ASSESSMENT OF VITAMIN A ROUTINE SUPPLEMENTATION AND DIET RICH IN VITAMIN A ON NUTRITION STATUS IN UNDERFIVE YEARS OF AGED IN WAJIR EAST SUB-COUNTY

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DECLARATION

DECLARATION

I declare that this research Thesis is my original work and has not been presented in any other university.

Signed…….…….. Date……

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RECOMMENDATION

This thesis has been submitted for examination with our/my approval as university.

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DEDICATION

I dedicate this thesis to my family.

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ABSTRACT

The deficiency of Vitamin A increases child vulnerability to stunting whose effects are permanent if not managed early and spilling over into adulthood. The study aimed to measure the outcome of vitamin A routine supplement and diet rich in vitamin A on morbidity and nutrition status (stunting) in under-fives months children in Wajir East Sub-County. The study design was descriptive cross-sectional survey. The target population was children under-fives months and the sample size was 207 however there was a non-response of two making the response rate 99.03% which is still considered valid. Interview schedule was used to gather information from the caretakers and mothers of under-fives children in the study and anthropometric measurement was used to collect data on height/length for age of the target children**.** The respondent was selected randomly. SPSS (Statistical Package for Social Sciences) was used to evaluate statistics. Permission was obtained from respondents. Research approval, ethical clearance and research permit were granted by Kenya Methodist University and National Council of Science, Technology and Innovation respectively. The routine coverage for under-fives was found to be 51.2%. Study findings also revealed the prevalence of stunting was high at 63.4% among children who did not receive vitamin A supplement as compared to those who were supplemented (36.6%). Further analysis indicated that there was substantial (0.036) association between the supplement and nutritional status of the target group. The study concludes that the outcome of the vitamin A routine supplementation had effect on both occurrence of morbidity and children nutritional status in Wajir east. The study recommends the need for the national, county government and health stakeholders to strategies and put more effort to accelerate and establish platforms that enhance service delivery at the community level such as Baby Friendly Community Initiative through community strategy to address the poor coverage and insufficient doses , and also to improve availability of the vitamin A stocks at the health facility level since it's one of the factors that is highly influential in supplementation as identified in the study.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
ASAL	Arid and semi-arid land
DHIS	District Health Information System
HIV	Human Immuno-deficiency Virus
HSSP	Health Sector Strategic Plan
MDVA	Mega Dose of Vitamin A
NDMA	National drought management authority
SMART	Standardized monitoring /assessment and relief and transition
UNICEF	United Nation Children's Fund
VAD	Vitamin A Deficiency
VAS	Vitamin A Supplementation
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Vitamin A is crucial micronutrient of interest that helps in growth and development in children. the vitamin comprises isoprenoid components with five carbon double bonds (Villamor & Fawzi, 2005a). The Vitamin is among the fat solvable vitamins and also contributing to immune functions and visualization. The vitamin is key micronutrient of importance for visualization as it comprise of rhodopsin that in aid absorption of light in the retinal receptors, (MANGUSHO, 2010) .Similarly, it also playing a considerate part in the normal development and repairs of organs such as kidney, heart and lungs. it also performs vital roles comprising hematopoiesis, reproduction visualization, and protection against the morbidity(Villamor & Fawzi, 2005b)

In spite of key improvements in the information of the supplement ecology, its deficit is a common challenging issue that touches a projected 127 million pre-schoolers internationally(Villamor & Fawzi, 2005b). The deficiency in children will contribute to a greater risk of death from diarrheal diseases as well as blindness and anemia. Numerous of these consequences can be associated to the immunologic roles of the vitamin (Villamor & Fawzi, 2005b).The routine supplementation of the vitamin (VAS) is recommended to prevent upper respiratory infections such as broncho pulmonary dysplasia (BPD)(Chabra, et al, 2013).

According to World Health Organization an estimated 250 million preschool children are vitamin A deficient. An estimated 250 000 to 500 000 vitamin A-deficient children become blind every year, half of them dying within 12 months of losing their sight.

Vitamin A deficiency is a major nutritional concern in lower-income countries. Indicates that in Africa, 2% of preschool-age children are affected by night blindness which is four times higher than the proportion in South East Asia (0.5%). Moreover, almost half of the children affected globally are found in Africa.

In Kenya, latest data show the prevalence of vitamin A deficiency (retinol-binding protein <0.70 mol/l) among pre-school children at 9.4% (CI: 7.5-11.3) - a moderate public health importance based on World Health Organization (WHO) classification (Oiye et al., 2019). The deficiency is higher in Arid and Semi-Arid Land (ASAL) counties namely Tana River, Turkana, Wajir, Isiolo Mandera, Marsabit, Mbeere and Kajiado Counties. In Wajir County for example, children aged 12-59 months who received Vitamin A twice was 21.6% both indices were below the national average of 80% coverage (Wajir County Health Department, 2017). The Ministry of Health [MOH] (2017) analysis indicates that the poor nutrition status reported across the ASAL Counties is majorly due to poor dietary intake and household level food insecurity, coupled with high disease burden. These factors compounded with the chronic issues prevalent in these areas like limited access to quality health services and inappropriate child care and feeding practices increase the vulnerability of the population, and aggravate the high malnutrition rates.

The Supplement (VAS) was started initially in the year 1970 based on the evidence that during the 1960s the degree of VAD was high, leading to nutritional blindness (Oiye et al., 2019) During the same period there was a high occurrence of respiratory illnesses, measles, diarrhea, and under nutrition among young children. The health services infrastructure was poor and frequent home visits by health workers were not likely. The populations were consuming foods with low content of retinol/carotenes. All these

factors contributed to the high prevalence of severe VAD, which led to nutritional blindness(Agrawal & Shrivastava, 2015).Vitamin A supplementation contributes to significant reduction in under-fives morbidity and mortality, thus VAS is highly recommended in areas with high risk of VAS(Imdad et al., 2017). Supplementation Was destined as a provisional intervention till additional sustainable methods might be employed, Such as addition of micronutrient in food which is processed with preformed vitamin A which will aim to improve vitamin A situation (Tanumihardjo, et al., 2015). According to World Bank the distribution of the supplement is in a form of tablets or capsules which is very actual both for preventive and therapeutic. Preventive vitamin A routine supplement was one of the projected cost-effective interventions currently accessible to the community (United Nations Child Fund [UNICEF], 2011)

The deficiency of the vitamin is one of hitches that affect the community nutritionally in the world; consequently 190 million preschoolers were affected. (Neves,et al 2015), This deficiency is linked to a significant extent of child morbidity and mortality indices, bearing in mind the countless benefits of vitamin A in the first stages of lifecycle, from conception until the age of 23 months of age . Vitamin A deficit is well-thought-out as the second greatest common reason for anemia, reducing its utilization for erythropoiesis (Mujica-Coopman et al., 2015).

The deficiency of the vitamin is an important a leading public health concern contributing to illness amongst preschoolers internationally (Kupka et al., 2016). According to most recent global estimates the deficiency of the Vitamin is well-defined as serum retinol <0.70 mmol/L. affecting 29 percent of preschoolers in low and middle-income backgrounds ,largely in sub- South Asia and Saharan Africa (Kupka et al., 2016). In unindustrialized nations, mothers regularly have VAD for the reason that

they eat foods with little vitamin A content affecting their children nutritional status which will also affect their offspring during pregnancy and breastfeeding (Martins et al., 2010).

Collective energies to battle this deficiencies have remained a concern for periods originally inclined on the approach in prevention of childhood sightlessness through activities s that will reduce the micronutrient position of children of preschoolers done through universal supplement of vitamin A capsule , additions of micronutrient to foods , additional dietary approaches to areas of widespread deficit(Palmer et al., 2012).

The source of this Vitamin includes the food from preformed such as animal products including milk, meats and from dark green vegetable and fruits. In developing nations, 70 to 90 percent of Vitamin A can be sourced from vegetables and which are not utilized well efficiently between 20 to 50 percent (Castillo et al., 2015) this Vitamin is which fat solvable vital micronutrient can be sourced from the diet in the form retinoic Acid (RA), retinyl esters, or β-carotene. Retinoic acid (RA) can be produced in plenty in a form of isoforms though outweighs mostly in tissues.

Mostly VAD are main public health concerns collectively which pose a severe menace to the susceptible groups of the society particularly in developed nations. The vulnerable group which affected by these deficiencies include the under-fives. several global summits including World Summit for Children, 1990, 1992 and The World Food Summit, 1996 The International Conference for Nutrition, have made obligation to decrease malnutrition over the last decade, and have also called for a wide range action to discourse these hidden hunger .in spite this call, 800 million people worldwide were lacking the important micronutrient ,these deficiency (VAD) is the foremost contributing of avoidable blindness in under-fives intensifying the menace of ailment

and death from severe infections(Chhagan et al., 2009). There is diverse indication of the risk of these micronutrient in on mortality amongst under-fives , with studies in South Asia (India, Philippines and Bangladesh) showing a decrease in same but little indication of a similar result among studies in Africa (Soofi et al., 2016).

The routine supplementation (VAS) is currently undertaken in Kenya in children 6 to 59 months for two likely advantages, to avert nutritionally weakened vision due to the deficiency and to decrease the mortality amongst under-fives. The existing scientific recommendation suggests that sightlessness deficiency has been nearly eradicated. The conflicting, scientific suggestion shows that the mega dose of supplement could have side effects on under-fives but not thoroughly examined (Kapil & Gupta, 2016). In Africa the vitamin A supplement and deworming (VASD) twice a year as a national interventions are only successful nutrition programs when implemented at scale, With reliably high coverage rates reported in the year 2001 in Tanzania . the delivery of vitamin A supplement coverage of has been mentioned as an aspect of a attributing element in the reduction of preschoolers mortality in the earlier historical period .(Lyatuu et al., 2016)

The Deficiency is a principal concern that mostly affects preschoolers living in countryside including the arid areas where the health services are compromised due to inadequate health facilities the distances covered(Clohossey et al., 2014) . It is essential to increase the effectiveness and packages that encompass supplementation of micronutrient (Pajuelo & Miranda 2015). The deficiency Vitamin A can be cured with the therapeutic doses Vitamin A supplements. The number of capsules can be determined by the age of the child. The supplementations can reverse night impaired vision by supporting properly through frequent greasing. Though, blindness triggered by damage

corneal is difficult to be reversed. Unanimously organizations are working to discourse Vitamin A deficiency in vulnerable populations, and seek to promote prevention through acceptable nutrition and vitamin supplements. The incidence of Vitamin A Deficiency was suggestively greater amongst under-fives years in famine zones insufficient intake of foods rich in vitamin A for an extended period of famine appears to have causative factors to the larger occurrence of the vitamin deficiencies.. overall, the under-fives who were affected by severe drought were more susceptible to the deficiency of the micronutrients compared to those who were not affected by drought (Belesova et al., 2019).

Vitamin A routine supplement to under-fives is recognized to reduce the dangers of death and illness such as HIV and AIDS infection, diarrheal diseases, measles and malaria. These might be probably as a result of the of vitamin A actions (Clohossey et al., 2014). These resistant functions of this vitamin have been defined in experimental trials which are related to therapeutic outcomes of supplement. These effects of illness such as measles are associated to improved antibody production as well as lymphocyte proliferation. And effect of reduction in severity in diarrheal illness might be attributed to the vitamin A outcome in supporting epithelia in the gut, while positive results in HIV-infected children might be effect of increase in T-cell lymphopoiesis. No definite outcome of vitamin A supplement effect on lymphocyte activation as well as cytokine production or. In some circumstances, the supplementation had possible advance effect to the infants antibody response to immunization such as tetanus, measles and polio. (Villamor & Fawzi, 2005a) the deficiency of the Vitamin A depresses resistance whereas vitamin A supplementation decreases diseases and death, mainly from measles and diarrhea. The supplement similarly reduces the death proportion in HIV/AIDS in infected children and interrupting HIV ailment. Zinc deficit is one of the interesting

factors in tuberculosis, imposing the risk of vitamin A deficiency. Supplement with numerous nutrients (including zinc) rather than vitamin A unaccompanied with other micronutrient may be very important in patients suffering from tuberculosis, but clinical trials on such amalgamation are wanting (Mathur, 2007).

Wajir County is among 47 Counties and situated in the Northern part of Kenya, with an area of 56,685.9 Km^2. The county borders Somalia to the east, Ethiopia to the North and garissa to the south.The Kenya 2019 Population and Housing census indicate that the county had a total population of 781,214. Comprising of 53% Males population whereas female population account for 47%. The infant and under-five death rates are at (44/1000**).** Malnutrition remains important public health subjects in Wajir County with prevalence of stunting and wasting at 26.4 and 14.2 percent respectively compared to national average of 26.0 and 4.1 percent, respectively as per demographic health survey 2014 according to County government of Wajir, 2018.

It is clear that vitamin A is important in the development of children under the age of 5 years. Available studies have focused on uptake of vitamin A supplementation. Studies on effect of vitamin A supplementation especially in arid and semi-arid area are however scarce. This study therefore seeks to determine an outcome of the routine supplement and relationship between diets rich in vitamin A on nutritional status in under-fives months in Wajir East

1.2 Statement of the Problem

The deficiency of the vitamin A is a stern universal under nutrition matters that predominantly touches children aged under-fives. Deficiency of Vitamin is the reason for severe visual damage that can lead to sightlessness, and suggestively reason for surges in

severe infection leading to death, from such childhood common illnesses including diarrheal disease, measles and pneumonia. The routine supplementation in Wajir is low (68%) for children under five years which is lower than the national target of above 80% in Kenya. Also in Wajir there is no adequate data on the factors affecting the vitamin A supplementations .Vitamin A have been acknowledged as priority micronutrient in Arid and Semi-Arid Land.

1.3 Purpose of the Study

The study sought to describe the vitamin A supplementation in Wajir East and how it affects nutrition status and morbidity among children under the age of 5 years.

1.4 Objectives

The study was guided by the following objectives:

1.4.1 General Objective

To determine an outcome of the routine supplement and relationship between diets rich in vitamin A on nutritional status in under-fives months in Wajir East

1.4.2 Specific Objectives

i. To evaluate the status of routine vitamin A supplement result in under-fives
ii. To find the outcome of the supplement on child nutritional effect.
iii. To investigate relationship between supplement and common disease occurrence.
iv. To determine the effect of vitamin A rich foods on nutritional status

1.5 Hypotheses

H_{A1} The routine supplement of vitamin A has a statistically significant outcome on children nutrition status in Wajir east

H_{A2} The routine supplementation of vitamin A has a statistically significant on the occurrence of morbidity among the children aged 6 – 59 months in Wajir east sub County.

1.6 Justification

Vitamin A deficiency is a public health problem all around the world, affecting children under five in more than half of all countries. The supplementation of the vitamin A is the most cost-effective and best-established technique to decrease the deficiency of the said vitamin to improve the nutrition status and at the same time saving the lives of the young children. The supplements do vital work in countries with high under-5 mortality, usually low-income countries with the lowest levels of nutrition. In these settings, the delivery of vitamin A is of utmost importance, yet progress made over the past two decades is stalling and receding. The study sought to describe the vitamin A supplementation in Wajir East and how it affects nutrition status and morbidity among children under the age of 5 years. The outcome of the study will be of great benefit to the county government and the other health stakeholders both in nutrition specific and sensitive in health and nutrition programing considering the insufficient information on Vitamin A in the county.

1.7 Limitations of the Study

The study was limited to in Wajir East. The study was descriptive in nature and therefore no causal inferences could be made. The results of the study were limited to the accuracy and honesty of respondents since it was a self- report study.

1.8 Delimitation of the Study

A large number of respondents was used to enhance generalizability of the study reults. Informed consent was sought to enhance the honesty of respondents.

1.9 Significance of the Study

The study results will be of great help toward county government programming specifically to the department of health and partners in health and nutrition both in nutrition specific and sensitive to come up with better strategies that aim to improve the poor coverage of Vitamin A routine supplementation and dietary intakes to improve dietary diversity in the county. Researchers may use the findings as reference material in future studies.

1.10 Assumption of the study

This study was built on assumption that vitamin A routine supplementation was conducted in the study area as recommended by the Ministry of Health. The study also assumes that children were breastfed and are well fed with nutritious foods. It was also assumed that the respondents would be honest and

1.11 Operational Definition of Terms

Bio fortification: this is a procedure of increasing the vital content of plant nutrients through breeding

Dietary diversity: Total number of diets or food collections consumed over specified reference period

Fortification: deliberately increasing the content of an vital a micronutrient in diet.

Malnutrition: Is impairment of health resulting from one or more nutrients resulting in under or over-nutrition.

Nutritional Status: Is the state of a person's health depending on his/her nutrients intake

Stunting: decreased progression in height or length that experienced from poor nutrition

Supplementation: Addition of extra element to the normal food intentionally by balancing a diet lacking to meet an essential recommended daily allowance

Underweight: a mass below the heaviness that is considered normal or desirable.

Vitamin A Deficiency: Inadequate vitamin A in blood and tissues for the body functions.

Micronutrients: component of diets that plays essential function in our body in minor quantities, which is critical for usual maintenance and growth whose deficit will cause undesirable changes in our body.

Vitamin A Supplementation Coverage: The proportion of under-fives in receipt of the Vitamin A supplement in a specific place in specific period of time

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section gives an insight into the literature by other scholars and investigators assessment of the outcome of vitamin supplement in children under-fives years in Wajir east sub County which analyzing collected work that is associated to the specific and overall objectives of the investigations.

2.2 Overview of vitamin A

The Vitamin is a collection of fat solvable, with retinol, retinal and retinyl esters. It's a collection of vitamin A complexes with the biologic activities. typically containing five conjugated double bond Carbon s and four isoprenoid units (Castillo et al., 2015). It helps in cellular communication, immune protection, eye sight and reproduction, it's also very important for visualization as a vital part of rhodopsin which is a protein that engrosses brightness in the retinal receptors, and aiding in a regular operational of the conjunctiva. It also cell repairs and developmental process, in performing a precarious function including formation and regular maintenance organs such as the kidneys, lungs as well as other tissues. It also act an main part in physiological functions visualization, , replications , hemopoiesis, and defense purposes(Villamor & Fawzi, 2005b)

Regardless of major improvements and understanding of the supplement science, which shows its absence is still a thoughtful public wellbeing issues which distresses 127 million projected preschoolers globally(Villamor & Fawzi, 2005b). In under-fives

children, the vitamin deficit consequences will be increased dangers of illness thus increases the mortality from measles diarrheal illness, iron deficiency as well as loss of sight. Numerous of these properties can be associated to the immunologic roles of vitamin A(Villamor & Fawzi, 2005b).the supplementation (VAS) is commended to deter broncho pulmonary dysplasia (BPD)(Chabra,et al, 2013).

Vitamin A is a group of unsaturated food carbon-based complexes that includes retinol, retinal, retinoic acid, and several provitamins. It has numerous roles such as growth and developments well as maintenance of the resistant functions and worthy visualization. Precisely, Night impaired vision and its worsened condition, (xerophthalmia,) groups of keratins in the conjunctiva, such as Bitot's spots, ulceration and hardening of cornea leading to keratomalacia. The Vitamin can also be sourced from the animal diets such as meats, Dairy and dairy products as well as from dark green leafy vegetables including kales, spinach, paw paws, and mangoes. In developing nations, 70 to 90 percent of supplement is sourced from vegetables and are utilized much less efficiently between 20 to 50 percent depending on the condition of vitamin A including other non-dietary aspects (Newton et al., 2016). The Vitamin is a fat solvable vital micronutrient sourced from foods such as vegetables.(Castillo et al., 2015)

Mainly VAD are main public health worries unanimously, it poses a severe risk to the susceptible members in the community particularly in unindustrialized nations. These exposed groups of the people are generally children between 6 to 12 months, preschoolers and school-age children. In fact, over the last era, numerous universal conferences such as 1992 World Summit for Children, the International Conference for Nutrition, 1990, and The World Food Summit, 1996 all have made obligation to decrease under nutrition and called for worldwide to discourse the insufficiencies

(Tanumihardjo, 2010).According to the World Health Organization, 45 nations have been affected by vitamin A deficiency which has public health consequence, including unnoticed signs of deficit of the vitamin, and 122 states have subclinical stages of vitamin A exhaustion with borderline liver reserves. Countless children have the deficiency that leads to sight loss and have increased risk of illness and death. VAD remains public health issues affecting children living in countryside zones and in the desert. It is essential to improve the effectiveness and outcome of programs such as routine supplement of vitamin A (Pajuelo &Miranda, 2015). These supplement deficiencies (VAD) is a foremost community wellbeing concern and significant contributing factors to diseases and death amongst preschoolers globally. (Kupka et al., 2016). These deficit is defined as serum retinol level <0.70 mmol/ according to most current worldwide estimations, affecting 29 percent of preschoolers in middle and low income backgrounds, generally in sub-Saharan Africa South Asia a and (Kupka et al., 2016). Public health efforts to fight the deficiency have been in place for years primarily towards the prevention of preschoolers sightlessness, .interventions to improve the deficiency in preschoolers through the routine supplement, addition of micronutrient or other dietary approaches were inadequate in parts of widespread xerophthalmia (Palmer et al., 2012).

According to study by Arlappa et al., (2011) the occurrence of VAD remained meaningfully higher amongst preschoolers in area affect by cyclic drought. Insufficient vitamin A-rich diets for extensive period during the famine appear to have contributed to the high rate of incidence of VAD: the consumption levels of nearly 80 percent of the household were lower than 50 percent of the Recommended Daily allowance. In generally, the children who were affected by acute famine have increased threat of deficiency as compared to those unaffected by famine(Belesova et al., 2019). There is

indication that poor vitamin A supplement affect amongst children under-fives predisposing them to increase on death, also the studies done in Bangladesh India, and Philippines demonstrated a decrease in high rate mortality among under-fives whereas minimal indication comparable result among studies in Africa (Soofi et al., 2016)

Vitamin A routine supplement to preschoolers is recognized to lessen the dangers of death and illness from illness including diarrhea, measles, HIV/AIDS, and pneumonia. These effects might be the possible outcome of the vitamin A supplement on immune functions. The resistance functions have been well-defined in investigational trials which might associated with effect of the supplement. Such results of supplement on illness are linked to enhanced antibody production of lymphocyte proliferation and acute diarrhea attributing to the roles of the supplement supporting the health of the epithelial gut, whereas helpful effects on HIV-infected children may possibly linked to increase of T-cell lymphopoiesis. In such circumstances, the children antibody is likely enhanced by response when some serums introduced during immunization such as tetanus and diphtheria (Villamor & Fawzi, 2005a) the absence of the immunization depresses immunity and poor vitamin A supplement also leading to illness such measles and diarrheal diseases which will increases the likely hood of death that are likely to occur from measles related illness . Supplement similarly reduces the death proportion of children affected with HIV/AIDS by interjecting the progression of HIV virus in affected patients.

Progress has been made with vitamin A capsule to alleviate invisible signs of vitamin A deficiency. Which cost only 2 to 3 cents each, increasing the vitamin A consumption which known as the most low cost interventions for community wellbeing contributing to child survival in Kenya. The full cost of distributing the capsules to children ages six

months to five years at six-month breaks is about 50 cents per child per year. World Bank study also estimated that for every dollar spent in supplement, more than $100 would be repaid in improved production associated with reduced infant death, reduced health care expenses, and better economic improved productions.

The deficiency of the vitamin A is the first reason of childhood loss of sight as agreed by World Health Organization, the deficiency affect 127 million children worldwide. One third of under-five childhood blindness is still prevalent and challenging to increase the danger of infant death. The is crucial for children's growth, development and resistance to disease. Some investigation has revealed that enhancing the Vitamin conditions of deficient children by routine supplement can reduce death by almost 23%. While advancement continued generally to improve evidence condition of vitamin A borderline deficiency (a state of gradual vitamin A exhaustion).

2.2.1 Vitamin A Sources

The two primary source of vitamin A include animal diets such vegetables and yellow fruits, where Fat or oil is essential to assist in absorption of the nutrient. In animal sources, vitamin A is produced in most absolvable (retinol) the ‘active’ form of vitamin A such as Liver, fish, egg yolk, dairy milk, human breast milk, cheese and butter, Vegetable sources contain vitamin A(carotenoid) which have to be transformed during digestion process into the active form(retinol) before it’s used by the body. These include papaws, mangoes, tomatoes, kales, carrots, sweet potatoes, fresh maize and spinach.

The important point to note is that all vitamin A source foods should not be overcooked, as this can diminish the vitamin A nutrient content .also withering of fruit and vegetables including mangos ,papaws, kales and spinach should not be done in direct sunshine as

will interfere with the nutrients. Cereals including rice, pasta, maize flour, cassava, millet and sorghum, have low content of vitamin A but in Kenya s fortification are mandatory for those staples food and public awareness are part of the interventions. For children 0 to 6 months of Breast milk alone is enough for their needs, however after 6 months when the introduction of the complementary foods (the foods introduced after 6 months of age along with to breast milk must contain small amounts of micronutrient to fill the gaps because as the children grows requirements is increased. Under-fives should at least eat more than 5 food groups to receive good amounts of vitamin A for their growth and development

2.2.2 Vitamin A Deficiency

The insufficient vitamin A in in the body (body fluid and muscles) is the basis for the deficiencies. The sign and symptom of is Vitamin A deficiencies include bitot spot night blindness, Exophthalmia resulting to keratomalacia. The deficit raises exposure to a variety of illnesses such as looseness of the bowels, measles, and upper respiratory infections. Vitamin A insufficiency is the foremost source of avoidable loss of vision in under-fives, showing in a negligible form of night blindness, leading to ceaseless sightlessness. Scarce nutritional consumption of the supplement is the principal basis for the deficiency of vitamin A. Additional features that contribute and degenerate the deficit are increased requirements during illness or malabsorption due to the inadequate presence of fat in the foods.

In situations when the absence of the vitamin is an issues (occurrence of night vision problem is high as 1% in under-fives children and the incidence for serum retinol is 0.70 µmol/l or lesser of the deficiency is 20% higher in infants and children 6–59 months of age. The deficiency of the vitamin is a common nutrition concern during in utmost

period in unindustrialized nations, largely affecting the health and survival of preschoolers, pregnant, lactating women and young children. In addition, these stages characterize periods when both growth and development is extraordinary and nourishment expected to be normally wanting in vitamin A. Nearly 127 million preschoolers are vitamin A deficient. Health concerns of vitamin A gaps include minor to severe effects on vital organs and acquired mechanisms of an individual resistance to illness. Bigger problem of infectious which is, mild to severe (blinding) stages of exophthalmia, and increased threat of death.

Vitamin A deficit raises susceptibility to a variety of ailments including diarrheal diseases, measles, and pneumonia leading to death among under-fives in low and middle-income nations, where threat of contamination and death can be heightened by concurrent malnutrition. The utilization of vitamin A in foods including mangoes, papaws, spinach and kales are low compared to expectation, hence affect the children to accomplish their regular nutrients through foods only. Therefore, Vitamin A deficit is common in household which cannot afford eggs ,dairy and dairy products(Mayo-Wilson et al., 2011).

The deficiency is on the increase clearly as public wellbeing subjects across the nations, mainly in unindustrialized and disadvantaged nations. Vitamin A absence raises illness leading to decreased visualization, affecting around 2.5 million preschoolers as conforming to 7.8% of the residents at danger of vitamin A deficit. approximately 1/3 of the toddlers in the world is projected as a victims lacking the supplement in Africa and Asia (Hakim, 2016).

The deficiency is a notable public health issues touching a projected 190 million children, generally of Africa and South-East Asia among regions of members of World Health Organization (WHO, 2011).

Deficit is common community wellbeing concern challenging more than half of the all nations. Africa or southeastern Asia is most countries affected. Inadequacy of the vitamin is the foremost reason of loss of sight in malnourished children, contributing to illness and death from severe infections, as well as diarrheal ailments and measles. Projected 250 million preschoolers in the world have the supplement deficit, and among them many suffer visionless yearly, and those who suffer the deficiency, half them end up losing their life within the year of suffering the insufficiency. Globally social behavior change through education or creating awareness of the advantage of the supplement in enhancing and keeping wellbeing has led to periods of supplement essentially delivered to infant (WHO, 2011). Vitamin A is a serious micronutrient of importance that is essential in minor quantities by persons for the regular working of the eye senses coordination, cell maintenance purpose for progress, cellular epithelial integrity, healthy roles and replication. Nutritional needs for vitamin A are usually delivered as consolidation of preformed vitamin A known as retinol, which is exist in animal source diets, and vegetables, including dark green leafy vegetable by transforming into retinol by tissues such as the digestive mucosa as well as liver in order to be used by cells.

Away from experimental visual signs, i.e. difficulty in seeing during the night leading to xerophthalmia, indications of vitamin A insufficiency (VAD) are generally non-specific. However, collected confirmation proposes that the deficiency is an imperative feature for children wellbeing and prudent parenting. Its recommendations in the nonexistence of

chemical actions of supplement, it is hard to characterize the eye signs to supplement insufficiency which may complicates the picture for the deficiencies. With these discussions and attention, WHO has precisely term the deficiency as tissue concentrations of in adequate supplement which predispose the subject to adverse wellbeing concerns, even if there is no sign of assessable xerophthalmia

The deficiency is absence of vitamin A in the body (blood and tissues, the sign and symptom is VAD include bitot spot night blindness, Xerophthalmia leading to keratomalacia. the deficiency rises the exposure to variety of diseases such as diarrhea, measles, and pneumonia. Vitamin A inadequacy is the main source of preventable loss of sight in children manifesting in a minor form of night-time loss of sight, and systematic to endless blindness in stronger cases. The supplement insufficiency is still among key nutritional complications widespread, which threatens the survival and well-being of many of children. 127 million toddlers are lacking the supplement'

Kids living in areas where vitamin A consumption is deficient need to take satisfactory quantities of vitamin A through breastfeeding combined with better-quality foods, which improved through food fortification when possible, and supplement through the routine schedule.

Vitamin A Deficiency also aids to exacerbate serious ailment and disorders, leading to increased rates of maternal and childhood mortality. The supplement insufficiency was among the major causes of death under-fives in third world countries, where danger of infection and death might be increased by prevailing malnutrition. The absorption of plant sources of vitamin A such as fruit and vegetables is less compared to animal source such as milk, egg and liver and hence hard for under-fives to realize the recommended everyday requirements from vegetables and fruits diets only. Therefore, the supplement

absence is public issues amongst kids in household which may not have enough money to buy eggs and dairy foods (Mayo-Wilson et al., 2011).

The supplement deficiencies are on the increase and of a challenging situation in the community affecting health and causing alarm across the sphere, particularly within the unindustrialized and underprivileged nations. The deficit(night blindness) touches roughly 2.5 million under-fives children equivalent to 0.9% of the people at danger of vitamin A deficit (Hakim, 2016) Touching roughly 190 million preschoolers generally from areas of Africa and South East Asia. Under-fives have increased requirement of the supplement to boost rapid growth to fight illness. Insufficient ingestion of the supplement at crucial of growth within the window of opportunity which may predispose the under-fives to the vitamin A deficit and when extreme deficit happen , may result in visual damage leading sightless night vision or raise the danger of infection and death among the infants (WHO, 2011))

This absence is a community wellbeing issues in more than 50 % of all countries, and almost all nations which is mostly affected included Africa and Southeastern part of Asia. The deficit was the principal reason for sightlessness among malnourished kids rises the illness and death from severe infections e.g. childhood common diseases such as measles and diarrhea. Currently almost affecting 250 million toddlers within sphere experiencing inadequate intake of the supplement affecting 250, 000 to 500, 000 of under-fives such leading to loss of eye sight yearly, causing preventable mortality killing half of the under-fives within the same year of losing their sight. Universally, creation of awareness of the benefit and the functions of the supplement in growth and development thus positive outcome and sustaining healthiness leading in of years of supplement actuality increasing the coverage of supplement for toddler (WHO, 2011).

The deficiency happens after the body supplies is exhausted to the degree that bodily roles are leading to Low insusceptible response, Weakened movement of iron (leading to IDA),Meagre development and progress ,Night blindness and Severe form leads to xerophthalmia.

2.2.2.1 Approaches to Combat Micronutrient Deficiency

The prevention of vitamins and minerals insufficiencies is a crucial part of the worldwide determination to fight deficiency and malnutrition. Countries need to embrace and back a wide-ranging method that addresses the under nutrition and often related hidden hunger (micronutrient deficiency) which break basic to poverty and unsustainable livings. Activities that endorse and intensify the supply, access, intake and intake of sufficient number of micronutrients, through diversify of diets for individuals or groups should be supported. They are different types of community involvements that support to decrease VAD in vulnerable populations through improving the access to the vitamin supplement and Vitamin A rich foods through nutritional amendment and should be look upon as an action for the community in order to improve the general nutrition situations of the people. This necessitates nutrition creating awareness to understanding of the community on dietary diversity improving behaviors, as well as providing improved access to diets rich Vitamin A such as mangoes, papaya, or dark green leafy vegetables (WHO,2009).creating awareness and improving the capacity of the community on modern technologies on home gardening to grow such foods may be vital in areas where they are not nearby accessible or are too expensive. Another method of improving the consumption of the nutrient rich in vitamin A thus increasing the dietary consumption of Vitamin A is through addition of micronutrients to common food consumed by the population or condiment with Vitamin A (WHO, 2009).the principal strategy for

decreasing VAD in was through fortification of numerous foods including sugar, vegetable oil was fortified with Vitamin A three decades ago. Though various food stuffs such as blue band, fats, vegetable fats, margarine and cereals including maize meal foodstuffs have remained fortified with the supplement in high income nations, limited further Vitamin A fortification interventions presently exist in poorer income nations. It can be anticipated that this method will gain energy as growing numbers of perhaps fortifiable foods become centrally produced and processed under skillful surroundings and enter markets of the poor in many countries. The thirdly, the best commonly practiced way to combat the supplement deficit in affected vulnerable nations is the continuous distribution of huge strength additions, encompassing 200 000 IU of Vitamin A, to preschoolers. The following are some of the strategies employed by high risk countries like Kenya through both nutrition specific and nutrition sensitive to combat micronutrients deficiencies among children in the community(WHO, 2009).

Fortification

This is the process of adding of nutrients to foods to increase its nutrient content for the betterment of the population to improve their nutrition situations. These can be carried out by food producers to conform to government regulations. In Kenya maize flour, sugar, and vegetable oil is fortified to increase their nutrient content .The most Important approaches of food fortification both in Profitable and manufacturing is the increase their nutritional value, in Wajir Home fortification was once implemented through distribution of micronutrient for children age 6 to 23 months, the intervention could not continue due to lack of funds. At least three critical circumstances must be met in any fortification programme such as; the fortificants should be real, absolvable, adequate, and reasonably cheap. The particular food vehicle should be easily reachable and a quantified amount of

it should be frequently consumed by the community and the labeling must contain manufacturer's instructions and should be monitored and actions should be in place to punished manufactures who failed the regulations and the government should sticky enforced the regulations or bylaw. In many nations vitamin A status has been improved by enriching sugar or cooking oil with vitamin A. However, food fortification is not still a promising activity in most developing nations because it requires identification of a food for fortification. A strong food manufacturing industry that can market its goods to the intended beneficiaries. Strong public-private enterprises and multi-level monitoring and enforcement mechanisms need to heighten. Fortified products for children that can be sprinkled as powdered form or spread on food are being established for use in unindustrialized nations and showing possible for improving nutritional intake of vitamin A and other micronutrients as long as these foodstuffs are inexpensive for disadvantaged individuals.

2.6.2.1 Bio Fortification

These are the procedures that nutritional superiority of plant foods origin is intensified through agricultural practices, conservative plant breeding, or up-to-date biotechnology. Which offers a relatively low cost sustainable, and long-standing means of distributing more micronutrients (Bouis et al., 2013). Bio fortified crops as sources include carrots, mangos, and papaya of vitamin, which are a precursor of vitamin A like those found in some plant foods (harvestplus, 2017). the action of fortifying food is a very good-looking and economical way to avert and control the deficiency of vitamin A (West, 2002). Maize varieties that contain Vitamin A are actuality verified in Brazil, China, Panama, Mozambique, Panama Colombia and India, while the similar test is being

conducted for cassava varieties in Ghana, Colombia, and Ethiopia Kenya. Brazil, Central African Republic and Ghana, Cote D'Ivoire, Kenya, Malawi, Mozambique, Sierra Leone, Tanzania, and Uganda. Since 2006, Diversity International has continued work on vitamin A banana or plantain Accomplished., Improving the micronutrient including both vitamins and mineral of staple foods which are commonly eaten will heighten the wellbeing of a specified populations by providing the requirements thus averting the deficiency (HarvestPlus, 2017).

farmers may aim to intensify the vitamin A consumption by adding the nutrient to foods commonly used such as rice and improving approachability to agricultural harvests such as the orange-fleshed sweet potato(West et al., 2010). Moreover, the supplement consumption decreases death through averting illnesses including measles. supplementation should remain as easy access to the community to improve micronutrient deficiencies .it will be significant to continue with the supplementation to the under-five's (Faber & Benade, 2010).

The Use of minerals or vitamins supplement on a temporary basis to inspire dietary methods in severely affected areas with the deficiency is suggested, the Supplement should be directed to under-fives especially the displaced ,and must be relinquished as soon as dietary strategies that support satisfactory intake of nutrients (Food Agricultural Organization [FAO], 2016)

Commercial and industrial fortification

These are preparation of deliberately increasing the content of a critical nutrient such as vitamin A enrichment to foodstuffs to increase a nutritive value in ordinary diets to bring a community healthiness advantage reducing minor danger for wellbeing. Adding micronutrients to processed foods, in various situations, can lead to relatively instant

enhancements in the micronutrient states of an individual, and at a very practical care. As the well-being the vitamin is actually great, the enrichment of food is one of low cost intervention for the community. Though, requirement is that the foods heighten with micronutrients needs to be consumed in suitable quantities by a large number of target people in a population. It is also essential to have access and use fortificants that are well utilized and do not affect the physical properties of nutrients. In most cases, it is necessary to use food vehicles that are centrally processed. Fortification of food with micronutrients is a lawful skill for decreasing hidden hunger as part of a food-based process when and where current foods access are limited and fail to deliver satisfactory levels of the specific nutrients in the food. In such cases, additions of nutrient to foods strengthens and supports existing nutrition interventions programmes and should be viewed as part of a wider, integrated method to avert Micronutrient malnutrition, thus complementing other methods to improve the hidden hunger situations (FAO, 2016). Viable food fortification which increases trace element of nutrients to primary nutrients or condiments throughout the processing periods benefits the users get the suggested the daily recommended allowance of nutrients at reachable, viable, and low cost to community wellbeing approach. enrichment has been fruitful mainly for iodized salt where71 percent of the world's population has access to iodized salt leading to number of iodine-deficient nations declining from 54 to 32 percent since 2003 .(FAO, 2016)

Home-based fortification

Home-based fortification is an invention planned at improving food value of under-fives who nutritionally vulnerable by using of micronutrient powder (MNP) that are readly sprinkled to any prepared foods either solid and partially solid foods that is ready for feeding. Where complementary foods do not deliver sufficient vital nutrients where it's

advisable to add micronutrient powder to their foods. This happens where dietary diversity is poor, due to inadequate accessibility or affordability which common phenomena in Wajir county. Complementary diets cooked for the young children have insufficient nutrient components and low concentration items of energy and other nutrients such as porridge which are not thick enough to sustain the recommended allowance e.g. watery porridges and foods with too little nutrient component and the absorption of nutrients is low due to inhibitors in the food such as fiber, phytate, tannin, particularly in the circumstance where in plant-source based meals are commonly consumed. The practice of using multiple micronutrient powders for enriching infant's diets on intake has been recommended as an alternative measure to alleviate or overcome the limitations related with supplementation and mass fortification. They are planned to increases the nutrient consumption of under-fives as specified by (WHO, 2016).

Dietary Approaches

These can be achieved through objectively shifting household diet to intensify the variety as well as amount of vitamin and minerals content to decrease micronutrient deficiencies ,this can be usually comprehended through social and behavior change actions and can be likewise embrace through improved production of nutrient-rich foods and heightened access to diverse foods

Home-based gardening , focusing on plant based such as vegetables and fruits as a long-standing approach contributing in fighting the supplement and common dietary insufficiencies which are of community wellbeing importance in emerging nations(Faber & Benade, 2010). The Use of micronutrient supplement on a temporary basis to strengthen nutritional procedures in severely deficient populations is considered.

Supplement must be focusing at infant and young child, , the ageing, immigrants and displaced people and must be phased out as quickly as diets approaches established and permit satisfactory intake of nutrients(FAO, 2016).

The deficiency of the Vitamin A is community key issues which are triggered by means of a dietetic design on circumstances where slight vitamin A is available to sustain functional recommended daily allowances under the normal situations. Functional requirements fluctuate in growth opportunities which may be conditioned by biological aspects that particularly or often due to poor intake in supplement. Over centuries, human life had faced challenges possibly progressed with similar shifting way of life with food sources. Hunting and collecting of wild meat, fish, nuts, fruits, and leaves (characteristic of early humans) provided a highly obtainable preformed vitamin A from animal foods and realistic fat and excellence protein from meat, fish, and nuts to allow best intake of less available provitamin carotenoids from wild fruits and leaves. Nevertheless, as the human way of life advanced vegetable and plants foods progressively substituted meat diets, with, vegetables including cabbages kales spinach as well as cereals and grains, majorly with little or no fat, deficient in vital supplement and providing protein of minor significance as plat source became the dietary staple, while tamed vegetables providing provitamin A carotenoid.

Mature breast milk produced by mother well-nourished encompasses a normal of 250 international units (IU) of vitamin A for each 100 ml. The vitamin A component of breast milk of lactating mother in unindustrialized nations comprises averages of about half this amount. Though recently In such cases, providing mothers with a high-dose vitamin A supplement instantly after delivery cannot guarantee that the supply of vitamin A in breast milk is satisfactory to meet the infant's daily vitamin A requirement

and to build stores. Further, Optimum breastfeeding practices are vital to sustain the child's vitamin A requirements for the first six months of life but beyond. In poor resource backgrounds, children depend on breast milk for vitamin A the first six months and routine supplement after the six months for critical nutrients(LINKAGES, 2001).

Supplementation of Vitamin A

National and county high impact nutrition interventions among them Supplementation of vitamin A are in place in over 70 nations universally which is of low cost activities targeting the community(Fawzi, 2006). Internationally, an approximate of 190 million under-fives is suffering from the vitamin A related deficiencies. The intervention when implemented well in the community, the impact of the supplementations will decrease the possibility of death by 24% saving about 1 million under-fives survivals annually. The supplement responds to an instant requirement for satisfactory nourishment, though they are not perfect lifelong keys the primary challenges. Other interventions including enrichment of foods, food supply packages and gardening improvements may deliver assistance that is promote long-term. For example, rice can be enriched by the vitamin A or gardeners may possibly purpose to intensify access to farming produces such as the orange-fleshed sweet potato(West et al., 2010). Also, if the supplement decreases death through averting illness including measles, extensive immunization may also relatively contribute to Vitamin A supplement. Till such lasting answers are domicile, giving supplement must remain. As well access to the capsule of vitamin A supplementation rises, it will be significant to remain to identifying vulnerable individuals by distributing supplements to them alongside improving nutritional diversity.

Universally, one in three preschoolers is lacking the supplement because to unsatisfactory dietary consumption, the top prevalence remains in Africa and South-east Asia. The supplement is essential to sustain resistant functions and under-fives who are lacking are likely to predispose to greater threat of mortality arising from communicable illnesses including whooping cough, measles and diarrhea. The supplement distributed occasionally to under-fives was well known be extremely in effect in decreasing death

for all causes in nations where vitamin A insufficiency is a public wellbeing issues .(Villamor & Fawzi, 2005b)

Vitamin A routine supplement is a universal health approach to eradicate the deficiency of vitamin A supplement and its devastating concerns. The vitamin A can be reserved in the body for a few months; two high-dose supplements per year are all that is vital for young children. And they should receive their first vitamin A capsule at the age of six months.

Supplementation is delivery of relatively huge dosages of micronutrients, usually in the form of capsules, pills or syrups. The coverage is the proportion of under-fives who is supplemented with at least one high-dose supplement in form of capsule in the earlier six months. It has the benefit of practicality capable of providing a best amount of a certain nutrients, in an extremely absorbable formulation, and is frequently the harmless to govern the deficit in people or populations that have been recognized as principally deficient in the vitamins, the supplement can be steadily distributed in large amounts to under-fives , fairly than supplementing numerous less dosages, which can be kept in the body and used when required over a period of stage as desired.in surroundings where vitamin A insufficiency is a community wellbeing worry (occurrence of nighttime sightlessness is 1% or greater in under-fives between 24–59 months of age or where the incidence of the deficiency (serum retinol 0.70 µmol/l or lower) are 20% or higher in under-fives), supplementation of high dose is suggested in all children under-fives. (WHO, 2016).

Numerous states have definitely combined methods to dispense the supplement in under-fives through integrated national health plans, as well as delivery throughout the routine health appointments, through health action days and immunizations. In circumstances

where the deficit is a common problem, monthly supplementation of vitamin A is encouraged in under-fives children(WHO, 2016). the supplementation in under-fives children living in undeveloped nations is linked to a reductions of death occurrence of diarrheal illness Imdad A et al., as cited in (WHO, 2011). In Each under-fives, supplemented is carefully planned with a low-cost input. Majorly the supplement used was throughout provided in jelly capsules costing approximately US$ 0.02 each, including the distribution cost of US$ 1–2 per year for every under-fives West, Klemm, Sommer, Klemm, Sommer as cited in (WHO, 2011)). The cost of supplementations as well as the cost projected to prevented under-fives death is at 200 US$–250 Ching P et al., as cited in (WHO, 2011).High-dose vitamin A supplement is recommended for under-fives in arid and semi-arid areas such the northern part of Kenya including Wajir where the population especially is risk of the vitamin A deficiency (WHO, 2011).

Vitamin A supplement has been exposed to lessen the hazard of death in under-five children by about 23%–30%.' Ensuring a high coverage of supplement is thus vital, not only to eliminating VAD as risk factor in the community but also as critical constituent of interventions for child survival program. It is recommended that all under-five children living in high-risk zones be made to have high-dose supplements every 6 months to encourage considerable reduction in childhood death, supplementation of Vitamin A in Kenya has been combined into the existing immunization schedule by the Kenya Expanded Programme of Immunization (KEPI), with twice supplementation after every, 6 months from 6 to 59 months. It's also integrated during National Immunization Days (NIDs), with intention of increasing the poor coverage of the supplementation. These interventions are estimated to bring roughly a reduction in the incidence of VAD amongst under-fives in Kenya

The 2011 WHO guidelines on Vitamin A supplement stresses the precautionary on supplement. They also include clinical treatment of cases of exophthalmia and measles, and evidence of regular dosing of Vitamin A supplement. The best to enhance good consumption for under-fives is create platform that integrated the routine supplement with other health and nutrition services including IMCI(Integrated Management of Childhood Illness) interventions realized to enhance services for under-fives in several nations in Africa including which Highlights on Vitamin A routine supplementation as high impact nutrition interventions .poor Coverage can also be enhanced by including supplement through national vaccination campaigns and during health actions days like Malezi bora with the purpose of improving and accelerating the normal routine activities which vitamin A supplement is among them (WHO, 2011). Process Target 6-11 and 12-59 months with a Frequency once and twice respectively with and Dosage of 100,000 IU and 200,000 IU.

2.2.3 Vitamin A Coverage

The vitamin A coverage pointer is well defined as the proportion or percentage under-fives who received double appropriate amounts of vitamin A supplementations in the previous 12 calendar month. The indicator measures the coverage reached through nationwide. Vitamin A routine supplement program efforts in a certain period, Coverage of the supplement was high in Central Africa, west Africa, Pacific and East Asia (above 80 percent; except in China for lack of data) and West .Approximately except few of the states having the higher proportion not attaining the 80% coverage objectives in 2011 (United Nations Children's Fund [UNICEF], 2013).

The Two-dose Supplement experience was key pointer for observing supplementation of vitamin A interventions. The supplement investigation was estimation on proportion of kids aged under-fives receiving the Supplement for around 6 months separately in a calendar year. According to "National policy to accomplish good coverage for vitamin A, is imperative in scaling up the distribution of collective platform of activities comprising of twice annual vitamin A supplement for children under-fives , in order to reach at least above 80% coverage. Continuously consistent basis for children 12-59 months VAS coverage has persisted low subsequently after the age of 18 months where most of the children have completed routine immunization schedule. To improve coverage for vitamin A supplement, a combined method should be recognized and resources needed to be organized from national through to the numerous levels of government. Other strategic programs such as the school health services and primary health care outreach players might contribute to scaling up Vitamin A Supplement; In Kenya apart from these three micronutrient; Zinc, Iron and iodine, Vitamin A has been acknowledged as one of the micronutrient of concern in high impact nutrition interventions and regularly observed.

As per WHO recommendations all countries/counties and sub counties should aim to have a coverage of above 80% for it to have optimal impact on mortality reduction. Interpretation of Vitamin A Supplementation coverage as per WHO- On track >80% .To watch 50-79% and High alert <50%, in relation to that wajir county is classified under on watch (50-79%) as per the above WHO coverage interpretations, which is between 50 to 79 percent. From the District Health Information System statistics for 2015, the coverage for was 53 %. and below the national target of above 80% in Kenya.

2.2.4 Vitamin A, Growth and Development

The Vitamin is very critical in growth and development of our children that required in minor quantities for the normal functioning of the visualization system, epithelial integrity, red blood cell production, defense functions, developmental roles and maintenance of cell. The body cannot be manufactured this Important nutrients by itself, thus must be provided through foods. Once food consumption is inadequate, there will be deficient of the supplement to sustain visualization and cellular growths, causing to debilitated muscle and nerve task. The insufficient ingestion during nutritionally demanding stages in life, such as initial stages of infants and during maternal period, significantly increases the danger of health complications such as poor growth and immune functions. Vitamin A supplement is significant and crucial for the growth, development and survival for children in areas with scarce resources, during infancy, breast milk only from the mothers is defensive against the development of xerophthalmia; it needs to be supplemented after six months by other dietary sources of Vitamin A to offer full health defense (WHO, 2011).

The vitamin supports the growth and generative process of cells and also aids in the development of a fetus in the womb. The High doses of the supplement and man-made retinols might result in complications in growth and progression challenge in the in the womb such as birth defects including neural tube defect. The supplement appears to benefitting the developing a fetus throughout the gestation period in in the womb. It also supports the placenta formation throughout gestation period. The supplement is a critical aspect in development during lifecycle. It supports in growth in addition maintenance of epithelial tissues, which include lubricated tissues, the coating of the digestive tract, lungs, bladder, urinary tract, vagina, cornea, and skin. The supplement also supports

process progression of skeletons and teeth. Provision of Vitamin A supplements every four to six months is a low-cost, fast, and effective way to intensify Vitamin A situations and decrease infant illness and death in the long duration. In habitations **where** deficit of Vitamin A is a community health concern, periodic supplement of Vitamin A is vital and commended in children age bracket in the study as a community health involvement or actions, and has continued to initiative to decrease the danger of all-cause death by 24%. The vitamins deficiencies (Vitamin A) and suboptimal breastfeeding account for 7% of death and 10% of the total morbidity burden (WHO, 2011).slow growth in height/length for age and other forms of malnutrition are evidently a key underlying outcome to child death, illness and incapacitated. A case in point, a severely underdeveloped kid is probably a four times greater likelihood of dying, and a severely wasted child is at a nine times higher risk. Related diet insufficiencies of the supplement also escalate the risk of death. Malnutrition can cause several illnesses such as loss of eyesight due to vitamin A deficiency (Winterfeld, 2010)

2.2.5 Vitamin A Coverage and Morbidity/ Mortality

Globally an estimate of 2 billion people are affected by nutrient insufficiencies, among them is vitamins A, leading to are poor development and growth, weakened intelligence, increased death and vulnerability to infection. The nutrients have an association to immunity development and resistant functions. The Vitamin also helps in sustaining the integrity of gastrointestinal tracts. the epithelium , the respiratory and Lower respiratory tract infections, in particular bronchiolitis and pneumonia which are the most severe forms of acute lower respiratory tract infections, which is the cause for mortality in under-fives . 1.8 million Under-fives are killed by Pneumonia alone yearly. Greatest of these possible avoidable deaths occur in areas with insufficient resource and are strongly

related to poverty, in Wajir poverty level is very high at 84% coupled with insufficient access to health care services leading to double burden of malnutrition and hidden hunger(Chhagan et al., 2009).

Generally, 100–140 million under-fives are supplement deficient as per prompting 1.2–3 million deaths per World Health Organization estimate, and the insufficiency increases the vulnerability to infections such as, pneumonia, diarrhea, other respiratory diseases, and measles leading to death. The deficiency, which, are closely linked to Measles infections is predicted to kill 2 million under-fives yearly which are more perhaps due to aggravating prevailing dietary deficiencies, in infant who are previously lacking the supplement remain at bigger threat of dying from measles. Diarrhea after the measles is mostly hard to respond to the treatment and has a high death rate. The deficiency also raises the danger of increasing breathing illness with chronic ear infections .Vitamin a supplement sustains gut integrity, lowers the incidence of respiratory tract infections, decreases mortality from diarrhea, and improves immunity. Immunization against measles often includes a high dose of vitamin A because Measles diminishes the body's source of vitamin A.

Several nutrition interventions among them vitamin A routine supplementation is revealed to remain very active in decreasing the number of cases of acute lower respiratory tract infections and morbidity associated with pneumonia. The supplementation is confirmed to be effective in defensive against diseases such as measles-associated pneumonia. the similar study also revealed the supplementation as a possible involvement to improve recovery, lessening the severity and reduces against recurrent acute lower respiratory tract infections episodes (Mangusho, 2010).

Children affected with deficit of Vitamin A seem to be at greater danger of illness and death due to respiratory tract infections. Pre-existing deficiency seems to degenerate infection and Vitamin A supplement has been revealed to decrease the danger of death in under-fives by about 23–30%. In the case of measles-associated pneumonia large doses of therapeutic effect of supplement have a strong defensive outcome. (Maziya-Dixon et al., 2006).

The deficiency is the main reason of avoidable childhood loss of sight and raises the danger of death such illnesses including the diarrheal diseases**.** The Periodic supplementation of high-dose of vitamin A is recognized; to be the low cost effective interventions which have been discovered to decrease all causes of death by 12 to 24 percent thus discovered to be vibrant programme in support of basis to reducing child mortality. The vitamin A deficiency has categorized as a community health issues, affecting about one third of under-fives in 2013reported World Health Organization, with the maximum rates in sub-Saharan Africa (48 per cent) and South Asia (44 percent).in Kenya the coverage of vitamin A supplementation was below the national coverage of above 80% and coverage of vitamin A for children under-fives in Wajir was 68 % as per SMART Survey report 2016 which was lower than the national target of above 80% in Kenya and no adequate data showing the relationship between vitamin A and diseases as well as the factors affecting the vitamin A supplementations .Vitamin A have been acknowledged to reduce the dangers of death and illness such as diarrhea, measles, human immunodeficiency virus (HIV) infection, and upper respiratory infections in Arid and Semi-Arid Land.. These effects are perhaps to be the consequence of actions of vitamin A on resistance. Some of the immunomodulatory mechanisms of vitamin A have been well-defined in clinical trials and can be linked with clinical consequences of supplementation.

The effects on illness from measles are associated to intensify antibody production and lymphocyte proliferation. Benefits for severe diarrhea could be attributed to the roles of vitamin A in supporting the integrity of mucosal epithelia in the gut, whereas positive effects among HIV-infected children could also be connected to upsurge T-cell lymphopoiesis. There is no sure evidence for a direct effect of vitamin A supplement on cytokine production or lymphocyte activation. Under certain circumstances, vitamin A supplement to infants has the possible effects to improve the antibody response to some vaccines, as well as tetanus and diphtheria toxoids and measles. (Villamor & Fawzi, 2005a)Vitamin A deficiency depresses immune functions whereas vitamin A supplement reduces illness and death, mostly from measles and diarrhea. Vitamin A supplement also decreases the mortality rate in HIV-infected children and interrupt the progression of HIV disease in infected subjects. Zinc deficiency is also common in tuberculosis, which may impose a secondary vitamin A deficiency. Clinical trials have shown contradictory results regarding the consequence of supplementation of vitamin A, only or with other micronutrients, on time taken to sputum conversion in patients with pulmonary tuberculosis. Supplement with many micronutrients (including zinc) relatively than vitamin A alone may be more helpful in patients with tuberculosis, but clinical trials on such a combination are missing as per the National Medical Journal of India 2007 (Mathur, 2007).

The deficit Vitamin A alone is the reason of approximately 6% of under-fives mortality in Africa and 8% in South-East Asia. The routine supplementation of vitamin A in children under-fives living in developing nations is related with a reduced danger of mortality and a reduced incidence of diarrheal diseases. The mechanisms by which Vitamin A decreases death are not well acknowledged and it is not clear whether its action is related through the correction of underlying deficiencies or through therapeutic

effects. The supplement of the vitamin may improve gut integrity and hence reduce the severity of diseases. The roles of the Vitamin A in immunity may also include reducing predisposing aspect and severity of infections (WHO, 2011).

2.3 Status of Routine Vitamin A Supplement Result in Under-Fives

Globally, the vitamin deficiency is the important reason of childhood blindness (Federal Ministry of Health [FMH], 2005). Universally 219 million children are predisposed to the vitamin A insufficiency, with Asia and Africa being among highest prevalence areas (Horton, 2008). The Vitamin is the major micronutrient documented in relation to visual roles, epithelial integrity and the functioning of the immune functions (Azevedo et al., 2013).

The deficiency of the Vitamin is one of the chief public health issues; the most susceptible are preschool children and pregnant women in under developed nations. The deficiency is the important reason of avoidable xerophthalmia. This is projected to affecting among 75 and 254 million pre-school yearly.

127.2 million Preschoolers were deficient of vitamin A revealed by recent meta-analysis by west, signifying 25% of preschoolers in developing nations and in developed state facing social conflict as well as Also, 26% of vitamin A deficient in Africa, with the largest number being in Ethiopia (6.7 million) (Maziya-Dixon et al., 2006).

2.4 Vitamin A Supplement and Nutritional Status of Children Under-Fives

Vitamin A supplement is an all-inclusive health approach to decrease vitamin A deficiency and its disastrous concerns. Vitamin A can be deposited in the body for a few months, double high-dose per year are all that is essential for young children. Children

should be given their supreme vitamin A capsule at the period of six months. Generally its projected that, the deficit of vitamin A affect 190 million under five years. WHO, 2009). Delivery of vitamin A supplements after every four to six months is a inexpensive, fast, and actual way to improve vitamin A situations and decreasing child illness and death in the long term. places where deficit of vitamin A is extensive , vitamin A routine supplement are endorsed in under-fives as a community wellbeing activities which revealing to decrease the susceptibility to all-cause mortality by 24% (WHO, 2011). Wide-range approaches to control the vitamin A deficiency should include dietary enhancement and food enriching foods with micronutrient as per WHO recommendations.

The deficiencies of the vitamin supplement are well-established danger influencing for death related with measles. Supplementation of high-dose of supplement of vitamin A throughout the course of a measles occurrence may decrease death and a problem associated with measles illness by about 66 percent and which is the protocol of attention for handling the ailment. A meta-analysis of several enormous vitamin A trials has discovered that increasing vitamin A coverage had resulted in decreases of under-fives deaths proportions by between 23 to 34 percent, if vitamin A supplement is given at least twice per year at proportions of at least above eighty percent coverage (Masanja et al., 2006).

2.5 Relationship between Supplement and Common Disease Occurrence

Respiratory tract infections, such as bronchiolitis ,pneumonia and other disease of respiratory are the most severe forms of acute lower respiratory tract infections, which are the main reason for death in children five years, (Chhagan et al., 2009). Some nutrition interventions among them vitamin A supplement have been proven to be

effective in reducing the cases of acute lower respiratory tract infections and morbidity associated with pneumonia. The supplement is established to be effective in self-protective against infections such as measles and pneumonia, the vitamin A supplement has been discovered as a likely one of the high impact to enhance recovery, decreases the severity and repeated occurrences of acute lower respiratory tract infections (Mangusho, 2012).

The deficiency of the vitamin is a community wellbeing matters in more than half of all nations, where Africa and Asia most of the affected nations (Gawronski & Gawronski, 2016). The deficiency is the major cause of sightlessness affecting the malnourished under-fives, contributing to illness leading to death due to the severe infections such as diarrheal diseases and measles. (Anthony & Nooshin, 2009), vitamin A supplement has been revealed to diminish malaria-induced illness in Burkina Faso (WHO, 2011)

High dose vitamin A periodic supplementations are in existence to prevent the negative effects of VA deficit and decreases illness leading to severe mortality in preschoolers aged 1–5 years in less industrialized nations. Infants are born with low Vitamin A stores and depend on their mother's milk for VA. Before an infant is introduced to optimal complementary foods, the mother may not be able to provide sufficient VA to increase the child's liver stores if she herself has poor VA stores due to lack of consumption of vitamin A diets all through lactation period (Dror & Allen, 2018).

A landmark study conducted in Indonesia on the outcome of MDVA (Mega Dose of Vitamin A) supplement among the Under-fives death which was published in 1986 revealed a decrease of 34% in death amongst children who received MDVA as compared to controls. Based on the outcomes of the study, the UNICEF and other global organizations endorsed VAS, as a main child survival intervention for under-fives

children in the unindustrialized nations. The health managers and planners of the developing countries were motivated to implement VAS for decreasing mortality in Under-fives (Kapil & Gupta, 2016).

The supplement in preschoolers' is acknowledged in reduction of the dangers of morbidity such bas diarrhea, measles, and malaria which might lead to death. The outcomes may be probably the effect of routine supplementation which increases the immunity. Mechanisms of Some of the immunomodulatory of vitamin A actions have been defined in clinical trials and can be associated with clinical results of supplement. There is no definite confirmation for a direct outcome of vitamin A supplement on cytokine production or lymphocyte activation. Under certain circumstances, vitamin A supplement to under-fives has the possible consequence to improve the immune response to some serums through immunizations such as tetanus polio, diphtheria toxoids and measles. (Villamor & Fawzi, 2005a)

Supplementation with several nutrients (including zinc) rather than vitamin A alone may be more advantageous in patients with tuberculosis, but clinical trials on such a combination are deficient as per the National Medical Journal of India 2007 (Mathur, 2007).

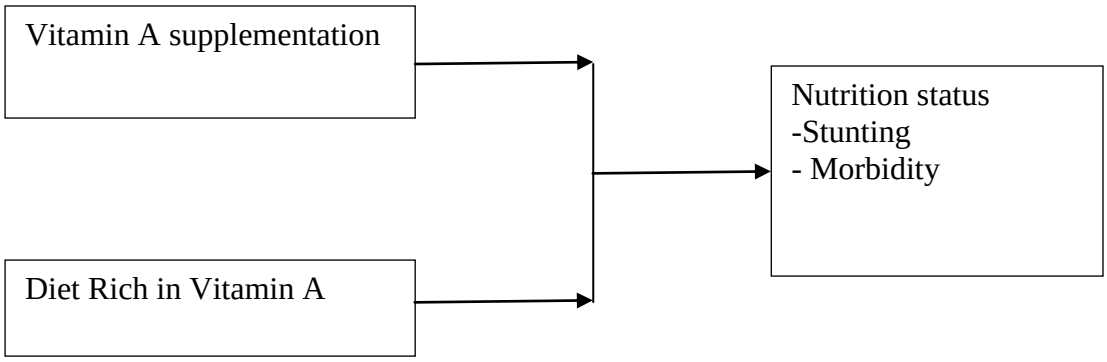
2.6 Conceptual Framework

The conceptual framework demonstrates graphic relationship of the dependent variables and independent variables; it also displays how independent variables influence the result of dependent variables. The indicators of vitamin A supplement include the status of supplementation, effects of vitamin A supplement, and the effect of dietary intake of foods rich in the supplement. The nutrition situations of infants age of 6 to 59 months

forms the independent variables of the conception framework. The interaction between independent and dependent variables is presented in Figure 2.1 below.

Figure 2.1

Conceptual framework showing the relationship between vitamin A supplement and nutrition status in children under fives



Independent Variables **Dependent variable**

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This section discusses the design of study of the research. The study area, sample size, target population, sampling procedure and method of data collection.

3.2 Research design

According to Khalid et al., (2012), study design constitutes the blue print for the collection, measurement and analysis of the data to accomplish specified objectives. It is a structure for examining the conceived so as to find responses to research interrogations and for teasing the hypothesis (Kothari, 2008). The design used in this study was cross study design because its main concern is to get the holistic view of the characteristic of children under-fives exposed and non-exposed to vitamin A supplement in Wajir East sub-county. This study is compares two sets of subjects in terms of Vitamin A routine supplementation, nutrient consumption of vitamin A rich foods and its effect on nutritional status of children under-fives years. Both quantitative and qualitative research was observed, as it will elicit opinions and numerical data from the respondents through survey interview schedule from the mothers/care takers and anthropometric measurement.

3.3 Target population

The target population for the study was children aged 6 to 59 months with 207 sample size drawn from households in Wajir East sub-county. The age group bracket was

targeted because they are vulnerable to malnutrition including hidden hunger which the vitamin A deficiency is among them

3.3.1 Inclusion/Exclusion Criteria

Only children aged between 6 and 59 months were included. Only children born and bred in in Wajir East sub-county. Participants had to provide informed consent and those who did not consent were not included in the study.

3.4 Sampling Procedure

The sampling is essential in selecting a portion of the entire population, Wajir East Sub County was purposively chosen out of the six sub county due to its proximity to my working area and to reduce the cost of the research, the selection was also because the Sub county accommodates and represent the entire five livelihoods of the county (i.e., pastoral-all species, pastoral cattle, pastoral camel Agro pastoral and formal employment), thus being a representative of the county as a whole. The list of the villages was generated from the 4 wards of wajir east namely Barwaqo, township, Khorof harar and Wagberi using projected 2009 census, 4 villages were excluded (handaki, gerille ,bojigaras and konton)due to insecurity. Using pps in built in ENA (Emergency Nutrition Assessment) version 2015. 23 out 36 villages were selected

The following formula was used to determine the sample size, which is $n = Z^2pq/d^2$ (Kasiulevičius et al., 2006) and confidence interval level of 95% was used.

Where:

n = sample size

P = prevalence of VAD in the affected population = prevalence of VAD in under-fives in Kenya = 80%.

q = 1-p = proportion not malnourished (without VAD) = 20%

d = error of assumption = 5%

Z = normal distribution at 95% confidence interval (1.96)

Therefore,

$n = 1.96^2*0.8*0.2/0.05^2 = 245.8$

The sample in the study was therefore 246 children. Convenience sampling was used. This is because not every household had a child under-five. Therefore, every household with a child under 5 years was included in the study until a sample size of children was achieved.

3.5 Instrumentation

Data was collected using an interview schedule and anthropometric measurement (height/length for age). The item of interview was constructed based on research objectives and research questions and related literature. The interview schedule was used to collect data from the mothers or care takers and anthropometric measurement (height/length for age) of the children age bracket in the study. It was divided into three sections. The first section was seeking information on Vitamin A status and dietary intake, the second section on morbidity of the children either supplemented or not supplemented with Vitamin A while the third section was seeking information on nutritional status of the children using height/length for age

3.5.1 Instrument Validity

Validity is the degree to which a test measures what it purports to measure(Borg & Gall, 2003). To test the validity of the instruments, the researcher conducted pretest in one of

the health facilities in Wajir County, which is not part of the study. University assisted in reviewing the interview schedule to address content and face validity. The review was focus on representativeness of the items in relation to the objectives and variables covered in the study.

3.5.2 Instrument Reliability

This is defined as a measure of the degree to which a research instrument yields reliable results or data after repeated trials (Mugenda & Mugenda, 2003) The researcher was administering the questionnaires to the sampled group of persons. A pretest was done using 10 mothers with children under five years of age in Wajir County. Pretesting was ensuring that there were no deficiencies and ambiguities in the final instrument

3.6 Methods of Data Collection

Due to extensive work involve in data collection, 5 Nutritionist were trained by principal researcher on study objectives, methodology, interviewing techniques, anthropometric measurement and maintenance of ethics during and after data collection. Data was collected during normal working days. An individual visit was scheduled with mothers or care takers for interviews and data collection. Information was collected through actual administration of interview schedule and anthropometric measurement by the investigator and the assistances. Participants were assured of confidentiality that the information collected would be used for the academic research purposes only.

Data for the independent variable, Vitamin A supplementation (Number of doses, Frequency of supplementation, Availability of vitamins A in health centers) and Dietary intake of vitamin A rich foods (Kind/type of foods, Frequency of consumption) was collected by use of a structured questionnaire. While anthropometric measurement was

used to collect data of dependent variable on nutritional status (Height for age and Morbidity).

In investigating the nutritional status of children 6 to 59 months (Anthropometric measurements) (height/ length for age) was obtained. The equipment used portable was height/length board with movable headpiece/foot piece which was checked at the beginning of the exercises. The board was put on flat surface and leaned against wall or stable tree to get the correct measurement. Collected data was corrected to detect and remove errors. Coding was done to interpret responses into precise categories. The coded items were analyzed with the aid of (SPSS) Statistical Package for Social Scientists package.

3.7 Data Analysis

Data collected was checked for errors, coded and analysed with the help of the (SPSS) Statistical Package for Social Scientists version 20 and ENA (Emergency Nutrition Assessment) for SMART version July,9th,2015). Objectives were analysed quantitatively through descriptive statistics and the findings presented in percentages and frequency distribution tables. While Z-score for the anthropometric measurements was analysed using the ENA for SMART.

3.8 Ethical Considerations

Authorization to collect data was acquired from the relevant authorities. The researcher also ensured the study conformed to ethical code by obtaining a permit from the relevant authorities including KeMU, (NACOSTI) National Commission of Science, Technology and Innovation, education sector at county, health and National government county representative. Participants' confidentiality was adhered to by excluding their names

from the analysis. In addition the study's feedback would be given to the participants and the entire community as a sign of gratitude and to help them to know about their health seeking behavior toward micronutrients consumption.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introductions

These section presents analysis of the research discussion, results, conclusions and recommendations. The overall objective of this study was to assess the effect of routine vitamin A supplementation and vitamin A rich foods on nutrition status of children aged 6-59 months in Wajir East sub-county. A total of 205 children were involved in the study representing a response rate of 83% which is above the 70% recommended by Mugenda and Mugenda (2003). Data collected was assembled and reports were produced in form of tables, pie charts and figures.

4.2 Respondents Profile

4.2.1 Demographic Characteristics of the Respondents

The respondents drawn from 23 villages across the four wards namely Township, Wagberi, Khorof Harar and Barwako, fully participated in the research. The results are presented in Table 4.1.

Table 4.1

Demographic Characteristics of the Respondents

Characteristics	% (N =205)
Age of the Respondents	
20 Years and Below	12 (26)
21-30 Years	50 (102)
31-40 Years	34 (70)
41-50 Years	4 (8)
Marital Status	
Married	92.7 (190)
Single	2.4 (5)
Widow	2.9 (6)
Divorced	(4)
Education Level	
No Education	81.5 (167)
Primary	12.2 (25)
Secondary	4.9 (10)
Tertiary	1.5 (3)
Occupation	
Housewife	78.5 (161)
Business	11.7 (24)
Employed	7.3 (15)
Casual Labourer	2.4 (5)
Source of Income	
Business	28.3 (58)
Relative in Kind	1.0 (2)
Livestock	27.3 (56)
Casual Labour	14.1 (29)
Salary	20.0 (41)
House Help	.5 (1)
None	8.8 (18)

The outcome of the study shows that majority of the respondents 102 (50 percent) who participated from the four wards were aged between 21-30 years, followed by 70(34 percent) who were aged between 31-40 years. Only 26 (12 percent) were aged below 20 years but above 18 years and 8(4 percent) were aged above 40 years. This implies all the respondents in the four wards in study were mature sufficient and were thus in a position to provide information required during the research. On marital status the study established that most of the respondents 190(92.7 percent) were married while only 6 (2.9 percent) were widowed, 5(2.4 percent) were single and only 4(3.0

percent) were divorced. This might not have had an effect on the coverage of the vitamin A routine supplementation.

In regard to the education level the result shows that majority of the respondents 167(81.5 percent) were illiterate , and only few of the 25(12.2 percent) had attained primary education , 10(4.9 percent) had reached secondary education and only 3(1.5 percent) had reached tertiary education . This implies that most of the respondents were illiterate and this could be a factor influencing the low coverage and insufficient doses of the vitamin A supplement in the sub county.

It was also important to assess the occupation of the respondents as it has an influence on the mothers' responsibility in ensuring a good health for their children. The results have indicated that most of the respondents 161(78.5 percent) were Housewives, 24(11.7 percent) were in various businesses, only 15(7.3 percent) were employed and 5(2.4 percent) were casual laborers. This result shows majority of the care takers were housewives which might help enhancing care practices that may help mothers to take care of their children, but this is not the case because of poor health seeking behavior in the county as per periodic smart surveys results.

Since people have different sources of income, the respondents were demanded to indicate their major source of income in order to relate the source of income .The main source of income for respondents as per the study is business (representing 28.3%), livestock keeping (27.3%), salary from employment (19.5%) casual labour (14.1%), 8.8% did not have a defined source of income, 1% depended on relative in kind and 0.5% were house help. This might affect the coverage since majority of respondents who their source of income were business and livestock rearing might have less time in caring for their children since they are busy with their source of income contributing to poor

health seeking behavior as indicated in periodic smart surveys and there is need to seek further study to be included in future to ascertain factor contributing poor health seeking behavior in the county.

4.2.2 Distribution of Target Children by Age

The study first sought to establish the age distributions in month and the supplementation status, the outcome are presented in Table 4.2 below.

Table 4.2

Distribution of Target Children by Age

Childs Age in months	Frequency	Percent
At 6 months	6	2.9
7-12 month	51	24.9
13-18 month	22	10.7
19-24 month	34	16.6
25-30 month	18	8.8
31-36 month	22	10.7
37-42 month	9	4.4
43-48 month	20	9.8
49-54 month	4	2.0
Above 54 month	19	9.3
Total	**205**	**100.0**

The results above show that most of the children 51(24.9 percent) who participated in the study were aged between 7-12 months. Followed by 34(16.6 percent) who were aged between 19-24 months, 9(4.4 percent) were aged between 37-42 years, 4(2.0percent) were aged between 49-54 years and only 6(2.9 percent) at six months.

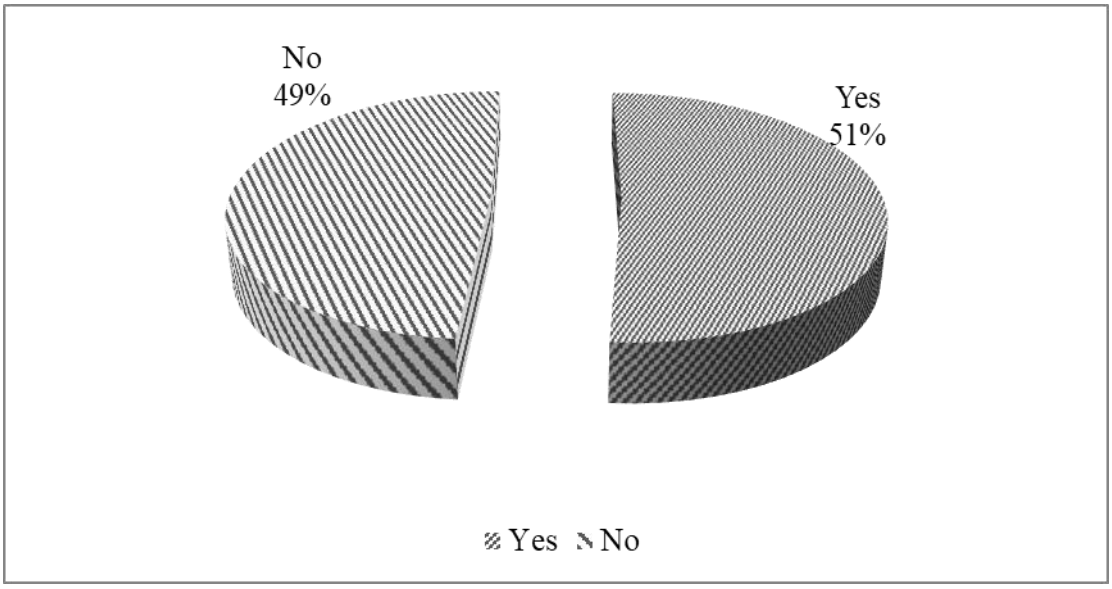
4.3 The Status of Vitamin A Supplement Coverage in Children under Fives

The first objective of the study was to measure the status of routine vitamin A supplementation coverage among the children aged between 6-59 years. Delivery of high dosages of routine vitamin A after every six months starting from six months up to the

59 months of age was recognized on the opinion that a single, large dose of vitamin A is well utilized and deposited in the liver, and then mobilized, as required, over an ample period of time. A dose of 100 000 International Units (IU) in infants 6–11 months of age and 200 000 IU in children 12–59 months of age is considered to deliver reasonable defense against the infections for 4–6 months, (WHO, 2011) .

Figure 4.1

Vitamin A Supplement Coverage in Children



Vitamin A routine supplement coverage for children aged 6 to 59 months in Wajir County was 53 % (DHIS, 2015) and below the national target of above 80% in Kenya and on to watch (50-79%) as per the above WHO coverage interpretations. The study results also showed the similar trends in poor coverage of Vitamin A among children 6 to 59 months where only 51 percent of the children had received the routine supplement Vitamin A and larger number of children in the age bracket in the study still remains not supplemented at 49 percent indicating poor coverage as indicated figure 4.1 above despite the supplement given freely at government health facilities, Wajir has a long way to improve the poor coverage to the beneficial effect of this routine vitamin A due

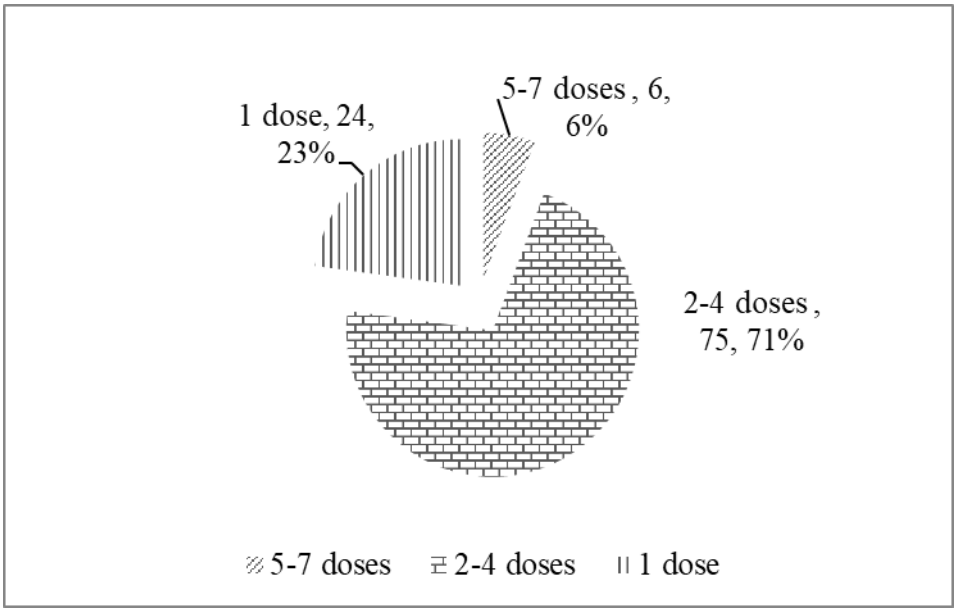
to poor access to health services. The 2014 KDHS findings also indicated the similar result of poor coverage at 58.5 percent both being below the National target of above 80 percent, the study also clearly indicated Access and awareness as the factors that is identified as significant which will affect the routine supplementation.

4.3.1 Frequency of the Vitamin A Doses Received

The WHO guideline recommends that infants aged 6-11 months to be given Vitamin A supplementation (100 000 IU) once in a period of six months and children aged 12-59 months should be given Vitamin A (200 000 IU) every 6 months. This frequency highly is recommended in areas having high incidences of VAD dues to lack of foods rich in Vitamin A wajir being one it. In this respect this study sought to examine the frequency of the vitamin A routine doses received which is presented in Figure 4.2 below

Figure 4.2

Frequency of the Vitamin A Doses Received



Majority of the children about 71% had received an average of 2-4 doses and 23% only received one dose and only about 6 percent had received more than 5 doses indicating

inadequate doses of the vitamin. The required doses as per the schedule are two doses for 6 to 11 months and 10 doses for 12 to 59 months depending on their age in months. There is need for the county to come up with an approach for improving both poor coverage and the inadequate dosages across the county since the areas of study gives out the entire picture of the county.

Further analysis was done to establish the comparison between age and doses of vitamin A routine received.

Table 4.3

Vitamin A Supplementation Dosage against Age

	Doses of Vitamin A supplementation received				Total
	7-5 doses	4-2 doses	1 doses	none	
at 6 month	N/A	N/A	2	4	6
7-12 month	0	13	11	27	51
13-18 month	0	8	4	10	22
19-24 month	0	12	0	22	34
25-30 month	0	11	1	6	18
31-36 month	0	11	2	9	22
37-42 month	0	5	1	3	9
43-48 month	3	10	1	6	20
49-54 month	1	2	0	1	4
Above 54 month	2	3	2	12	19

The above results shows that at least children at 6 months of aged who have been supplemented with the vitamin, 50 percent received the required dose of the routine vitamin A supplement. while children aged 49 months and above only 10 percent of them received near normal doses of the vitamin. This portray that there is poor uptake of vitamin A routine supplementation in children aged above 12 to 59 months in the sub county, Although supplementation in the aged bracket is targeted under the big 4 in one of the indicator in UHC (universal health coverage) still remained challenge in the sub county, hence there is need by the county government and partners in health and

nutrition to come up with strategies that will improve routine vitamin A supplement for the preschoolers.

4.3.2 Vitamin A Coverage per Ward

The study also sought to assess the routine vitamin A supplementation in different wards in the study area whether there was any difference in vitamin A uptake in the four wards. The outcomes are presented in Table 4.4 below

Table 4.4

Vitamin A Coverage per Ward

\		**Has your child received Vitamin A routine supplementation**		**Total**
		Yes	No	
	Township	32 (52.5)	29 (47.5)	61 (29.8)
	Barwako	28 (48.3)	30 (51.7)	58 (28.3)
	Khorof Harar	31 (50.8)	30 (49.2)	61 (29.8)
	Wagberi	14 (56.0)	11 (44.0)	25 (12.2)
Total		105 (51.2)	100 (48.8)	205 (100.0)

The results shows that most of the children who had received vitamin A supplements were in Wagberi and township ward (56 and 52) percent respectively followed by Khorof Harar 50.8percent . Barwaqo ward had the lowest up take of vitamin A supplements with only 48 percent of the children who were reported to have received the supplement. These further shows that there is very poor uptake of the vitamin A supplementation across the all wards with less than 80 percent national target coverage,

The study further sought to assess the doses per wards. The results are presented in Table 4.5 below

Table 4.5

Doses Of Vitamin A Supplementation Across Wards

	Doses of Vitamin A routine supplementation across the 4 wards				
	7-5 doses	4-2 doses	1 dose	none	
Township	0 (0.0)	21 (34.4)	11 (18.0)	29 (47.5)	61 (29.8)
Barwako	3 (5.2)	18 (31.0)	7 (12.1)	30 (51.7)	58 (28.3)
Khorof Harar	3 (4.9)	24 (39.3%	4 (6.6)	30 (49.2)	61 (29.8)
Wagberi	0 (0.0)	13 (52.0%	1 (4.0)	11 (44.0)	25 (12.2)
Total	6 (2.9)	76 (37.1)	23 (11.2)	100 (48.8)	205 (100.0)

The results show that most of the children who have received vitamin A routine supplementation were in Township and Khorof Harar ward. Out of the 61 in township 21 had received 4-2 doses while 11 had received 1 dose. In Khorof Harar, most of the children 24 had received 4-2 doses, 3 had received 7-5 doses and only 4 received 1 dose. In Barwako 18 children had received 4-2 doses and 3 had received 7-5 doses and 7 had received only one dose. This further shows that 76(37.1percent) of the respondents had received between 4-2 doses, 23 (11.2 percent) had received only 1 dose and only 6 (2.9 percent) had received 7-5 doses. This further suggests that half of the children across the wards did not received the required doses of the supplement which of course portray poor uptake of vitamin A across the four wards which might affect the growth and development of the children in age bracket in the study . The maximum dosage for vitamin A routine schedule is 10 doses for the children in age bracket in the study; therefore there is need for the county to come up with a plan for improving both

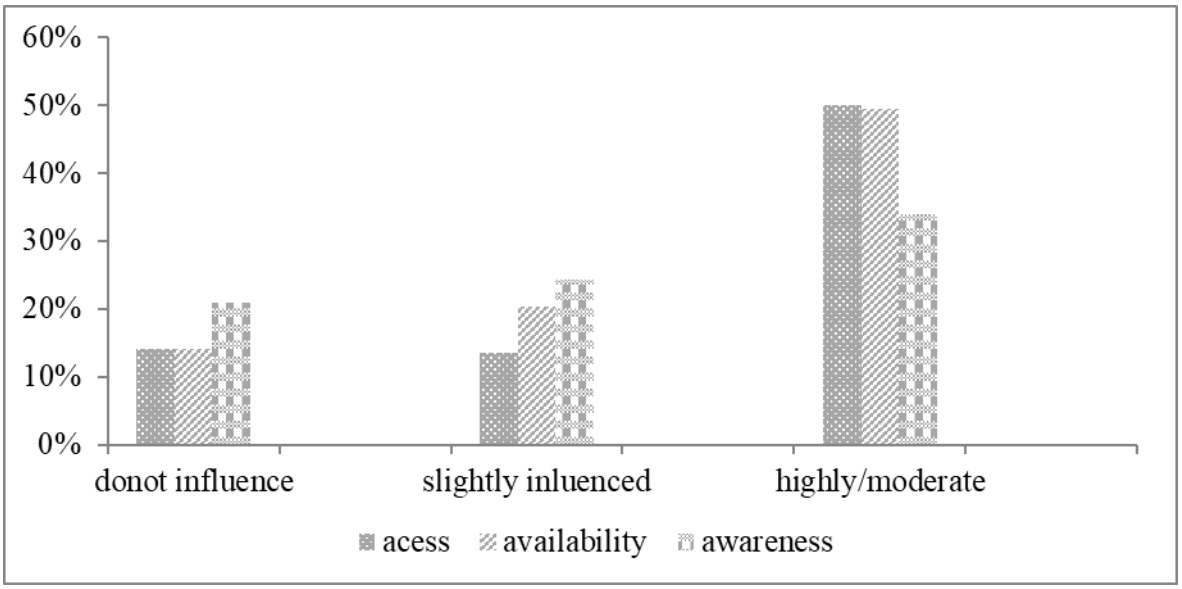
coverage and the doses. From the study it was apparent that only 51.2 percent of the children under the study had received Vitamin A supplementation with varying dosages being administered and which is inadequate over their life time despite the availability and the effort of the UNICEF to reach all the between 6 to 59 months in Arid and semi-arid areas to reduce micronutrient deficiency.

4.3.3 Factors Influencing Vitamin A Routine Supplementation

The study also sought to measure the issues affecting or influencing vitamin A routine supplementation in the sub county. Information on access, availability and awareness was collected to measure whether it has an influence on the routine supplementation. The result was presented in Figure 4.3 below.

Figure 4.3

Factors Influencing Vitamin A Routine Supplementation



The result shows that the access and availability was the factors that are highly influencing supplementation of the routine vitamin A. Hence there is need for the county

government to come up with comprehensive strategies that will improve the especially to the nomadic population that had no access to the health and nutrition services either through outreaches or nomadic clinic facilities. Also there is need to improve the availability of the vitamin to avoid stock out since its highly influencing factor for supplementation that discourages caretakers. Awareness was another factor that was pointed out after the access and availability hence scaling up health and nutrition education was an important element in health services. This differs from findings of (Mostafa et al., 2019) where non-compliance to VAS was found to be associated with older children, parents without formal schooling, family with greater poverty, low family income, and lack of measles vaccination.

4.4 Effect of Vitamin A Supplementation on Child Growth and Development

4.4.1 Prevalence of Stunting

Stunting is an indicator of chronic malnutrition and its effects are adverse and irreversible. Diseases like measles, diarrhea, pneumonia and malaria have long term effects on stunting (KNBS, 2011)while vitamin A deficiency increases susceptibility to these diseases .Therefore, Vitamin A routine supplementation can help prevent these effects and improve nutritional status of these vulnerable groups. The study shows prevalence of stunting was high among the children who were not supplemented and less in children supplemented with routine vitamin A as shown below in Table 4.6

Table 4.6

Stunting among Children

		Children stunted		**Total**
		Normal	Stunted	
Vitamin A routine supplementation	Yes	90 (54.9)	15(36.6)	105(51.2)
	No	74(45.1)	26 (63.4)	100 (48.8)
Total		164(100.0)	41(100.0)	205(100.0)

The results shows that out of (105) 51.2 percent who had received vitamin A routine supplementation indicated only (15) 36.6 percent were stunted compared to those who did not receive the routine supplementations which indicated majority at(26) 63.4 percent were stunted. This agrees with the findings of Kenya Demographic Health Survey(Survey & Indicators, 2014).Which established that in Wajir County 26.4 percent of children in the age bracket were stunted and also indicating the poor coverage of vitamin A routine supplementation at 58.9 percent. This finding is similar to results of a study by(Holick & Chen, 2008), in Uganda where twenty-seven percent preschool children were stunted. However, the prevalence of stunting in this study is much lower than that reported by (Derso et al., 2017) in a study where the prevalence of stunting among children was 58.1%. The stunting prevalence also differs greatly from that of (Kimani-murage et al., 2010) where the prevalence of stunting in the study group was 46%.

4.4.2 Association between Vitamin A Supplementation and Stunting

In order to establish whether there was any significant association between the vitamin A routine supplementation and growth and development of the children. The study used a

chi square test analysis. The test is done at the 95% confident level . In order to indicate that there is a significant difference between the test variables, that is vitamin A supplements and stunting level of the children, the critical P value must be < 0.05. The critical chi square value for 1 degrees of freedom will be > 3.841.

Table 4.7

Chi-Square Tests on Vitamin A Routine Supplementation and Stunting

	Value	**df**	**P value**
Pearson Chi-Square	4.393[a]	1	.036
Likelihood Ratio	4.429	1	.035
Linear-by-Linear Association	4.371	1	.037
N of Valid Cases	**205**		

The association between vitamin A supplementation and nutrition status of the children was significant with a p value of less than 0.036 which was less than 0.05 while the chi square value of 4.393 was more than the critical chi square value of 3.841. This therefore indicates there is a positive significant association between vitamin A supplementation and nutrition status of the children in the study in Wajir east Sub County. Therefore there is a connection between vitamin A. growth and development of children as agreed in many studies.so there need for the county to invest on high impact nutrition intervention especially in the area of micronutrient supplementation. This agreed with the finding of KNBS (2011) and WHO (2011) which indicated that there is a significant association between vitamin A supplementation and growth and development of children. Findings of Ssentongo et al. (2020) also suggested that a significant association of vitamin A deficiency with linear growth failure in preschool children in Uganda.(Kimani-Murage et al., 2010) also found that receiving vitamin A supplement was significantly negatively associated with stunting and underweight status,

adjusting for other co-risk factors. However (Oliveira, 2014) found that stunted children had no benefit from supplementation.

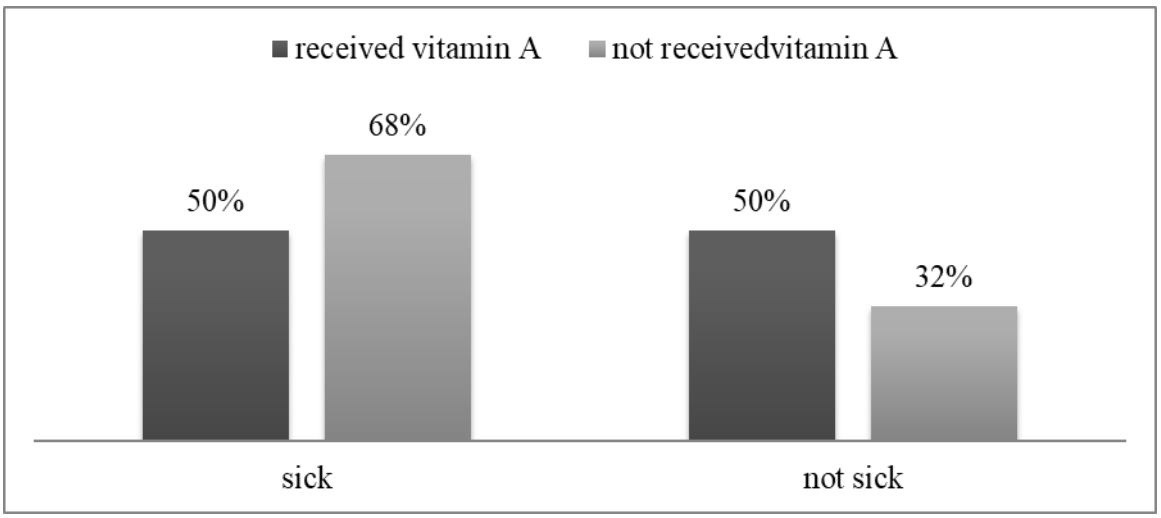
4.5 Effect Vitamin A Routine Supplementation on Disease Occurrence

4.5.1 Morbidity among Children

The deficiency Vitamin A is the leading cause of avoidable blindness in children, and insufficient intake of vitamin A contributes to an unnecessarily high level risk of disease and mortality resulting from the common childhood infections such as diarrheal disease and measles. Vitamin A deficit also causes weakened immune role, poor iron breakdown and acute respiratory infections. The prevalence of reported illness was determined based on a two-Month recall period (this was inclusive of the day of the study conducted), The study focuses on relationship between morbidity and vitamin A routine supplementation, the result indicated in figure 4.3 below shows that there was important connection between Vitamin A supplementation and common illness. Children who received the routine vitamin A supplement experienced less morbidity episodes than those who did not receive at all. The diseases that the children suffered from however varied and a further study could be carried out to investigate the type of diseases that were closely associated with susceptibility occasioned by failure to receive the supplementation. It was apparent as indicated in the result that close to half of (50 percent) of the children who had received Vitamin A supplementation were able to fight off illness as opposed to about 68 percent who got sick and had not received the supplementation. Indicating that vitamin A supplementation has an effect on the immunity status of the children in the study, however, other factors that might have caused the illness could have influenced morbidity among the children who also received the supplementation which need further investigations.

Figure 4.4

Morbidity And Vitamin A Supplementation in Children



4.5.2 Association between Vitamin A Supplementation and Morbidity

The study also sought to establish whether there was an association between morbidity and the uptake of vitamin A supplementation. The result is shown as per Table 4.8.

Table 4.8

Chi-Square Tests for the relationship between morbidity and vitamin A routine supplementation

	Value	**Degree of freedom**	**P value**
Pearson Chi-Square	6.503[a]	1	.011
Continuity Correction[b]	5.799	1	.016
Likelihood Ratio	6.550	1	.010
N of Valid Cases	205		

The association between vitamin A supplementation and the occurrences of illness among the children was significant with a p value of less than 0.011 which was less than 0.05 while the chi square value of 6.503 was more than the critical chi square

value of 3.841. This therefore indicates that there is a positive and significant association between vitamin A supplementation and the occurrence of illness among children in the study. The hypothesis that the routine supplementation of vitamin A has a statistical significant on the occurrence of common morbidity among the children aged 6 – 59 months in the study was retained. Hence the study concludes that the uptake of vitamin A routine supplementation has an effect on both the occurrence of morbidity and nutrition status among the children aged 6- 59 months.

This agreed with the finding of KNBS (2011) and WHO (2011) which indicated that there is a significant association between vitamin A supplementation and occurrence of illness among children aged under-fives. Imdad et al., (2011) also found that preventive vitamin A supplementation reduces all-cause and diarrhea specific mortality in children 6-59 months of age in community settings in developing countries. However (Smith et al., 2016) found that Neonatal vitamin A supplementation (NVAS) did not affect the risk of death or incidence of common childhood morbidities. Analysis of data in (Haider & Bhutta, 2011) study showed no significant reduction in infant deaths at six months of age with the intervention and similar findings for infant deaths at 12 months of age. Similarly in conflict with the results of this study(Masanja et al., 2006) found that Neonatal vitamin A supplementation did not result in any immediate adverse events, but had no beneficial effect on survival in infants in Tanzania

4.6 Effect of Dietary Intake of Vitamin A Rich Foods on Nutritional Status

The fourth objective of the study sought to determine the effect of vitamin A rich foods on nutritional status

4.6.1 Dietary Intake of Vitamin A Rich Foods

Vitamin A is a micronutrient acknowledged to be linked with visual functions, epithelial integrity and the functioning of the immune system (Azevedo et al., 2013). Children can obtain micronutrients from foods, food fortification, and direct supplementation. Rich sources of Vitamin A animal sources include; colostrum, liver, eggs, fish, butter while plant sources include dark green leafy vegetables, yellow fruits e.g. mangoes, pawpaw, pumpkin, carrots, orange-fleshed sweet potato red palm oil and some of the other fruits and vegetables.(ICF & KNBS, 2015; MoPHS, 2008). However, its bioavailability is high in the animal sources than plant sources. The aim of these objectives was to observe intake and frequency of diets rich in vitamin A and whether there were any direct associations. The result of the intake and frequency is shown below in Table 4.9 below

Table 4.9

Dietary Intake

Types of food	Do not offer	once a day	Twice a day	More than Three times a day	N/A
Animal rich foods	30(14.6)	23(11.2)	27(13.2)	112(89.5)	3(1.5)
Dark green leafy vegetables	134(65.4)	47(22.9)	7(3.4)	6(2.9)	11(5.4)
Starchy foods	24(11.7)	12(5.9)	47(22.9)	113(41.0)	9(14.1)
Legume	39(19.0)	73(35.6)	45(22.0)	35(8.8)	13(6.3)
Fruits	132(64.4)	43(21.0)	9(4.4)	6(3.0)	15(7.3)
Cereals	64(31.2)	27(13.2)	33(16.1)	70(15.6)	11(5.4)

The study findings as shown in Table 4.9 above reveal that most of the respondents 112(89.5%) consumed animal rich foods more than three times a day . this could be as a

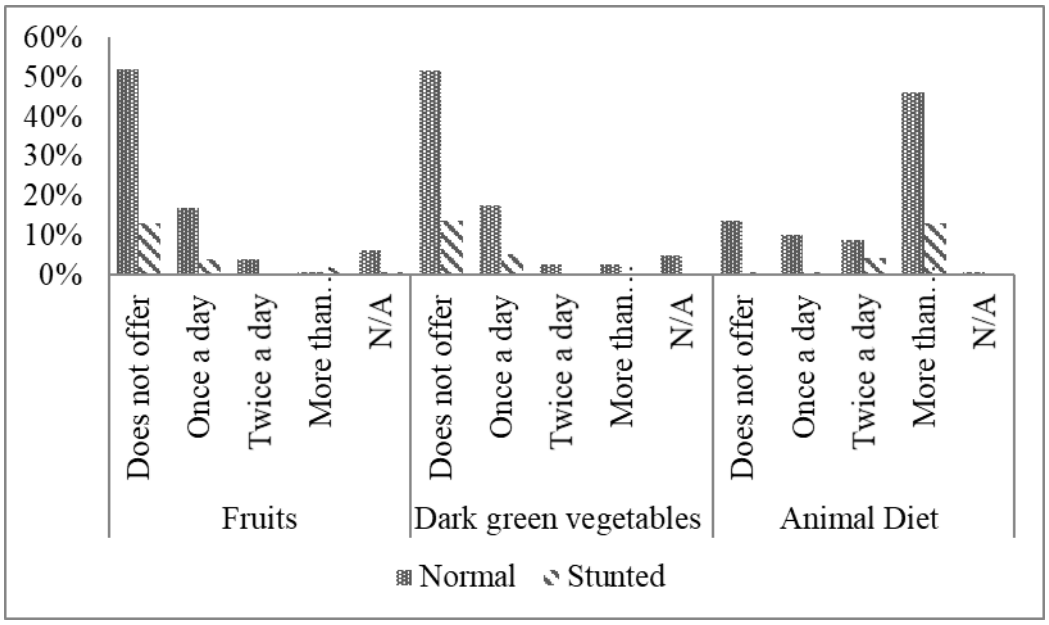
result of most respondents being pastoralists rearing livestock and their products are readily available to them. Fruits and vegetable consumed at 134(65.4%) and 132(64.4%) respectively. This is because they are rarely available and inadequate information on the importance of consuming fruits and vegetables, although the county working on behavioral changes on dietary diversity through nutrition sensitive programs in collaboration with other sectors like ministry of agriculture.

These study suggest that children from Wajir East sub-County mostly consume Vitamin A in form of retinol but lack consumption of Beta-carotene from the plant sources hence there is need for supplementation since intake of animal sources foods is based on seasonality and the sub county in the study is always prone to recurrent drought that might affect the intake due to low productivity of the animal product due to deterioration of animal body condition during the drought period. The study did not sought the quantity consumed which might give clear picture on the nutrition status and further study needed to determine the quantity consumed by the target group.

The study analysis further sought to determine whether dietary intake of Vitamin A rich foods was associated with child nutritional status indicated in Figure 4.5 below.

Figure 4.5

Dietary Intake of Vitamin A rich Foods



The result above indicated, as frequency of intake of fruits and dark green vegetables increases also the stunting level decreases indicating positive significant relation except in animal diets which is vice versa despite higher frequency and it does not indicate any positive significant on nutrition status and further study need to be establish to ascertain the cause .

4.6.2 Association between Dietary Intake and Nutrition Status

The study also sought to establish whether there was a significant relationship between dietary intake and the nutritional status of the children in the study, the results are presented in Table 4.10 and explained below

Table 4.10

Chi-Square Tests for Dietary Intake and Nutrition Status

	Value	Degree of freedom	P value
Pearson Chi-Square (fruits)	11.171[a]	5	.048
Pearson Chi-Square (animal rich diet)	9.098[a]	5	.105
Pearson Chi-Square (dark green vegetables)	2.869[a]	5	.720

The results in Table 4.10 show that there is a positive and significant association between fruits intake and the growth of the children in study since the p value was less than 0.05 and the chi square value was 11.171 which was more than the expected table value of 3.841. This indicated that the fruits intake has a significant association on nutrition stats of the children in the study. The study also established that there was no significant association between animal rich diet and nutrition status of the children in the study area since the p value was more than 0.05, however the chi square value was more than 3.841. This indicates that animal rich diet has no association on the nutrition status of the children in the study.

In regards to dark green vegetables the result shows that there was no significant association with the nutrition status of the children in the study area since the p value is more than 0.05 while the chi square value is less than 3. 841. The hypothesis that Vitamin A routine supplementation has a statistical significant effect on nutritional status of children aged 6 – 59 months in Wajir east sub County was therefore retained and it was concluded that vitamin A supplementation has an association with nutritional status of the children in the study area. This is similar to findings of (Correia et al., 2019) that Vitamin A supplementation showed protective effect to delay in cognitive and motor development modified by interaction with nutritional status.

CHAPTER FIVE

SUMMARY, CONCLUSIONAND RECOMMENDATION

5.1 Introduction

These section presents the summary of the key results and discussions as well as the conclusions and commendations drawn from the assessment of impact Vitamin A routine supplement and vitamin A rich dietary. It also presents the areas for additional research.

5.2 Summary of Findings

The key objective of the study was to assess the effect of Vitamin A supplementation on nutritional status, morbidity and the effect of dietary intake of vitamin A rich diets in children aged 6-59 months in Wajir East sub-county. The study was guided by two hypotheses; Vitamin A routine supplementation has a statistically significant effect on nutritional status of children aged 6 – 59 months and vitamin A routine doses has a statistically significant on the incidence of morbidity among the children aged 6 – 59 months in Wajir east sub County.

The study found that the prevalence of stunting in the study was 20%. The results showed that the access and availability was the factors that are highly influencing supplementation of the routine vitamin A. The study found that close to half of (50 percent) of the children who had received Vitamin A supplementation were able to fight off illness as opposed to about 68 percent who got sick and had not received the supplementation. The results revealed that most of the respondents 112(89.5%) consumed animal rich foods more than three times a day.

5.3 Conclusion

The study findings depicted poor status of the routine vitamin A supplement at 51 % coupled with inadequate doses which might be the contributing factors to the high stunting level shown in the study. The study also sought to see intake and frequency of diets rich in vitamin A and whether there were any direct relationships, the findings was that the children mostly consume Vitamin A in form of retinol but lack consumption of Beta-carotene from the plant sources. The study further sought to investigate whether the dietary Vitamin A intake of foods was linked with child nutritional status in Wajir east sub county which revealed that , as frequency of intake of fruits and dark green vegetables increases also the stunting level decreases indicating positive significant relation except in animal diets which is vice versa despite higher frequency and it does not indicate any positive significant on nutrition status and need further investigation to ascertain the cause .

5.4 Recommendations

The study recommends the following to help improve the poor coverage and insufficient doses of vitamin supplementation to reduce the morbidity which might be the factors contributing factors to the high stunting levels and improve the accessibility and availability of the vitamin. There was need for strategies and more effort to accelerate and create platforms that enhance service delivery at the community level such as Baby Friendly Community Initiative through community strategy to address the poor coverage and the access issue.

The ministry of health ought to improve availability of the vitamin A stocks since it’s one of the factors that is highly influential in supplementation as identified in the study.

There is a need to strengthen the routine supplementation and creating awareness on important of consumption of fortified foods since intake of animal sources foods is based on seasonality and the sub county in the study is always prone to cyclic drought that might affect the intake due to low productivity of the animals product due to deterioration of animal body condition during the drought predisposing the children to micronutrient insufficiency and deficiency.

There is a need for scaling up both nutrition specific and sensitive interventions targeting the women who are primary caregivers of the children. Men should also not be left out as they make key household decisions which may also impact on feeding and health seeking behavior. Besides that, consumer education should also be considered at community level to enable individuals make informed choices on issues on proper infant feeding practices and dietary diversification. Nutrition education should be targeted as a priority informing the community on benefit of vitamin A in growth and development of their children and also emphasizing locally available vitamin A rich foods,

Finalization of existing draft strategy aimed at social behavior communication change for Maternal Infant Young Child Nutrition (MIYCN) to improve sub optimal feeding practices and the 2014 draft outreach strategy that target nomadic population to improve access to health and Nutrition services including vitamin A routine supplementation. National government, county government and health and nutrition stakeholders to assign nutrition budget line for nutrition in their planning and budgeting towards attaining Vision 2030 and strengthening multisectoral collaborations through other ministries/sectors to improve access to nutritious and safe foods along the food value chain pathways by improving Agri-nutrition capacities and coordination both at the

national and county levels to support Agri-nutrition coordination mechanisms through private and public sectors.

Last but not least achieving all these efforts geared towards raising awareness, improving availability of the vitamin A stocks and promoting health/nutrition positive practices requires combined efforts of all stakeholders starting with the individuals, community, leaders, health care providers, partners, policy makers and academia for survival, dignity and economic productivity of our community. The Kenya Constitution of (2010) guarantees each person the right to the free from starvation and to have acceptable food of adequate quality in article 43c and every single child the right to the basic food in article 53c. Despite these constitutional rights; micronutrient deficiency remains a major challenge that threatens achievement of Vision 2030, Sustainable Development Goals.

5.3 Suggestions for Further Study

The study depicted multiple diseases that the children suffered from and a further study could be carried out to investigate the type of diseases that were closely associated with susceptibility occasioned by failure to receive the supplementation. Consumption of animal diets does not indicate any positive significant on nutrition status in the study, despite higher frequency and therefore further study needs to be established to ascertain the cause

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APPENDICES

APPENDIX I: LETTER OF INTRODUCTION

NURIA IBRAHIM ABDI

HND-3-1670-2/2015

Kenya Methodist University

Date:……..

Dear Respondent,

RE: COLLECTION OF DATA FOR RESEARCH PROJECT.

I am a graduate student at Kenya Methodist University, pursuing Master degree in Human Nutrition as a partial fulfillment for the award of the degree, My research project is entitled Assessment of the effect of Vitamin A routine supplementation in children aged 5 years in Wajir County.

You have been randomly selected to participate in this study. Kindly, provide the required information with sincerity, honesty and fairness. Information given will be treated with highest confidentiality. The study is purely for academic purposes and as such, will not be used for any other undertaking.

Many regards.

_____

NURIA IBRAHIM ABDI

HND-3-1670-2/2015

APPENDIX II: INTERVIEW SCHEDULE

This questionnaire aims at collecting data on Assessment of the effect of Vitamin A supplementation and diet rich in vitamin A in children aged 6 to59 months in Wajir east sub County. You are requested to participate in the proposal by filling in the questionnaire. You are assured that the information you provide will be used for the purpose of this proposal and your identity will remain confidential.

Instructions: The respondent is required to respond to all the items in this interview schedule

Fill in the blank spaces provided and use a tick *(√)* where necessary.

Sub-county_____

Ward _____

Village _____

Section A: Demographic of the respondent

Age of the respondent …….

Education level……

Marital status ……..

Occupation …….

Source of income…….

Number of children (under your care) ……

SECTION B

Vitamin A status of children age of 6 to 59 months

1. Has your child received Vitamin A routine supplementation?
    - □ Yes
    - □ No

1b .How many doses of Vitamin A supplementation has your child received so far? ……

    - □ 9—8 doses
    - □ 7—5
    - □ 4—2
    - □ 1—0

2.

3. Does the health facility have vitamin A whenever your child is due for supplementation?
    - □ Yes
    - □ No
4. To what extent do the following factors influence Vitamin A routine supplementation of your child?

Factors	Level of influence			
	Do not influence	Slightly influence	Moderately influence	Highly influence
Access to the health facilities				
Availability of Vitamin A in the health facilities				
Awareness from the health care provider				

SECTION B: DIETARY INTAKE

5. What kind of foods did you offer your child most of the time and at what frequency level?

Type of food	**Frequency of intake**				
	Does not offer	**Once a day**	**Twice a day**	**Three times a day**	**More than three**
Animals Rich Foods					
Vegetables					
Starchy foods – rcie,maize meal,pasta					
Legumes-beans,pulses					
Fruits					
Cereals					

SECTION C: MORBIDITY AMONG CHILDREN UNDER THE AGE OF 6 TO 59 MONTHS

Child No.	**Name of the child**	Sex Male-1 Female-2	Age (months)	how many times has the child received Vitamin A (Show the mother the capsule so that she recalls A,1- B2 -3 c4,-6 3=Don't Know	Has the child been sick in the last 2 months?1=Yes 2 =no	If yes, What illness did your child have in last two month? 1= Diarrhea 2=Vomiting 3=,cough, difficulty in breathing 5= Measles 6=Eye infections 7 =other (specify)

PART 2. Vitamin A routine supplementation and its effect on nutritional status of children (ANTHROPOMETRIC MEASUREMENT).

Child no…….

Age in months

Sex Male -1 Female-2

Measurements

Age (month) _____

Height/length (cm) _____

Z score----------

APPENDIX III: RESEARCH PERMIT AND AUTHORIZATION

KENYA METHODIST UNIVERSITY
P. O. BOX 267 MERU - 60200, KENYA
TEL: 254-064-30301/31229/30367/31171
FAX: 254-64-30162
EMAIL: INFO@KEMU.AC.KE

6TH MARCH, 2017

Nuria Ibrahim Abdi
HND-3-1670-2/2015

Dear Nuria,

SUBJECT: ETHICAL CLEARANCE OF A MASTERS' RESEARCH THESIS

Your request for ethical clearance for your Masters' Research Thesis titled "Assessment of the Effect of vitamin A Supplementation on Nutrition Status in Children Aged 6-59 Months in Wajir East Sub-County" has been granted to you in accordance with the content of your Thesis proposal.

As Principal Investigator, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the Thesis.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the SERC for re-review and approval prior to the activation of the changes. The Proposal number assigned to the Thesis should be cited in any correspondence.
3. Adverse events should be reported to the SERC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for SERC review. The SERC and outside agencies must review the information to determine if the protocol should be modified, discontinued, or continued as originally approved.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by subjects and/or witnesses should be retained on file. The SERC may conduct audits of all study records, and consent documentation may be part of such audits.

5. SERC regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the SERC in order to continue the study beyond the approved period.** Failure to submit a continuing review application in a timely fashion will result in termination of the study, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.

Please note that any substantial changes on the scope of your research will require an approval.

Thank You.

KENYA METHODIST UNIVERSITY
RESEARCH & DEVELOPMENT
06 MAR 2017
DISPATCHED
P.O. Box 267-60200, MERU

Dr. Wamachi
Chair, SERC
Cc: Dean, RD&PGS

25/05/17

Received
County Director of Health
P. O. Box 2, Wajir

CC

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,
2241349,3310571,2219420
Fax: +254-20-318245,318249
Email:dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/17/51506/16715**

Date: **28th April, 2017**

Nuria Ibrahim Abdi
Kenya Methodist University
P.O. Box 267- 60200
MERU.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Assessment of the effect of Vitamin A supplementation on nutrition status in children aged 6-59 months in Wajir East Sub-County"*** I am pleased to inform you that you have been authorized to undertake research in **Wajir County** for the period ending **28th April, 2018.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Director of Health Services, Wajir County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

GKalerwa.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Wajir County.

The County Director of Education
Wajir County.

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officer will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one (1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEACH CLEARANCE PERMIT

Serial No.A 13893

CONDITIONS: see back page

THIS IS TO CERTIFY THAT:
MS. NURIA IBRAHIM ABDI
of KENYA METHODIST UNIVERSITY , 0-70200 wajir,has been permitted to conduct research in *Wajir County*

on the topic: *ASSESSMENT OF THE EFFECT OF VITAMIN A SUPPLEMENTATION ON NUTRITION STATUS IN CHILDREN AGED 6-59 MONTHS IN WAJIR EAST SUB-COUNTY,*

for the period ending:
28th April,2018

Permit No : NACOSTI/P/17/51506/16715
Date Of Issue : 28th April,2017
Fee Recieved :Ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

THE PRESIDENCY

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

Telegraphic Address: "County"
Email: ccwajircounty@yahoo.com
When replying please quote

The County Commissioner
Private Bag
Wajir

Ref No: F.50 VOL I (12)

25th May, 2017

Deputy County Commissioners
Wajir East Sub- County County.

RE: RESEARCH AUTHORIZATION.

Reference is made to a letter Ref No. NACOSTI/P/17/51506/16715, dated 28th April, 2017, from the Director general/CEO, National Commission for science, Technology and innovation office Nairobi.

This is to certify that Mrs. Nuria Ibrahim Abdi of Kenya Methodist University, Meru has been permitted to conduct Research in Wajir County, on the topic "***Assessment of the effect of Vitamin A supplementation on nutrition status in children aged 6-59 months in Wajir East Sub-County*** for the period ending 28th April, 2018.

John K.Chelimo
County Commissioner
Wajir County.

Cc
Nuria Ibrahim Abdi
Kenya Methodist University,
Box 267,
Meru.

elegrams. "046-21029

Telephone.0720938171

When replying please quote

EDWE/GEN/VOL 1 (98)

COUNTY DIRECTOR OF EDUCATION
WAJIR COUNTY
P.O BOX 31,
WAJIR

DATE 5TH June 2017

REPUBLIC OF KENYA
MINISTRY OF EDUCATION
State Department of Basic Education

Nuria Ibrahim Abdi

Kenya Methodist University

RE: RESEARCH AUTHORIZATION

Reference is made to a letter ref NACOSTI/P/17/51506/16715 dated 28th April 2017, from the National Commission for Science and Technology and innovation Authorizing you to carry out a research on **''Assessment of the effect of vitamin A supplementation on nutrition status in children aged 6-59 months''** in Wajir East sub-county for the period ending 28th April 2018.

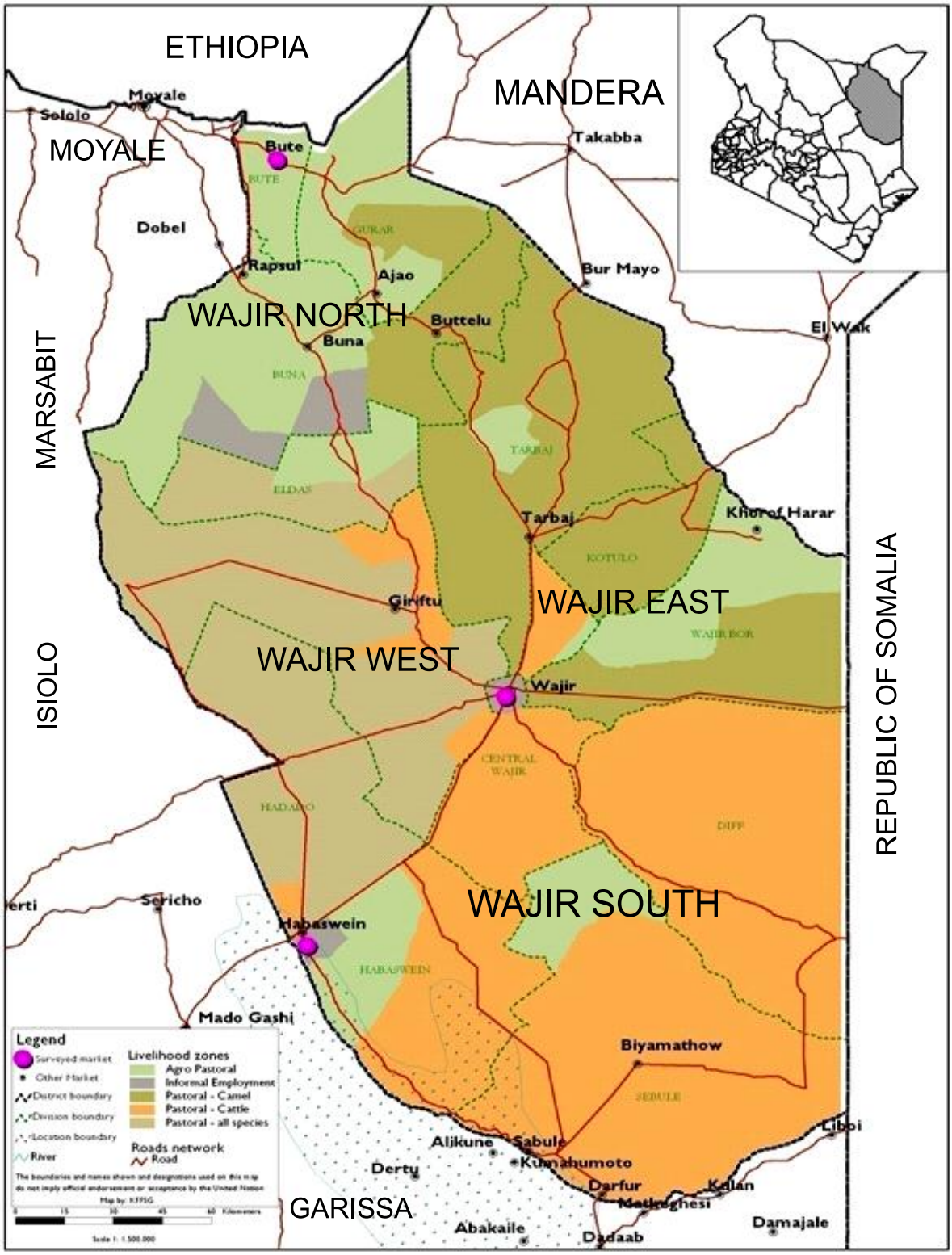
This office has no objection to the research.

HUSSEIN OSMAN

COUNTY DIRECTOR OF EDUCATION

WAJIR COUNTY

APPENDIX IV: WAJIR COUNTY MAP



International Journal of Professional Practice

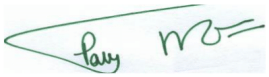
Date: .....28th October 2020.....

Dear Nuria Ibrahim Abdi, Job Mapesa and Joyce Meme

Acceptance Letter

This is to formally inform you that your manuscript entitled ***"Effect of Routine Vitamin A Supplementation on Nutritional Status of Children Aged 6-59 Months in Wajir County, Kenya"*** has been accepted for publication in the **International Journal of Professional Practice (IJPP) of Kenya Methodist University**. After editing and processing, your paper will be published in the next available issue.

Thank you for your contribution. On behalf of the members of Editorial Board of International Journal of Professional Practice, we look forward to your continued contributions to the Journal.



Paul Gichohi, Ph.D, Editor in Chief
International Journal of Professional Practice (IJPP)