a Formal Approval Number ***FAN: IREC 1764*** on 27th September, 2016. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 26th September, 2017. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

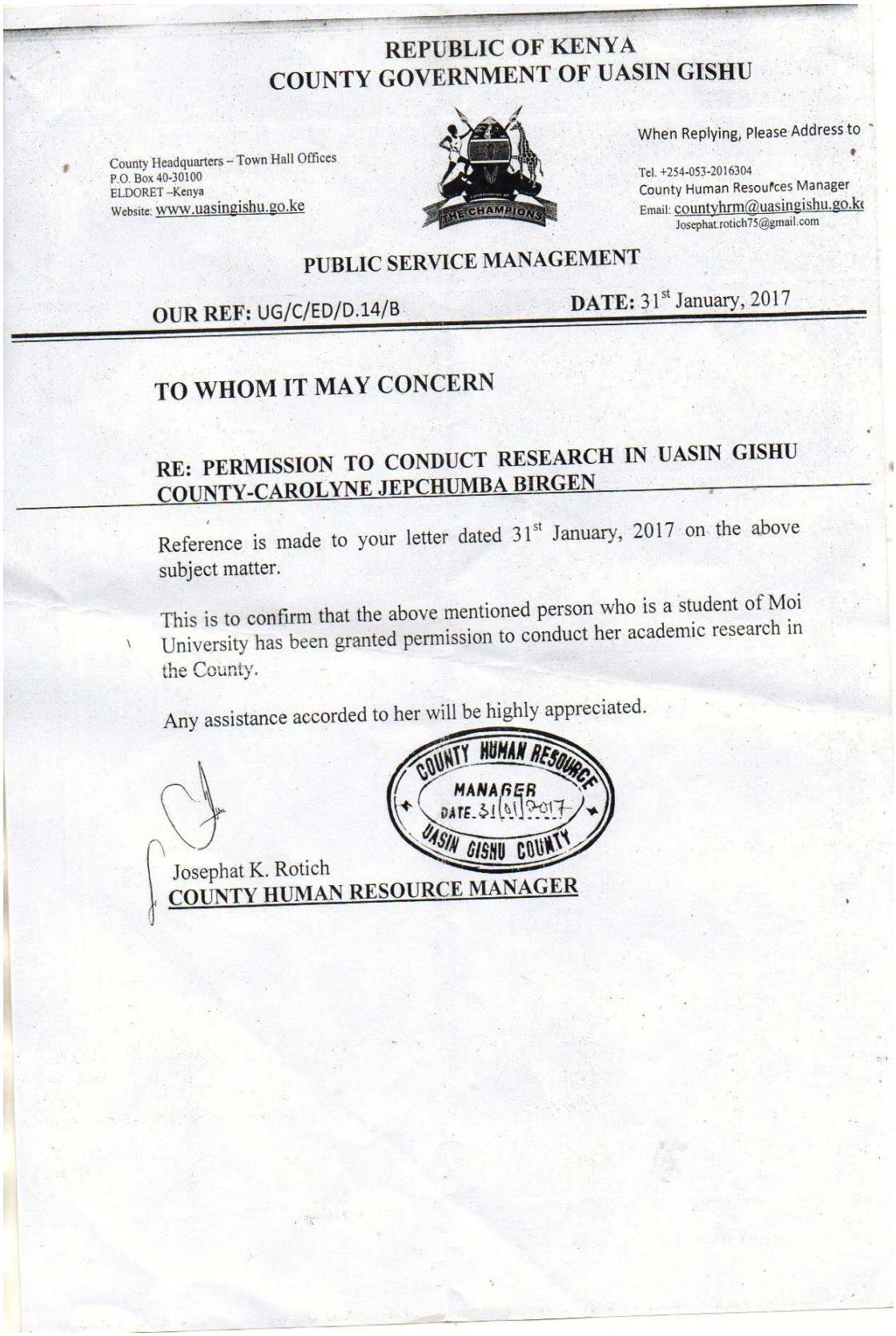
Sincerely,

for

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc CEO - MTRH Dean - SOP Dean - SOM
Principal - CHS Dean - SON Dean - SOD

APPENDIX IX: APPROVAL TO CONDUCT RESEARCH FROM THE UASIN GISHU COUNTY



REPUBLIC OF KENYA
COUNTY GOVERNMENT OF UASIN GISHU

County Headquarters – Town Hall Offices
P.O. Box 40-30100
ELDORET –Kenya
Website: www.uasingishu.go.ke

When Replying, Please Address to

Tel. +254-053-2016304
County Human Resources Manager
Email: countyhrm@uasingishu.go.ke
Josephat.rotich75@gmail.com

PUBLIC SERVICE MANAGEMENT

OUR REF: UG/C/ED/D.14/B DATE: 31st January, 2017

TO WHOM IT MAY CONCERN

RE: PERMISSION TO CONDUCT RESEARCH IN UASIN GISHU COUNTY-CAROLYNE JEPCHUMBA BIRGEN

Reference is made to your letter dated 31st January, 2017 on the above subject matter.

This is to confirm that the above mentioned person who is a student of Moi University has been granted permission to conduct her academic research in the County.

Any assistance accorded to her will be highly appreciated.

COUNTY HUMAN RESOURCE MANAGER DATE 31/01/2017 UASIN GISHU COUNTY

Josephat K. Rotich
COUNTY HUMAN RESOURCE MANAGER