

**VITAMIN A DIETARY INTAKE AND SUPPLEMENTATION AMONG  
CHILDREN AGED 12 TO 59 MONTHS IN GATUNGA WARD, THARAKA NITHI  
COUNTY, KENYA.**

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## DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or any other award.

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## **DEDICATION**

To my husband, Mr. David Mugo Michire, my beloved daughters, Kathomi Nyawira and Zawadi Liposo, and my adorable son, Horoho Michire.

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## DEFINITION OF TERMS

**Bio availability:** The extent to which a nutrient is capable of being absorbed or utilized within the body.

**Carotenoids:** Substances chemically related to beta-carotene in chemical structure

**Coverage:** Vitamin A supplementation for children aged 12-59 months in a particular location.

**Dietary diversification:** The art of including a variety of foods from different food crops in a meal with the aim of getting adequate nutrients in the body.

**Dietary modification:** The art of changing the routine diet by introducing other foods in addition to the traditional ones, increasing the amounts consumed per person in a meal, or serving the usual diet/meal with foods that will enhance absorption.

**Fortification:** The addition of one or more nutrients to commonly eaten foods, with the aim of increasing the level of consumption of the added nutrients in order to improve the nutritional status of a given population.

**High-risk groups:** Refers to the nutritionally vulnerable groups such as children less than five years and women of childbearing age due to their higher levels of micronutrient requirements for rapid growth and building of new cells.

**Knowledge/Awareness:** In this study both terms are used interchangeably to mean having information of familiarity of Vitamin A food rich sources and supplementation.

**Micronutrients:** A natural or synthesized vitamin, mineral or trace element required in the body in small amounts, that is essential for normal growth, development and maintenance of life and whose deficiency will cause negative biochemical or physical changes.

**Nutrient density:** A measure of nutrient content of a food in relation to nutrient weight – a food's nutrient density is proportional to its nutrient value. .

**Public Health Measure:** An activity aimed at improving the health of a population by preventing diseases, prolonging life or promoting health.

**Supplementation:** Provision of a specified dose of nutrient preparation which may be in form of a tablet, capsule, oil solution or modified food, for either treating an identified deficiency or prevention of the occurrence of such deficiency in an individual or a community.

**Vitamin A Supplementation Coverage:** The proportion of children of a given age in a particular location receiving Vitamin A supplementation.

## **ABBREVIATIONS AND ACRONYMS**

<b>ASAL</b>	Arid and Semi-Arid Lands
<b>CIDA</b>	Canadian International Development Agency
<b>ECD</b>	Early Childhood Development
<b>EPI</b>	Expanded Programme of Immunization
<b>FNB</b>	Food and Nutrition Board
<b>GoK</b>	Government of Kenya
<b>IDDS</b>	Individual Dietary Diversity Score
<b>IU</b>	International Units
<b>KDHS</b>	Kenya Demographic Health Survey
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KNMS</b>	Kenya National Micronutrient Survey
<b>MCH</b>	Maternal and Child Health
<b>MDGs</b>	Millennium Development Goals
<b>MoH</b>	Ministry of Health
<b>MoPHS</b>	Ministry of Public Health and Sanitation
<b>NGO</b>	Non-Governmental Organization
<b>NS</b>	Nutrition Status
<b>PPM</b>	Parts Per Million
<b>RDA</b>	Recommended Dietary Allowance

<b>RE</b>	Retinol Equivalents
<b>SDGs</b>	Sustainable Development Goals
<b>SES</b>	Socio-Economic Status
<b>U5MR</b>	Under Five Mortality Rate
<b>UNICEF</b>	United Nations Children's Fund
<b>VA</b>	Vitamin A
<b>VAD</b>	Vitamin A Deficiency
<b>VAS</b>	Vitamin A Supplementation
<b>WHO</b>	World Health Organisation

## ABSTRACT

Vitamin A intake is one of the dietary interventions that support the achievement of nutrition priority outcomes. Inadequate Vitamin A intake leads to its deficiency which causes depressed immune response, impaired movement of iron, poor growth, night blindness and xerophthalmia major public health concerns. Vitamin A deficiency has been addressed through supplementation worldwide to children under the age of 59 months. The purpose of this study was to assess Vitamin A intake and supplementation coverage among children aged 12 to 59 months in Gatunga Ward of Tharaka-Nithi County. The study specific objectives were: to establish Vitamin A rich foods consumed by children aged 12 to 59 months, to assess the knowledge of Vitamin A among the caregivers of children aged 12 to 59 months, to determine supplementation coverage of Vitamin A among children aged 12 to 59 months and to establish factors influencing Vitamin A intake among children aged 12 to 59 months in Gatunga Ward. The target population were 370 caregivers of children aged 12 to 59 months who met the inclusion criteria. Sampling procedure included purposive, cluster, and random sampling. A cross sectional descriptive study design was used to guide this study. Semi-structured questionnaires and key informant interviews schedules were employed to collect primary data from caregivers and key informants respectively. Informed consent was obtained from respondents. Research approval, ethical clearance and research permit were granted by Kenyatta University Graduate School, Kenyatta University Ethical Review Committee and National Council of Science, Technology and Innovation respectively. Quantitative data was analysed using Statistical Package for Social Sciences Version 20 while qualitative data was organized and analysed thematically. The findings revealed that only 41.8% consumed more than five food groups and indicator of a children likelihood of suffering from Vitamin A deficiency due to limited dietary diversity. It also emerged that only 36 (9%) of the respondents could mention at least one type of foods rich in Vitamin A while only (23.5%) could mention at least one benefit of Vitamin A, an indicator of knowledge on Vitamin A-rich foods and their benefits was scanty. The supplementation coverage of children aged between 12 to 59 months stood at 35.6%. Chi-square test of independence at significance level of 0.05 results showed that the main determinants of Vitamin A intake were level of education ( $X^2 = 10.880$ ,  $df = 2$ ,  $P < 0.004$ ), age of the caregiver ( $X^2 = 12.055$ ,  $df = 2$ ,  $P < 0.002$ ), marital status ( $X^2 = 18.928$ ,  $df = 2$ ,  $P < 0.001$ ) and income level ( $X^2 = 5.158$ ,  $df = 1$ ,  $P < 0.023$ ). The study recommends that the government and stakeholders need to develop a policy of ensuring caregivers are adequately educated on Vitamin A-rich foods and their benefits. Interventions such as forming self-help groups which will provide platforms of starting of income generating activities such as investing in production of green vegetables, fruits and chicken to diversify on Vitamin A rich Vitamin A-rich foods. Vitamin A supplementation campaigns should also be intensified to ensure adequate coverage.



## CHAPTER ONE: INTRODUCTION

### 1.1 Background Information

Vitamin A is essential in enhancing eye vision, reproduction, cell division, and differentiation (Khillan, 2014). According to the United Nations Children's Fund (UNICEF), Vitamin A is important for a strong immune system and healthy growth and development of children (UNICEF, 2012). Further, if there is inadequate intake of Vitamin A in children, there is an increased risk to illness, blindness, death, measles, and diarrhoea. Vitamin A maintains the surface linings of the eye, respiratory, urinary, and intestinal tracts and is essential for the functioning of an individual's immune system (Smith, 2012).

According to the World Health Organisation (WHO), Vitamin A is essential for proper foetal development right from the embryonic stage (WHO, 2015). From these observations optimal Vitamin A status is important for maintenance of good health and prevention of disease. According to WHO, VAD is defined as “tissue concentrations of Vitamin A low enough to have adverse health consequences despite showing no clinical evidence of Xerophthalmia” (Sommerburg, Siems & Kraemer, 2013, p. 376). Sommer and Davidson (2002) refer to Vitamin A Deficiency (VAD) as having less than 20 µg of stored in the liver.

VAD symptoms may include loss of appetite, hair loss, rashes and frequent infections especially respiratory related (Smith, 2012). Mostly, VAD symptoms may also present as dry skin and eyes, night blindness and other visual challenges, fatigue, poor growth and development among others (Tidy, 2015). Primarily, Vitamin A deficiency is caused by prolonged dietary deprivation and is common in areas where main consumed staple foods have insufficient levels of carotene. Another cause of VAD is inadequate metabolic conversion of carotene to Vitamin A in the body which is as result of poor absorption, storage, and transport of Vitamin A. According of a report by UNICEF (2015), VAD is

the third most widespread and common serious nutritional disorder among young children after protein-energy malnutrition and anaemia caused by iron deficiency.

Children aged between 5 and 59 months and pregnant women are two major groups who are at risk of suffering from VAD. Children aged between 5 and 59 months and pregnant women are likely to suffer from VAD since they fall in the groups in the society affected by major nutritional concern in poor societies, especially in lower income countries (UNICEF, 2015). The young children and pregnant women are vulnerable to Vitamin A-rich dietary decline which predisposes VAD and its disorders. According to Akhtar et al. (2013), VAD manifest in a person when insufficient Vitamin A is consumed in a diet, too little is absorbed by the body from the food sources, or too much is lost due to illness or infection (UNICEF, 2007).

Protein–energy malnutrition, worm infestations, malaria attacks, mal-absorption of fat from consumed foods, liver cirrhosis and socioeconomic factors can lead to severe VAD (UNICEF, 2013). According to Tariku, Fekadu, Ferede, Abebe and Adane (2016), VAD is experienced during illness, particularly measles, diarrhoea and fevers where rapid utilization of Vitamin A is necessary. Studies conducted in Kenya showed a close nexus between malaria and VAD. This is so since VAD weakens resistance to malaria. On the other hand, malaria can lead to VAD by obstructing VA transport from liver storage. Iannotti, Trehan and Manary (2013) argue that there is a nexus between VAD and diarrhoeal. Iannotti, Trehan and Manary (2013) further revealed that children who are not periodically supplemented with Vitamin A were more likely to suffer diarrhoea disease than those who are supplemented.

Motee and Jeewon (2014), observe that for young children, breast milk is a good source of Vitamin A, however, lack of exclusive breastfeeding and abrupt weaning may contribute to VAD. According to Hazir et al., (2011), wrong timing of introduction of

complementary feeding deprives an infant optimum nutrition and this can lead to morbidity, increased mortality and under nutrition. Timeliness is evaluated by determining whether infants are getting solid, semi-solid, and soft foods in addition to being breastfed. According to a report by UNICEF (2012) improving Vitamin A status of VAD affected children by supplementation or food fortification enhances their survival chances since it provide them with more resistance to diseases.

According to Chiu and Watson (2015) poor Vitamin A source diets and disease infections coexist and interact in populations where VAD is rampant. They (Chiu & Watson, 2015) explained that in such situations, Vitamin A deficiency has a high likelihood of increasing infection severity. They also noted that infection severity in turn, can reduce intake and accelerate body losses of Vitamin A subsequently leading to VAD deficiency in the body. According to Akhtar et al. (2013), VAD occurs commonly in developing countries in an environment of ecological, social, and economic deprivation. In these environments deficient dietary intake of Vitamin A is associated with severe infections such as measles, diarrhoea and respiratory diseases. Sardesai (2011) attributed depressed appetite low absorption, excessive metabolism and excretion to low intake of Vitamin A. Vitamin A deficiency has been noted to be a major contributor of under-five mortality and provision of adequate Vitamin A supplementation could prevent many deaths (Kupka et al., (2016).

There are a number of interventions adopted to address VAD. Nair, Augustine and Konapur (2016) posit that the primary intervention measure is to avail adequate Vitamin A intake through dietary diversification. This primary intervention measure is more feasible if properly promoted in the communities with high prevalence of severe VAD. The Vitamin A diet sources comprise of animal and non-animal (plant based) sources. Plant based Vitamin A sources as opposed to animal based ones constitutes the largest proportion of foods intake for most individuals in the developing world. However, these

plant based food sources do not provide enough active Vitamin A. Jemberu, Zegeye, Singh and Abebe (2017) argue that due to insufficient Vitamin A intake from plant food sources, the only feasible remedy is to provide dietary diversification. This would require increased consumption of animal-based Vitamin A food sources (bioavailable Vitamin A-rich foods) together with nutritious fruits and vegetables.

Vitamin A supplementation has been found to have a quick and remarkable effect on reducing infant and child mortality in a number of developing countries globally (Wilson, Imdad , Herzer, Yakoob and Sheriff , 2011). This effort of Vitamin A supplementation globally is a major public health achievement and has saved as an estimated over a million child form deaths each year in developing countries (UNICEF, 2013). These significant reductions on VAD are to a large extent attributed to expanded and sustained Vitamin A supplementation approaches, which have resulted in wide coverage across targeted regions (Akhtar et al., 2013). A high-dose of Vitamin A supplements in form of capsules has been used as the principal strategy for controlling Vitamin A deficiency (Bruins & Kraemer, 2013).

According to UNICEF (2007), resistance to disease and reduced mortality from all causes by approximately 23% has been realised through supplementations. This observation by UNICEF (2007) is a confirmation that Vitamin A supplementation is one of the feasible interventions for VAD in developing countries. Vitamin A supplementation is the best VAD interventions that guarantee high Vitamin A intake for young children aged between 12 and 59 months (Office of Dietary Supplements, 2016). Vitamin A supplementation has also been found to be effective in eliminating Vitamin A deficiency public-health concerns and ensuring child survival.

WHO estimates, over 250 million children under five years of age globally suffer from VAD which as a result has caused blindness to 250–500 millions of them (Bailey, 2015). Kenya is one of the Sub-Saharan country that is affected by VAD. A report by Micronutrient Survey of 2011 (GoK, 2011), in Kenya 76% of the children below five years were found to suffer from Vitamin A deficiency. A Kenya Ministry of Public Health and Sanitation (MoPHS) survey estimated the prevalence of VAD to be 84% among children below five years (KNBS, 2014).

The health survey established that 64.4% of children aged 6 – 23 months in Eastern Province consumed foods rich in VA (KNBS, 2014). The same health survey established that only 73.9 % of children aged between 6 – 59 months had received VAS in the previous six months preceding the study. The findings were captured for the entire Eastern Province but did not specifically indicate figure for Tharaka Nithi County. This is could be not a true reflection of the situation on the ground bearing in mind the difference in socio-economic disparities. The Vitamin A supplementation coverage in Sub-Saharan countries is major concern for governments and stakeholders. Only 17 Sub-Saharan countries have effective two-dose coverage (UNICEF, 2016). The coverage of Vitamin A supplementation in Kenya was between 20-30% and was not evenly distributed across the country (UNICEF, 2016). The low coverage affected mostly semi-arid regions and areas without developed infrastructure (KDHS, 2014).

## **1.2 Problem Statement**

From 2000 – 2014, the Vitamin A supplementation coverage has not been consistent globally – it has been ranging from 15 to 69% with no sustained improvement (UNICEF, 2015). The Kenya National Micronutrient Survey (KNMS) of 2011 established that the countrywide coverage of VAS of children between 6 – 59 months was 28%. The prevalence of VAD was 9.2% - mild severity (MoH, 2011). The KNMS (2011) survey

established that the prevalence of overall marginal VAD was 24.4%, which was lower than the global estimate of 33.3%. The Kenya Demographic Health Survey (2014) established that 73.9% and 71.7% of children age 6-59 months consumed Vitamin A-rich foods and were supplemented with Vitamin A supplements respectively nationally. The percentage of coverage and VAD levels varied across counties with arid and semi-arid counties performing poorly (KDHS, 2014).

Deficient dietary intake of Vitamin A is associated with severe infections. The infections include measles, diarrhoea and respiratory diseases. Deficient dietary intake of Vitamin A is associated with depressed appetite, low absorption, excessive metabolism and excretion, leading to low intake of Vitamin A. Vitamin A deficiency has been noted to be a major contributor of under-five mortality. The provision of adequate Vitamin A supplementation could prevent many deaths (Kupka et al., 2016; Sardesai, 2011).

The poor performance on the Vitamin A supplementation coverage as established by the survey showed the need for the Kenyan government to continue Vitamin A supplementation interventions to address VAD. The interventions comprise twice yearly provision of Vitamin A supplements in all counties to children aged 6 to 59 months. Despite having a Vitamin A supplementation strategy, a nutritional survey found out that more than 80% of the children aged between 12 and 59 months were not served by the VA delivery strategies initiated.

In the former Eastern Province, about 64.4% of the children aged between 6 and 23 months consumed foods rich in Vitamin A in 2014 (KDHS, 2014). The survey also noted that about 73.9% of children aged between 6 and 59 months had received Vitamin A supplements. The findings were captured for the entire Eastern Province but did not specifically indicate a figure for Tharaka Nithi County. The low Vitamin A supplementation coverage was attributed to unreliable and inconsistent delivery mechanisms. It was also

blamed on lack of adequate information by the caregivers on the importance of Vitamin A supplementation and lack of adequate funding due to reliance on external funding which is not sustainable in the long run. Tharaka-Nithi County located in the former Eastern Province is categorized among the Arid and Semi-Arid Lands (ASAL). A Government of Kenya report on the situation of food security has identified Tharaka District as one of the most hit by drought. The report also noted the residents' lack of sufficient information on VA intake which has the likelihood of affecting vulnerable children nutritional status. These revelations therefore means a lot need to be done to address the micro-nutrient deficiency among the vulnerable groups. Few children (12 to 59 months) complete the national schedule for VA supplementation making them liable of suffering from VAD.

This is so because once the child completes the nine months measles vaccination caregivers do not continue to visit the Maternal and Child Health clinic. This means that the possibility of the child getting vitamin supplementation beyond nine months is not assured. The supplementation challenges may be due to household behaviour, inadequate outreach services and poor facility based services. It can also be attributed to expensive fortified foods beyond the reach the community in the study area due to their socio economic status. Gatunga Ward is one of the areas in the county that suffers from prolonged droughts and no studies have been conducted to establish the status of Vitamin A supplementation among children (12-59 months). The study therefore explored the status of Vitamin A intake and supplementation coverage among children (12 to 59 months) in Gatunga Ward in Tharaka-Nithi County.

### **1.3 Justification of the Study**

Gatunga ward in Tharaka North District is an ASAL area due to erratic rainfall. Poverty is prevalent in this ward, which is regularly targeted for relief food aid by government and Non-Governmental Organizations. However, little has been done to determine VA intake

in the study area in attempt to alleviate the effects of micro-nutrient deficiency. Vitamin A is a major public health concern in Kenya and there is need prioritising nutrition interventions that are geared to the eradication of VAD. VAD status has profound negative effect on the country health status or indicators which calls for a study to help address these gaps. The alleviation of VAD will help in attaining Sustainable Development Goals (SDGs): “end poverty in all its forms everywhere” and “end hunger, achieve food security and improved nutrition and promote sustainable agriculture”.

#### **1.4 Research Questions**

The research attempted to answer the following questions;

1. What Vitamin A-rich foods are consumed by children aged 12-59 months in Gatunga ward?
2. What level of knowledge of Vitamin A does caregivers of children aged 12 to 59 months in Gatunga ward have?
3. To what extent is the coverage of Vitamin A supplementation in Gatunga ward for children aged 12 to 59 months?
4. What influence do socio-demographic characteristics have on Vitamin A intake among children aged 12 to 59 months in Gatunga ward?

#### **1.5 Research Hypotheses**

The study was guided by the following null hypothesis:

**H<sub>0</sub>:** Socio-demographic characteristics do not influence Vitamin A intake among children aged 12 to 59 months in Gatunga Ward.

#### **1.6 Research Objectives**

##### **1.6.1 Main Objective**

The overall objective was to determine Vitamin A intake and supplementation coverage for children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County.



### **1.6.2 Specific Objectives**

1. To establish Vitamin A-rich foods consumed by children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County.
2. To assess knowledge levels on Vitamin A among the caregivers of children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County.
3. To determine the Vitamin A supplementation coverage among children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County.
4. To establish the socio-demographic factors influencing dietary Vitamin A intake among children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County.

### **1.7 Significance of the Study**

The outcome of the study revealed valuable data that can be used in the improvement of nutritional quality of the meals given to children to alleviate VAD. The findings are useful to the Ministry of Health, UNICEF, WHO and other stakeholders in planning VAD interventions. The findings are also expected to contribute to the growing body of knowledge on Vitamin A intake and supplementation in arid and semi-arid areas of developing countries. This can be made available to readers and researchers through presentation at the university, conferences and publication in peer review journals.

### **1.8 Limitations and Delimitations of the Study**

#### **1.8.1 Limitations**

There could have been recall biases on the type of foods consumed in the previous 24 hours and the exact time of the supplementation. The enumerators were trained to ensure such limitations were eliminated by guiding the respondents to capture only foods consumed within the 24 hour period.

### **1.8.2 Delimitations**

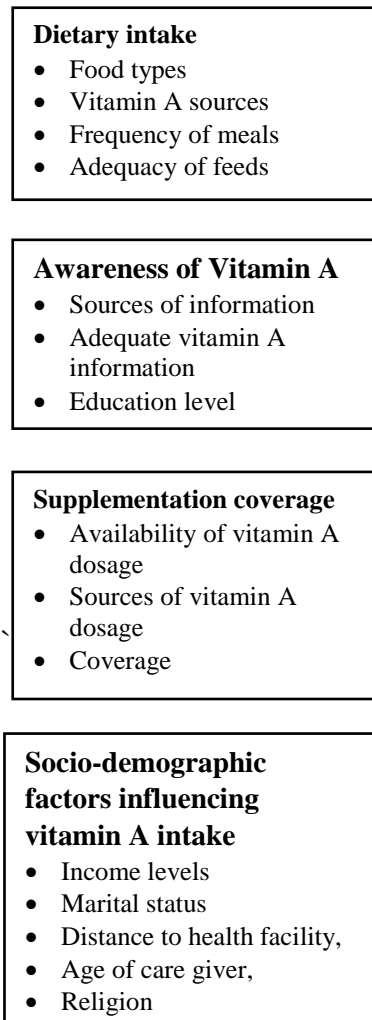
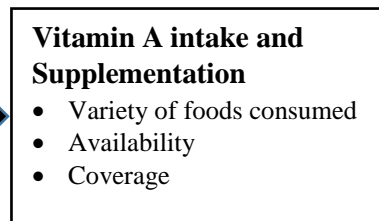
The study focused only on children aged between 5 and 59 months within the sub-locations sampled; hence generalization of results to other counties should be done with caution.

### **1.9 Assumptions of the Study**

The study was based on the assumption that the knowledge of caregivers, social, economic and demographic factors, Vitamin A supplementation, and the diet given to children can influence Vitamin A intake in children between 5 and 59 months.

### **1.10 Conceptual Framework**

Conceptual framework shows a pictorial relationship of independent variables and dependent variables. It also shows how independent variables influence the outcome of dependent variables. The conceptual framework under study is presented in Figure 1.1.

**Independent Variables****Dependent Variables**

Source: Author (2016)

**Figure 1.1: Conceptual Framework**

Figure 1.1 shows the relationship of independent variables and dependent variables. The dependent variable is the Vitamin A intake and supplementation coverage. Adequate Vitamin A intake and wide coverage during vitamin supplementation is dependent on the independent variables. The independent variables that influences Vitamin A intake and supplementation coverage included; dietary intake, knowledge of Vitamin A, supplementation coverage and social economic characteristics.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter captures reviewed literature under the following subheading; vitamins A rich foods consumed by children aged 12 to 59 months, knowledge of Vitamin A among the caregivers of children below five years, factors influencing VA intake and supplementation coverage and interventions to have Vitamin A among children. It also presents the summary of literature reviewed.

### **2.2 Vitamins A-Rich Foods Consumed by Children Aged 12 to 59 Months**

According to Azadbakht and Esmailzadah (2010), dietary diversity has a direct relationship with good nutritional status as it is usually linked to improved health and nutritional adequacy. Vitamin A is necessary for foetal development and growth and is also important for ensuring healthy functioning of the eyes. It also enhances the immune system thus preventing and decreasing the severity of infections like diarrhoea and measles. According to a report by Kenya MoPHS (2010), adequate Vitamin A in the body increases chances of survival for young children by reducing overall child mortality by 23%. It also reduces death from measles and death from diarrhoea by 50% and 33% respectively (MoPHS, 2010). Other benefits of Vitamin A include aiding absorption of iron which leads to reduction of anaemia and it is also protects body cells from being damaged by the free radicals by acting as an antioxidant compound.

Thome-Lyman et al., (2010), posits that in urban areas, a low food variety is associated with the risk of children being underweight and or stunted. Vitamin A is obtained from animal and plant sources are a fat soluble and can be stored in the liver for up to six months. Animal Vitamin A sources are obtained from liver, whole milk products, butter, fish, meat and eggs in form of a group of molecules called retinoid. Vitamin A-rich plant sources are referred to as carotenoids and also include beta-carotene. Plant group are also

referred to as carotenoids and also includes beta-carotene. Plant based Vitamin A sources can be obtained from red palm oil, mangoes, papayas, carrots, pumpkins, and dark green leafy vegetables. For adequate intake of plant Vitamin A sources a little oil should be added in foods during cooking. The body extract Vitamin A and store it in the liver as beta-carotene. The stored beta-carotene is converted to Vitamin A.

The UNICEF (2010) recommends that all children to be exclusively breastfed even up to two years or longer. This is so because breast milk is a natural source of Vitamin A and has a role of protecting a child from diarrhoea and malnutrition. According to Motee and Jeewon (2014), breast feeding is critical in reducing the risk of developing Vitamin A deficiency. The practice of exclusively breastfed by well-nourished mothers for the first six months of life helps the child to get enough and build (store) sufficient Vitamin A in the liver. This is a cheap method of ensuring children get initial dose of natural Vitamin A. It is therefore imperative for the mothers to be educated on the relationship between breast feed and Vitamin A uptake. Vitamin A is a fat soluble which means it requires presence of lipids in the stomach to allow quick absorption (DellaBartolomea, 2016). This means that for adequate vitamin uptake from consumed foods fat or oil is necessary. Kuriyan, Konforti and Wemmer (2012) observed that dietary fat and proteins are vital for absorption and metabolism of Vitamin A and its precursor. Foods that are rich in Vitamin A and pro-Vitamin A carotenoids are breast milk, eggs, liver, fish, butter, carrots, sweet potatoes, leafy greens, whole milk, red palm oil, pumpkin, mango, papaya avocado and apricot among others.

The Kenya Demographic and Health Survey KDHS (2014) observed that in Kenya, nutritional status is poor and this malnutrition puts children at an increased risk of morbidity and mortality. The study found out that 11% of children in the country below five years are under weight and 2% severely underweight. The survey also showed that

26% of children below five years were stunted and 8% of the children were severely stunted. Mortality in children below five is linked to under nutrition. According to UNICEF (2013), household food security is influenced by drought, poverty and other factors but food security has an important role in determining the state of maternal and child nutrition in many countries. USAID (2017) observed that as much as 3.5 million people in Kenya are in need of food assistance and this has led to acute malnutrition challenges in some areas especially in Arid and Semi-Arid parts. This situation was caused by failed rains which led to inadequate food production leading to consumption of low nutritious foods.

Tulchinsky (2010) posits that micronutrient deficiencies are a major health problem globally with poor countries having the greatest burden of disease. These countries have high rates of child morbidity and mortality. Micro nutrient malnutrition caused by lack of vitamins and minerals do manifest itself through conditions as night blindness, goitre, reduced immunity, reduced learning ability and anaemia (Bhandari & Banjara, 2015). UNICEF's State of the World Children report (2014) indicates that 16% of children under the age of five years in Kenya are moderately malnourished while 4% are severely malnourished. Stunted growth is also a major problem in least developed countries as compared to developed economy like Australia, Canada, and Japan among others where zero malnutrition is recorded (UNICEF, 2014). According to Akombi et al., (2017), East Africa leads with the most stunted children. Akombi et al., (2017) established that there is strong evidence to conclude that poor growth is associated with delayed mental development and that growth retardation in childhood is linked with functional impairment in adult life.

### **2.3 Levels of Knowledge of Vitamin A Intake and Supplementation among Caregivers of Children 12-59 Months**

Maternal nutritional knowledge and caregiver knowledge of nutritional aspects fundamentally contribute to nutritional status of children. This knowledge affects food choices and preparation by caregivers. Williams et al., (2012) observed that promoting maternal nutrition knowledge in social economically poor areas may represent an important opportunity for improving diet in children. Sometimes maternal nutritional knowledge may substitute for schooling especially at lower levels of income. Nutrition education presents another avenue of increasing knowledge of Vitamin A uptake. Nutrition education is critical in changing habits which contribute to intake of poor diet. The challenges of insufficient Vitamin A intake is a question of ignorance due to lack of knowledge among the caregivers. This can be addressed by carrying out Nutrition education. Nutrition education is critical in ensuring caregivers gain knowledge, skills and motivation to make wise dietary and lifestyle choices (Kulwa, Verstraeten, Bouckaert, Mamiro, Kolsteren & Lachat, 2014). Also nutrition knowledge by primary caregivers should include age of introducing solid food into infants' diet, frequency of feeding, types of solid foods to be given. Education should also impact knowledge that will help mothers cope with perception of her own child's nutritional status.

Babatunde et al. (2011) observed that prevalence of malnutrition including one involving Vitamin A deficiency is high in mostly developing world. This has leads to a situation where by approximately 183 million children are underweight, 226 million children are stunted and 67 million children are underweight. Malnutrition is all over the world and all nations including the developed and developing nations. It is a health problem which is related to literacy of mothers and other caregivers (Khan et al., 2010). Therefore if social conditions and caregivers' literacy are improved, this might help improve Vitamin A

nutritional status. Williams et al., (2012) records that, promoting caregiver and paternal knowledge of Vitamin A nutritional status may provide an avenue to improve diet in children from disadvantaged neighbourhoods. Mothers are the foremost primary caregivers for their children and their understanding of nutrition and health measures strongly relate to the care they give. To a large extent, other factors like social economic characteristics determine nutritional status of children.

Education of caregivers on feeding practices is crucial in ensuring children are fed with adequate and correct food commodities. Education targeting caregivers has been used as an intervention measure of addressing VAD with varied successes. In Kenya according to Abuya, Ciera and Kimani-Murage (2012), inclusion of nutritional education at child health and maternal clinics operates on the assumption that caregivers' knowledge can have an impact on children's nutritional status. Brown (2016), argues that educational interventions on Vitamin A to the caregivers should focus on basic knowledge regarding sources as well as symptoms of deficiency. In addition education on Vitamin A to primary caregivers should emphasize on increasing variety of foods rich carotenoids grown in home gardens.

Multi-sectoral approach like health programme support and school feeding programmes is another strategy of creating knowledge of Vitamin A (Pepino, 2014). This approach according to Aliyar, Gelli and Hamdani (2015), have been found to be effective in enhancing knowledge of Vitamin A and improve school attendance, retention of students, children growth and improve performance of the school. CIDA (2007) found out that by caregivers in school offering nutritious meals to children in African schools can help in their health and well-being and can stimulate their families to send them to school. The school feeding programme can play a huge role in helping curb communities' health problems. The primary caregivers in schools include teachers who should be taught on



nutritional knowledge and interventions like micro nutrient supplementation. Nutritional education has been shown to improve knowledge, skills, physical activities and health status for school going children. This approach need to be used to address vitamin deficiency for pre-schoolers.

Infant and child growth and monitoring are an important tool for informing nutritional deficiencies among the infants and children. According to Marotz (2014), growth and monitoring of infants and children increases knowledge about children growth and helps to improve caring practices. This serve as a core activity in an integrated child health and nutritional programme for addressing nutrients deficiencies like Vitamin A. Growth monitoring teaches mothers, health workers and families about diet and how illness affects growth and thus stimulates individual initiatives to improved practices.

#### **2.4 Factors Influencing Vitamin A intake**

There are a number of factors that have attributed to the increase in VA intake. These factors are; the mothers age by the time she gives birth. The older the child's mother the higher the chances of that child consuming foods rich in Vitamin A. The mothers' education levels also have been found to influence Vitamin A intake. There is close relationship between poor diet and poverty while lack of supplementation could be attributed to lack of information on accessibility and the importance of the supplements (KNBS, 2010).

UNICEF (2017) observed that as many as 3.7 million people in Kenya are in need of food assistance and this has led to acute malnutrition rates of 37% in some localized areas. According to UNICEF (2013), household food security is influenced by drought, poverty and other factors but food security has an important role in determining the state of maternal and child nutrition in many countries. Vitamin A intake and food security is influenced by drought, poverty and other factors but food security has an important role in

determining the state of maternal and child nutrition in many countries. People in Kenya are in need of food assistance and this has led to acute malnutrition rates of 37% in some localized areas (UNICEF, 2013). Malnutrition can therefore be considered as both cause and consequence of poverty. To achieve sustainable development, investments in meeting nutritional requirements and enhancing nutritional status of children poverty or lack of food security needs to be addressed. High proportions of children from least developed nations suffer from one or more forms of malnutrition. Poor pre-school child nutritional status is known to cause long term effects on the intellectual performance, life time earnings and work capacity. School going children face nutritional problems that may sometimes affect their ability to go to school, physical development as well as their ability to learn.

Micronutrient deficiencies are a major health problem globally with poor countries having the greatest burden of disease. These poor countries have high rates of child morbidity and mortality. Economic and social status plays a huge role in determining intake of nutrients like vitamins as it affects the purchase of certain nutrients rich foods like fruits and vegetable. In a study on the impact of the economic crisis and access to sufficient food Christian (2010) argued that there is a close correlation between socio-economic factors like food prices and food availability which may result in low Vitamin A intake. This observation means that the lack of adequate incomes affects families' purchasing power which eventually leads to nutritional challenges. Cheaper foods in most cases are of low nutritional value but with relatively high energy content known to contribute to obesity in children. The high prices of food commodities results in many families unable to buy meats, milk, fruits and vegetables which are rich in nutrients like vitamins and minerals (WHO, 2015). These normally affect low income earners in urban poor and rural arid areas. The end result of inadequate income is malnutrition due to lack of essential

vitamins. Ayieko and Midikila (2010) carried out a study in Sabatia Kenya to establish the food supply, coping strategies and child nutritional outcomes. The study results showed that food production in households cannot meet food needs even in areas with adequate rainfall. Low levels of education, income and unemployment among caregivers limit their purchasing power and knowledge required to meet nutritional requirements of children.

## **2.5 Supplementation Coverage and Interventions on Vitamin A among Children**

The WHO defines Vitamin A supplementation as the periodic administration of high doses of the vitamin supplementations to a Vitamin A deficient person (WHO, 2009). Therefore, supplementation of Vitamin A in children below the age of five years is done given that Vitamin A insufficiency is of public concern especially in developing nations as this deficiency plays a major role in mortality of children below five years (WHO, 2011). According to Agrawal and Agrawal (2013) Vitamin A supplementation is one of the most cost-effective interventions for improving child survival. Vitamin A supplementation is a necessary for achieving SDG three (3) especially in countries with high under-five mortality and VAD rates (UNICEF, 2016). Vitamin A supplementation of children according to UNICEF (2016) is recommended in all countries where the Under 5 Mortality Rate (U5MR) exceeds 70 deaths per 1,000 live births. In 2016, in Kenya the U5MR stood at 52 deaths per 1,000 live births which was lower as compared to 115 in 2003 (KDHS, 2014). In Tharaka North district the U5MR stood at over 80 deaths per 1,000 live births (KDHS, 2014).

According to UNICEF (2013), supplementation of Vitamin A in Kenya is integrated with the other child survival interventions. These interventions are de-worming, immunization and nutritional education. Vitamin A Supplementation is the widely used intervention to increase uptake. In 2010, supplementation coverage for Vitamin A stood at 68%. This is low supplementation coverage as compared to previous years where it stood up to 80%.

Kenya started twice yearly periodic large doses of Vitamin A supplements VAS in the year 2000 through campaigns to children aged between 6 to 59 months through the ministry of health. Since 2007, VAS in Kenya has been delivered through the child health and nutrition weeks that focus on strengthening of routine uptake of Vitamin A at health facilities. Other avenues used by MoH for VAS include Early Child Development (ECD) centres, EPI and *Malezi Bora* delivery strategies. The children aged 6 to 11 months has been consistently received high VAS (over 65%) as compared 20% of children aged 12 to 59 months in the last two years in Kenya in 2010. The success of VAS strategy is envisaged will lead to reduction of VAD leading to attainments of Sustainable Development Goals (SDGs) 2 and 3. This will in turn end hunger, achieve food security and improve nutrition. It will also promote sustainable agriculture to ensure healthy lives and promote wellbeing for all at all ages.

The fortification method of adding extra vitamin food sources especially processed ones is another supplementation strategy used to address VAD (Dary & Mora, 2002). For better wide coverage for supplementation dietary intake of Vitamin A can also be increased through fortification of a staple food or condiment with Vitamin A. For a long time in developed economies foods such as fats, oils, margarine, and cereal products have long been fortified with Vitamin A in unlike in lower income countries. However, in the recent times since the early 2000 in developing countries for example Kenya fortification of sugar, oil and flours in gaining momentum.

## **2.6 Summary of Literature Review**

The literature reviewed showed that dietary quality and diversity of food consumed has a direct relationship with the status of Vitamin A intake. Inadequate Vitamin A intake leads to Vitamin A deficiency which leads to depressed immune response, impaired movement of iron, poor growth, night blindness and xerophthalmia. The consequences of VAD

necessitate a multi-sectoral approach to prevent and control. Supplementation is one of the nutrition interventions that support the achievement of nutrition priority outcomes. Though it's a costly strategy its benefits out ways the cost implications of treating Vitamin A deficiency in young children. Nutrition education presents another avenue of increasing knowledge of Vitamin A uptake. Parents and primary caregivers' knowledge should be enhanced so as to reduce negative effects of Vitamin A deficiency.

## **CHAPTER THREE: MATERIALS AND METHODS**

### **3.1 Introduction**

This chapter describes materials and methods adopted in this study. The materials and methods are discussed under the following subsections: study area, research design, target population, exclusion criteria, sample size and sampling procedure. It also captured research instrument validity and reliability, pre-testing, data collection techniques, data analysis techniques and logistical and ethical consideration.

### **3.2 Research Design**

The study adopted a cross sectional descriptive study design. This research design was appropriate for determining association between the independent and dependent variables of the study. The study was carried out with the use of a semi structured questionnaires to determine the VA intake, adequacy of food taken and the VA supplement taken by the children aged between 12 to 59 months.

### **3.3 Dependent and Independent Variables**

The independent variables were age of caregiver and child, socio economic status of the household, and level of education of the caregiver. The dependent variables were dietary Vitamin A food intake and Vitamin A supplementation.

### **3.4 Location of the Study**

The study was carried out in Gatunga Ward in Tharaka North Sub-County of Tharaka Nithi County. The ward borders Mukothima, Nkondi and Marimanti wards to the North and Mwingi County to the East and South. The estimated number of children under the age of 5 years in the division was 3,850 (Kenya Population and Housing Census, 2010). Two locations in Gatunga ward namely Kathangacini and Maragwa, were purposively sampled for the study due to the ward being classified as the most arid ward in Tharaka Nithi County. These locations are the most arid and occasionally go up to six consecutive

seasons without harvest. The main source of livelihood for the inhabitants are mixed farming, rain fed cropping and livestock rearing.

### 3.5 Target Population

The study targeted the caregivers of the children aged between 5 and 59 months in Gatunga Ward (Table 3.1).

**Table 3.1: Target population**

<b>Gatunga Ward</b>	<b>Households</b>
Khangachini Location	1660
Maragwa Location	1301
<b>Total</b>	<b>2961</b>

Source: Tharaka Nithi County Commissioner office 2016

### 3.6 Inclusion and Exclusion Criteria

The research involved the caregivers of the children aged 12 to 59 months who had resided in the area of study for at least 12 months. However, mothers or caregivers whose children have lived in the area of study for less than 6 months were not included in the study.

### 3.7 Sample size Determination and Sampling Techniques

#### 3.7.1 Sample Size Determination

Population sampling is necessary in selecting a portion of the entire population. The sampling size of the households was determined using Slovin's formula  $n = \frac{N}{1+N(e)^2}$

(where " $n$ " is the desired sample size, " $N$ " is the population size, and " $e$ " is the margin of error). Sari and Iskandar (2012) argue that the Slovin's formula is suitable in calculating study sample size when the available study population size of the subjects to be studied is known. The study used 0.05 margin of error where  $n = \frac{2961}{1+2961(0.05)^2} = 352$  to calculate the

sample size of households. The number of households in each location was determined proportionate to the sample size of 352 subjects calculated using Slovin's formula. Table 3.2 presents the calculated proportionate sample size distribution of respondents for each location.

**Table 3.2: Proportionate sample size distribution**

<b>Location</b>	<b>% proportionate</b>	<b>Proportionate Sample Size</b>	<b>Allowance (5%) of the sample size</b>
Khangachini	56	197	10
Maragwa	44	155	8
<b>Total</b>	<b>100.00</b>	<b>352</b>	<b>18</b>

A five per cent of 352 that is, 18 extra households were included from the study to compensate situations such as incomplete filling. This gave 370 household that were earmarked for primary data collection.

### **3.7.2 Sampling Techniques**

Sampling procedure included purposive, cluster and random sampling. Purposive sampling was used identify the ward, which was clustered into two regions, Khangachini and Maragwa, then random sampling was used to locate household with children aged 12-59 years depending on the records obtained from the Chiefs office.

## **3.8 Research Instruments**

The study used two types of data collection instruments namely; questionnaires and key informants interview schedule. Each type of the instrument is discussed in the subsequent sections.

### **3.8.1 Questionnaires**

Open and closed ended items in the questionnaires were used to collect primary data from caregivers (Appendix II). Information collected from caregivers comprised demographic



characteristics, socio-economic characteristics and Vitamin A supplementation delivery strategies. A food frequency table was used to collect data on the Vitamin A-rich foods consumed by the child in the past seven days. The mother-child health card was observed to determine whether the child had received Vitamin A supplement in the past six months.

### **3.8.2 Key Informants Interview Schedule**

Key informants comprised of nutritionists, public health officers and nurses in charge of the facilities. They were interviewed using key informants interview schedule. The key informant interview schedules collected mainly qualitative data and also provided an avenue of clarifying and probing responses. Information on the sources of Vitamin A foods, strategies used in delivering VAS, types of VA rich foods grown in the area and factors that influenced VA intake was collected using this data collection instrument.

## **3.9 Pre-Testing**

A pre-test was done using 10% of the caregiver sample size. The pre-test involved caregivers of children aged 12 to 59 months in the nearby Marimanti ward, Tharaka South Sub County. The pre-test helped to determine the reliability of the data collection instruments. During pre-testing problems that were likely to occur in the actual data collection was explored. Pre-testing also helped to identify and remove possible errors in the instruments.

### **3.9.1 Validity**

The study used content validity to ensure instruments collect what they were intended. To ascertain the content validity, research instrument were presented to experts to ensure the items in the questionnaire were relevant to the study objectives. The research also engaged the supervisors' advice on the instruments validity.

### **3.9.2 Reliability**

The test-retest was conducted to determine the reliability of the instruments. The test-retest method was done by administering questionnaires to pre-testing sample respondents at intervals of two weeks. The pre-tested instruments were subjected to Cronbach Alpha coefficient in order to establish the instruments reliability. According to Amin (2005), only Cronbach Alpha reliability index of  $\geq 0.7$  is acceptable. The Cronbach Alpha calculations returned a coefficient of 0.89 which indicated that the instrument were consistent and, therefore, reliable.

### **3.10 Data Collection Techniques**

Due to expansive data collection site eight research assistants with a minimum qualification of secondary school level of education certificate were recruited from the study area and trained by the principal researcher on the purpose and objectives of the study. They were trained on the study objectives, methodology, and maintenance ethics during and after data collection. They were also trained on sampling, pre-testing and administering data collection instrument, actual data collection and recording, ethics and interviewing techniques. The eight research assistants were used by the principal researcher to collect data from the caregivers in the sampled sub locations. Respondents (caregivers) filled questionnaires with the help of research assistants. As well, key informants were orally interviewed by the researcher using interview guide (Appendix I).

### **3.11 Data Analysis**

Primary data collected using questionnaires was cleaned, coded and then keyed into Statistical Package for Social Sciences (SPSS) Version 20 computer software used for data analysis. Mean, variance, standard deviation and percentages descriptive statistics were computed to analyse quantitative primary data collected using questionnaires. Analysed quantitative data was organized and summarized using tables and charts. Vitamin A

coverage was determined by dividing the number of children receiving VAS in the past 12 months by the total number of children then multiplied by 100.

The influence of independent variables on the intake of Vitamin A was tested using Chi square where a  $p$  value of  $<0.05$  was considered significant. A Chi-Square  $p$  value of more than 0.05 was an indicator that tested variables did not vary meaning there was no statistical difference among the group variables. Chi Square  $p$  values equal or less than 0.05 indicated the tested variables varied significantly - meaning there was statistical difference among the group variables explored.

### **3.12 Logistical and Ethical Consideration**

The research ensures the study, conformed to ethical codes during data collection, data analysis and dissemination of findings. This was done by seeking clearance from Kenyatta University Review Board to conduct the research. Permit was also obtained from the National Commission of Science, Technology and Innovation (NACOSTI) after approval by graduate school. The participants (caregivers) were requested to sign informed consent forms before commencing the study. The respondents were assured that the information collected would be treated with confidentiality and would be used for the purposes of academics research only.

## CHAPTER FOUR: RESULTS

### 4.1 Introduction

This chapter discusses the results of the study as analysed instruments used to collect quantitative and qualitative primary data. The overall objective of the study was to determine Vitamin A intake and supplementation coverage among children aged 12 to 59 months in Gatunga ward of Tharaka-Nithi County.

### 4.2 Response Rate

#### 4.2.1 Response Rate of Administered Questionnaires

The study earmarked to administer 370 questionnaires but only 350 were administered. After data cleaning and editing only 311 were found adequate for analysis. A total of 39 was not completely filled thus were not valid for analysis. Table 4.1 tabulates the response rates.

**Table 4.1: Response rate**

<b>Questionnaires Earmarked to be Administered</b>	<b>Questionnaires Administered &amp; Returned</b>	<b>Questionnaires Returned &amp; Valid for Analysis</b>	<b>% Response rate</b>
370	350	311	88.9

The results in Table 4.1 indicate an overall of 88.9% response rate for the respondent sampled from the two locations of Gatunga ward. According to Mugenda and Mugenda (2003) a 50% response rate is adequate, 60% good and above 70% is rated very good. Based on this assertion, the response rate of 88.9 % was excellent and was therefore the data was valid for analysis. The high response rate was attributed to the use of research assistants, assistance from the assistant chief for each sub-location and adequate mobilization.

### 4.3 Socio-Demographic Characteristics of the Respondents

#### 4.3.1 Distribution of the Respondents Based on Gender and Marital Status

The respondents were asked to indicate their gender and marital status. This was necessary in order to establish the caregiver's gender and marital distribution. Table 4.2 shows a cross tabulation on the distribution of the respondents by gender and marital status.

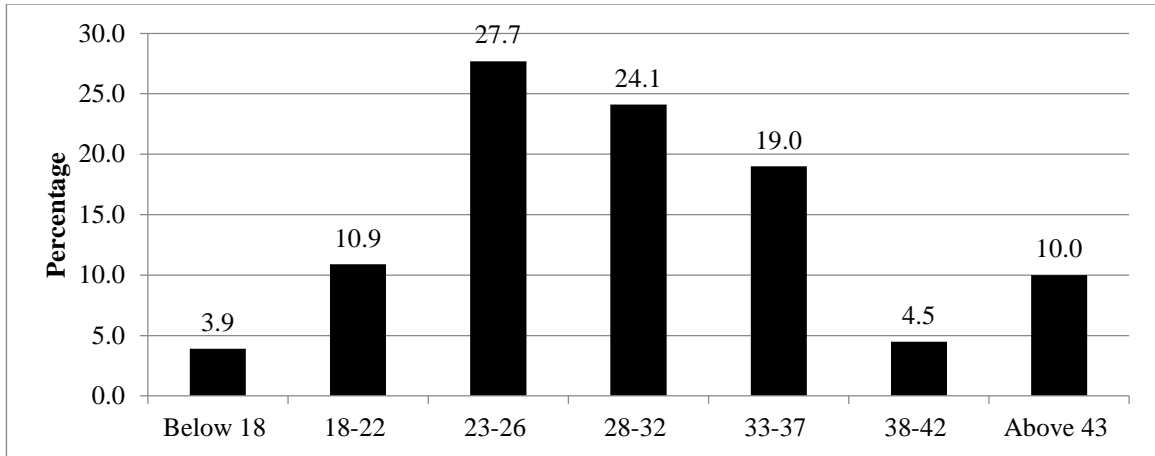
**Table 4.2: Respondents socio-demographic characteristics**

Gender	N=311	
	n	%
Male	21	6.8
Female	290	93.2
<b>Total</b>	<b>311</b>	<b>100.0</b>
<b>Marital status</b>		
Married	230	74.0
Single	9	2.9
Separated	29	9.3
Widowed	25	8.0
Divorced	18	5.8
<b>Total</b>	<b>311</b>	<b>100</b>
<b>Religion</b>		
Protestants	242	77.8
Catholic	69	22.2
<b>Total</b>	<b>311</b>	<b>100.0</b>

The analysis in Table 4.2 shows that majority 290(93.2%) of the caregivers were women as compared to a small number of 21(6.8%) The study also established that majority 230(74.0%) were married. Finally, the findings established that all the respondents were Christians with majority (77.8%) being protestants while the rest were Catholics a confirmation that Christianity is the major religion in the study area.

#### 4.3.2 Caregivers Age

The respondents were asked to indicate their age. This was important in order to establish the age distribution of caregiver ages (Figure 4.1).



**Figure 4.1: Caregiver age**

The findings in Table 4.1 established that most 86 (27.7%) of the respondents were of the age of 23-26 followed by 75(24.1%) of the age of 28-32 years with the least at 12 (3.9%) were below 18 years. The above findings show that majority (81.7%) of the caregivers were in the reproductive age of 18-37 years.

#### 4.3.3 Education Levels

The study found it worthy to establish the respondent level of education (Table 4.3).

**Table 4.3: Education levels of the caregivers**

Highest education levels	N=311 Frequency	Percent
Not completed Primary School	160	51.4
Completed Primary School	75	24.1
Completed Secondary School	26	8.4
No formal education	23	7.4
Tertiary	17	5.5
Not complete Secondary school	10	3.2
<b>Total</b>	<b>311</b>	<b>100.0</b>

The findings in Table 4.3 established that most 160(51.4%) of the respondents had not completed primary school education followed by 75(24.1%) who had completed primary school education. The highest education attained was tertiary education at 5.5%. Worth noting is 23(7.4%) of the respondents had no education at all. These findings implies that

majority 268(86.1%) of the respondents lack adequate academic education since they have no education at all, have or have not completed primary and secondary education.

#### 4.3.4 Household Sizes

The study sought to establish the household sizes of the sampled households. Studies have shown that large rural families face shortage of variety of foods in their meals which eventually affect nutrient intakes (Table 4.4).

**Table 4.4: Household sizes**

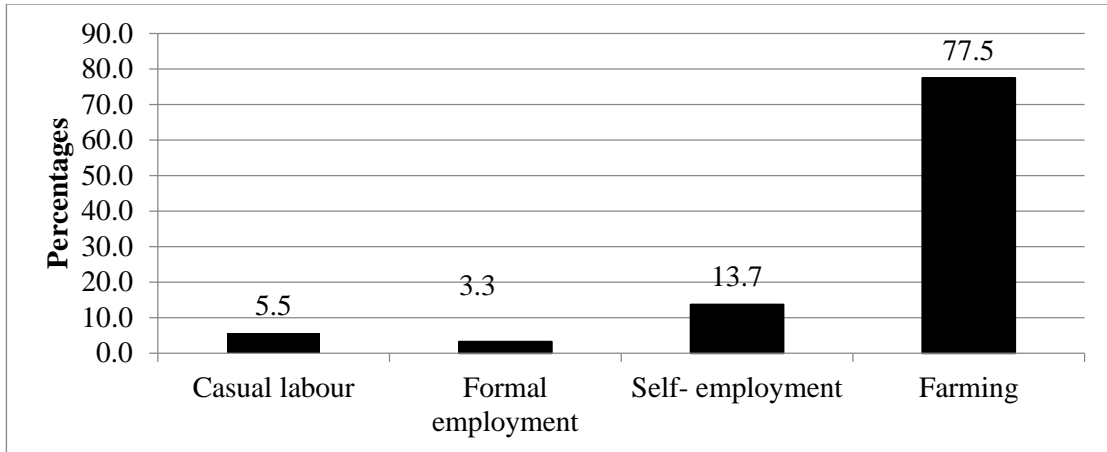
Household sizes	N=311 Frequency	Percent
2	10	3.2
3	86	27.7
4	69	22.2
5	50	16.1
6	12	3.9
7	49	15.8
8	32	10.3
9	3	1.0
<b>Total</b>	<b>311</b>	<b>100.0</b>

Mean - 4.83, Mode - 3, Minimum – 2, Maximum – 9

The study results in Table 4.4 show household sizes ranging from two to nine members. Most 86(27.7%) of the respondents had three members of the family. The findings above imply that there is no absolute majority on household number among the respondents. From the findings shows that most of the households had three to five followed by seven and eight members. These findings imply that majority of the household sizes ranges from 3-8 members.

#### 4.3.5 Main Source of Income of the Caregiver

The respondents were asked to indicate their main source of income. This was necessary in order to relate the source of income and ability to buy Vitamin A source foods (Figure 4.2).



**Figure 4.2: Main source of income of the caregiver**

The findings in Figure 4.2 established that majority (77.5%) of the respondents depends on farming as source of income followed by self-employment (13.7%) while 3.3% had formal employment. The findings above imply that majority of the caregivers had no stable source of employment as majority are not in formal employment. These findings were confirmed by the area chief who noted the following;

“... this location falls under the semi-arid lower part of Tharaka Nithi county which experiences low rainfall supporting little arable farming. Majority of the citizens engage in farming especially the growth of beans, cow peas and keeping of livestock mainly chicken, goat and cows. Very few are in formal employment since there are no industries to offer them formal employment. In addition majority of the citizens have little education where most of them have primary level of education which is not adequate to secure formal employment. Due to erratic rainfall and lack of irrigation the produce from farms are not adequate to earn them stable income. ...” (Informant Oral Interview [OI], Gatunga Ward: September, 2016).

The sentiments above by the area chief confirm why majority of the respondents are engaged in farming. These revelations imply that the respondents get their income mainly from farm proceeds. The study location being an arid agro-ecological zone portends a situation where the availability of green vegetables throughout the year is not certain which may result in deficiency of Vitamin A foods.

#### **4.3.6 Caregiver Monthly Income**

The respondents were asked to indicate their average monthly income (Table 4.5).



**Table 4.5: Caregivers monthly income**

Respondent's monthly level income (Ksh.) N = 307	
Mean	3936.81
Median	3,000.00
Mode	1,000.00
Minimum	200.00
Maximum	30,000.00
Std. Deviation	4904.391

*NB: N=307 representing only the respondents who answered the question*

The study results in Table 4.5 show that the minimum income was Ksh. 200.00 while the maximum was KSh. 30,000.00. The mean income for the respondents was KSh. 3936.81 per month. The study established that majority were earning KSh. 1,000.00 per month which is about 10 USD an indicator that the respondents have inadequate income levels. This was way below the World Bank standards of 1.90 USD (KSh. 1900) per month (World Bank, 2015). The above revelation on the respondents' income level implies that the caregivers might have limitations in buying food rich in Vitamin A.

#### **4.4 Dietary intake of Vitamin A-Rich Foods among Children 12-59 Months**

The first objective sought to determine Vitamin A-rich foods consumed by children aged 12 to 59 months in Gatunga Ward. Vitamin A is sourced from plants and animal products whose availability is determined by socio-economic factors. The study findings on the dietary intake for Vitamin A are presented in sections below.

##### **4.4.1 Vitamin A-Rich Foods Identified by the Caregivers of Children Aged 12-59 Months**

The respondents were asked to indicate the kind of Vitamin A-rich foods they feed their children aged 12 to 59 months. This was necessary in order to establish respondents' knowledge of Vitamin A-rich foods consumed by children aged 12 to 59 months (Table 4.6).

**Table 4.6: Vitamin A-rich foods identified by the caregiver**

Vitamin A-rich foods	Responses	
	Count (n)	Percentage within cases
Eggs	30	78.9
Meat	23	60.5
Milk	12	31.6
Fruits (Mangoes and Pawpaw)	9	23.7
Fish	4	10.5
<b>Total</b>	<b>78</b>	<b>205.3</b>

*NB: Data was analysed from multiple responses.*

The analysed data in Table 4.6 found that most 30(38.5%) identified eggs as one type of food rich in Vitamin A as opposed to 4(5.1%) who named fish. The findings imply that the respondents get Vitamin A mostly from animal sources. However, the responses who responded to question were few, an indicator that knowledge of the foods rich in vitamin was scanty. Of important to note, no single respondent identified any Vitamin A-rich foods from vegetable sources.

#### 4.4.2 Sources of Food Rich in Vitamin A Consumed by Children in Households

The respondents were asked to indicate the sources of food they thought was rich in Vitamin A. This was necessary in order to establish if the respondents produce them in their farms or not (Table 4.7).

**Table 4.7: Sources of Vitamin A-rich foods in the households**

Sources of Food rich in Vitamin A	Responses	
	N	Percent of Cases
Own reared chicken for meat and eggs	289	92.9
Own cows /goats milk	239	76.8
Buy vegetables from market and neighbours	222	71.4
Grow vegetables in my farm	77	24.8
Buy fruits from market and neighbours	55	17.7
Grow fruits in the farm	35	11.3
Buy meat/liver from butchery	32	10.3
<b>Total</b>	<b>949</b>	<b>305.1</b>

The findings in Table 4.7 shows that most 289(30.5%) and 239(25.2%) of the respondents indicated that they rear chicken and keep cows or goats as source of Vitamin A respectively. The study also established that 222(23.4%) buy vegetables to get Vitamin A. The findings revealed that few 77(8.1%) and 35(3.7%) respondents grow crops rich in Vitamin A. Worth noting is a small number 32(3.4%) of the respondents who buy meats as source of Vitamin A. This can be attributed to the high cost of buying meats due to low income come levels as noted by this study.

The study through an oral interview with an Assistant Chief sought to establish the frequency of consumption of meat by residents of study area from their own reared chicken and meat bought from butcheries. The interview found that the residents rarely consume the animals they keep which are only slaughtered in special days and during festivities. However, consumption of eggs is common in households that keep chicken. The interview also noted that consumption of meat bought from butcheries is low and only persons with relatively good income can afford. The interviewee confided that most of the residents get Vitamin A-rich food from milk or from vegetables bought in the market.

#### **4.4.3 Vitamin A-rich food groups consumed by children aged 12 to 59 months**

The respondents were asked to identify Vitamin A consumed foods. This was necessary to assess the intake of Vitamin A based food groups as recommended by FANTA (2009) (Tables 4.8).

**Table 4.8: Vitamin A-rich food groups consumed by children aged 12 to 59 months**

IDDS for Children Food Groups (Score: 0-8)	Food Eaten/Taken	
	Yes (%)	NO (%)
Vitamin A-rich plant foods (Green leafy vegetables)	58.5	41.5
Eggs (all types of eggs)	52.1	47.9
Other fruits or vegetables (tomatoes, pumpkins)	43.4	56.6
Meat, poultry, fish, seafood (all types of meats)	33.8	66.2
Foods cooked in oil/fat (Fat, vegetable oils, margarine, ghee (traditional))	32.5	67.5
Milk and milk products (all types of milk products)	25.7	74.3
Roots or tubers (yellow sweet potatoes)	22.5	77.5
Fruits (Fruit mangoes, pawpaw, watermelon)	7.2	92.8

From the eight food groupings assessed the findings in Table 4.8 show that the children consumed a variety of Vitamin A-rich foods groups. Vitamin A-rich plant food (Green leafy vegetables) 58.5% were the most consumed Vitamin A-rich foods. On the other hand fruits (7.2%) and roots or tubers (25.7%) were among the least consumed Vitamin A-rich foods groups. From the findings above it is apparent that Vitamin A-rich plant foods (leafy vegetables) and eggs accounted for majority source of Vitamin A.

#### **4.4.4 Seven-Day Frequency of Vitamin A-Rich Foods Consumed by Children Aged 12-59 Months**

The respondents were asked to identify Vitamin A-rich foods which were consumed children aged 12-59 months in a period of one week (7 days). The study also sought how many times the children consumed various Vitamin A-rich foods. This was necessary in order to establish the frequency of consumption of Vitamin A-rich foods by children aged 12-59 months (Tables 4.9).

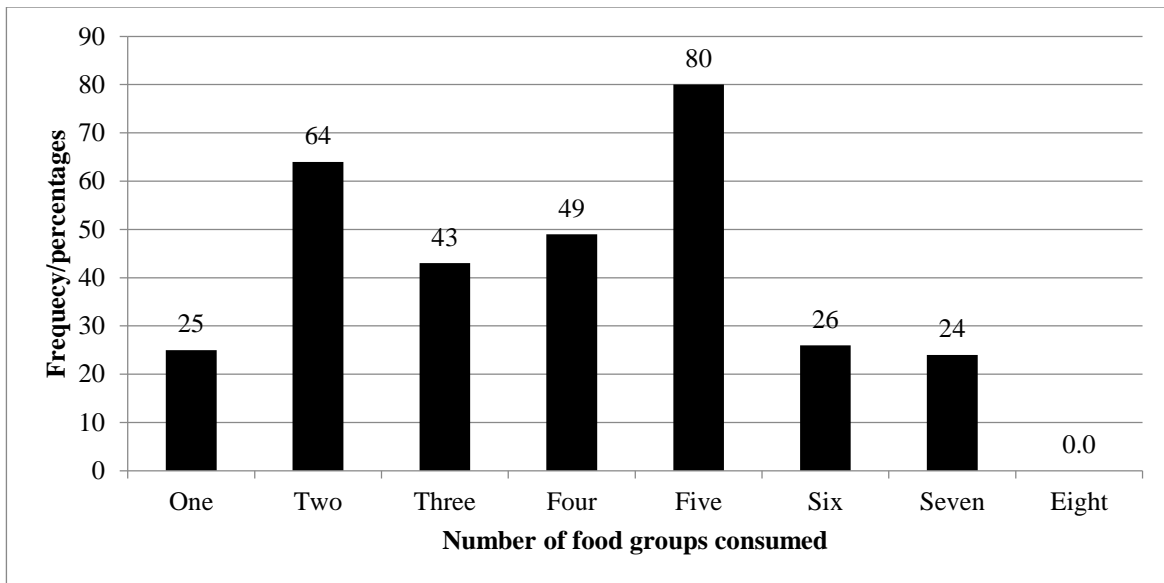
**Table 4.9: Frequency of Vitamin A-rich foods consumed in the previous seven days**

Food taken	Once	Twice	Thrice	Four Times	Five Times	Six Times	Seven Times	Total consumption	Did not take
Green leafy vegetables	10.6	24.4	15.1	6.4	-	-	1.9	58.5	41.5
Carrots	8.4	14.8	25.1	14.1	8.0	1.6	10.9	83.0	17.0
Fruits mangoes	3.5	0.3	-	-	-	-	-	3.9	96.1
Pawpaw	4.2	1.3	4.3	-	-	-	-	10.0	90.0
Watermelon	1.9	-	-	3.2	-	-	-	5.1	94.9
Fats	-	1.6	-	3.9	5.5	4.2	17.7	32.8	67.2
Vegetable oils	-	1.0	3.2	3.9	1.3	6.8	47.9	64.0	36.0
Margarine	26.7	13.8	7.4	1.0	-	1.0	2.3	52.1	47.9
Ghee (Traditional)	-	-	-	-	-	-	-	-	-
Eggs	26.7	13.8	7.4	1.0	-	1.0	2.3	52.1	47.9
Beef	31.8	15.4	3.2	-	-	-	2.3	52.7	47.3
Chicken	15.4	0.3	-	-	-	-	-	15.8	84.2
Pumpkin	0.6	1.6	1.0	1.6	2.3	0.6	0.3	8.0	92.0
Sweet potatoes	15.8	6.1	0.3	0.3	-	-	2.3	24.8	75.2
Milk	2.9	18.0	3.5	2.3	1.3	1.6	7.4	37.0	63.0

The findings above findings show mixed responses on the frequency of consumption of different rich foods rich in Vitamin A in a period of one week. It was established that cooking oil (64.0%) were highest consumed Vitamin A-rich foods every day while pumpkin (0.3%) was the least. The study also established that out of the 15 food rich in Vitamin A explored only ghee (traditional) was not consumed.

#### 4.4.5 Dietary Diversity Assessment

The dietary diversity assessment was done by computing dietary diversity scores using simple count of food groups that the children consumed over the preceding seven days using simple dietary diversity questionnaire. FANTA (2009) recommends an eight (8) food diversity food groups to assess Vitamin A intake for children (Table 4.8). The adequacy of Vitamin A intake was determined by calculating Individual Dietary Diversity Score (IDDS) from the consumed foods collected using 24 hours recall questionnaires. The collected data was analysed for IDDS (Figure 4.3).



*Mean 3.9, Standard deviation 1.72*

#### **Figure 4.3: Individual dietary diversity score**

The findings above show that the most 80 of the children consumed five groups of foods followed by 64 who consumed two groups. The mean IDDS was (Mean 3.9, SD 1.72) from a possible eight food groups. The mean of 3.9 denote a scenario where the children are consuming low number of food groups. Only less than 130 consumed more than five and above food groups.

#### **4.5 Knowledge of Vitamin A among the Caregivers**

The second objective sought to assess the knowledge of Vitamin A among the caregivers of children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County. Studies have established that if caregivers, be it mothers, fathers, siblings or guardians, have adequate knowledge on Vitamin A, the uptake is usually high. For instance, Mills, Mills and Reicks (2007) found out that lack of knowledge of Vitamin A contributed to VAD in the Dominican Republic regardless of the caregivers' social economic status. It is with that in mind that this study sought to assess the knowledge of Vitamin A by caregivers of children aged 12 to 59 months. It will also explore if the knowledge available affect the

intake of Vitamin A among the children aged 12 to 59 months. The findings are presented in sections below.

#### 4.5.1 Source of Information on Vitamin A

Sources of knowledge of foods rich Vitamin A is critical in ensuring caregivers provide such foods. The study therefore found it prudent to establish where the caregivers got information regarding Vitamin A (Table 4.10).

**Table 4.10: Source of information on Vitamin A**

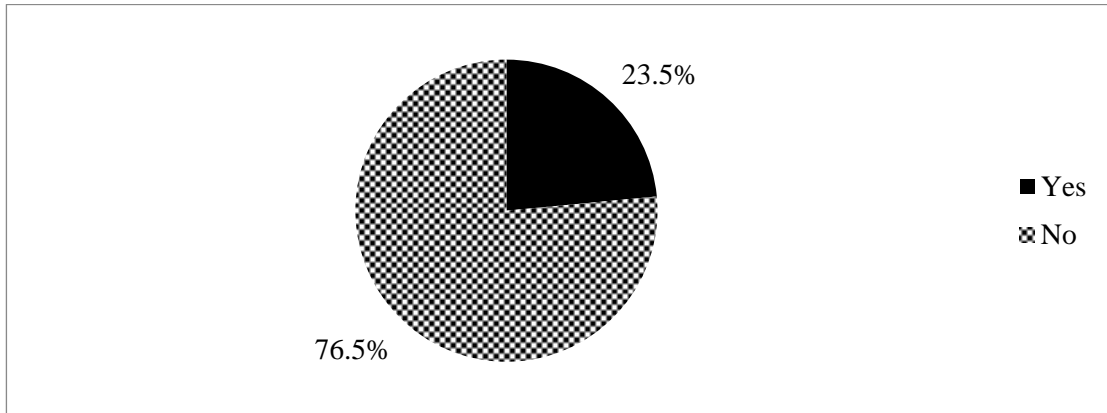
Source of information on Vitamin A	Responses	
	Count	Per cent of Cases
<b>Health worker</b>	<b>302</b>	<b>97.1</b>
Other members of the family	45	14.5
Husband	40	12.9
Friends	31	10.0
Mother	25	8.0
Radio	23	7.4
Pastor/priest/imam	14	4.5
<b>Total</b>	<b>480</b>	<b>154.3</b>

*NB: data was analysed from multiple responses*

Table 4.10 shows that majority 302(97.1%) of the respondents got information on Vitamin A from health workers followed by 45(14.5%) from other members of the family other than their husbands and mothers. The role of health workers as the main source of information on Vitamin A can be attributed to their responsibility of educating caregivers on health matters. Worth noting is the low contribution of media (radio) and religious persons on providing information on Vitamin A.

#### 4.5.2 Benefits of Vitamin A

The respondents were asked to indicate if they knew of any of the benefits of Vitamin A. This was necessary in order to establish if the information provided has made respondents realise the benefits of Vitamin A (Figure 4.4).



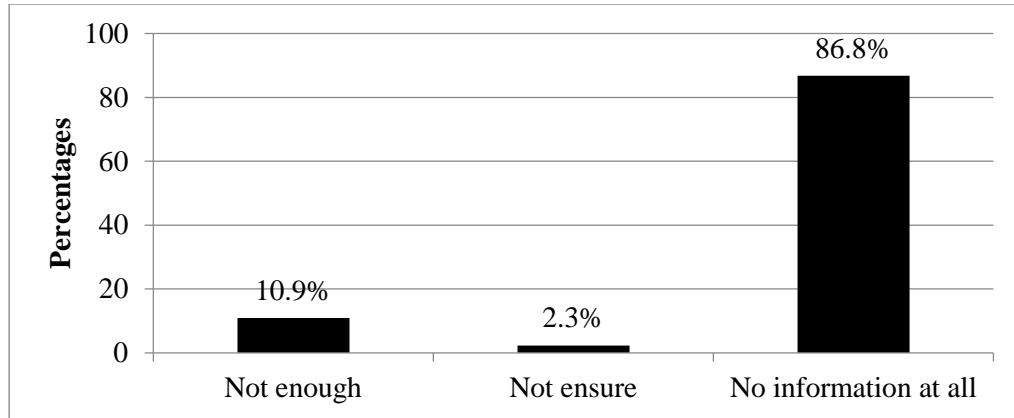
**Figure 4.4: Benefits of Vitamin A**

As shown in Figure 4.4, majority, 76.5% of the respondents indicated they were not aware of the benefits of Vitamin A as compared to only 23.5% of the caregivers who were aware. From the study findings, it's clear that information availed to caregivers did not make them recognize the benefits of Vitamin A. This revelation implies that the information available on Vitamin A among the respondents is not holistic in terms of impacting broad based knowledge and attitudes.

#### 4.5.3 Adequacy of Information on Food Rich in Vitamin A

The study sought to establish the adequacy of information received from different sources regarding Vitamin A (Figure 4.5).





**Figure 4.5: Adequacy of information on food rich in Vitamin A**

Figure 4.5 show that overwhelmingly 86.8% of the respondents did not have adequate information on Vitamin A. These findings imply that time allocated for dissemination on Vitamin A information is not adequate. These findings are supported by the revelation of one health service provider who had this to say;

“.... Information of Vitamin A is normally provided to mothers during pre and post-natal visit in health facilities. There is also an education health programme carried out in the health facilities targeting every patient who visit a health facility in specific days. This health education intervention is not specific to Vitamin A only and the time allocated in not adequate to disseminate enough information on any given topic. Vitamin A supplementation is also done during polio eradication interventions and at that time there is little time available to administer polio and Vitamin A and give enough information. (Informants OI, Gatunga Ward: September, 2016).

The above revelation can be attributed to lack of specific programmes for addressing holistically the Vitamin A issues.

#### **4.5.4 Expenditure for Buying Food Rich in Vitamin A**

The study sought to establish the respondents' expenditure on buying Vitamin A-rich foods in a month. This was important in order to assess the amount spent on buying Vitamin A-rich foods (Table 4.11).

**Table 4.11: Expenditure for buying food rich in Vitamin A**

<b>Expenditure</b>	<b>N</b>	<b>Mean</b>	<b>Mode</b>	<b>Min</b>	<b>Max</b>	<b>SD</b>
Ksh.	278	182.12	80	40	1000	127.277

*NB: N=278 represents the respondents who answered the question*

The analysed data in Table 4.11 shows that most of the respondents spent Ksh 80 and an average of Ksh 182.12 on buying Vitamin A-rich foods in a month. These amounts of money are too low to buy enough Vitamin A-rich vegetables, fruits and meats considering the high cost of these commodities in the study area. These findings imply that children may not get sufficient Vitamin A from the foods they produce from their farms. The reliance on farming as source of income which is not sufficient due to lack of adequate rainfall could be attributed to low spending on foods rich in Vitamin A. It can also be attributed to lack of adequate information on the benefit of Vitamin As established in this study.

#### **4.6 Supplementations Coverage of Vitamin A**

The third objective sought to determine the supplementation coverage of Vitamin A among children aged 12 to 59 months in Gatunga ward, Tharaka-Nithi County. The extent of Vitamin A supplementation is critical in reducing VAD. The study has explored a number of factors that determine supplementation coverage of Vitamin A as discussed in sections below.

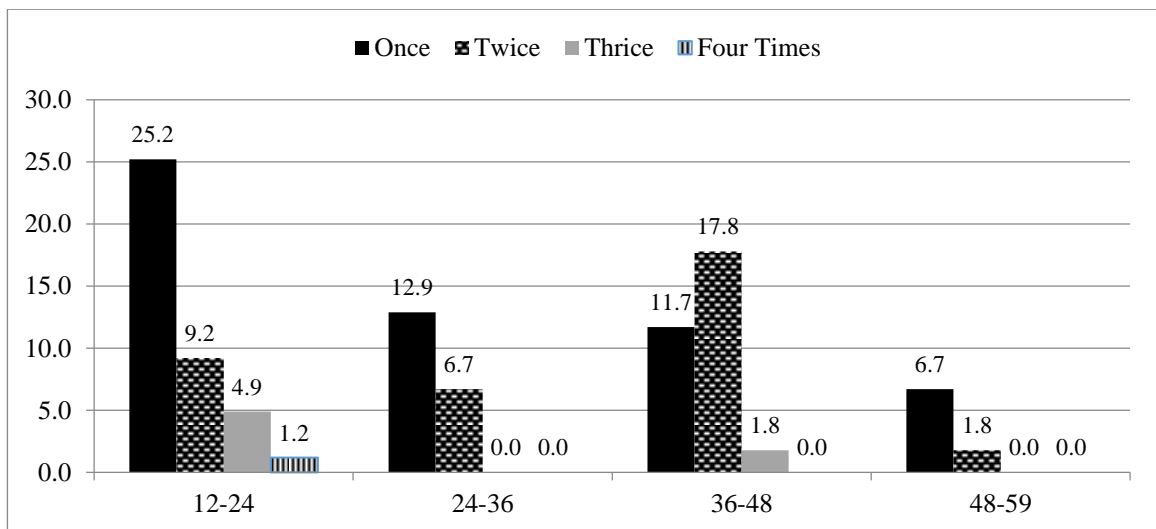
##### **4.6.1 Vitamin A Supplementation**

Vitamin A supplementation is widely used intervention to increase uptake to control VAD in most high risk countries (WHO, 1997). This is done by periodic delivery of high-potency Vitamin A supplements to children from 6 months to 5 years. In that respect, the study sought to establish if the target children had received Vitamin A supplements.

Primary data on Vitamin A supplementation was collected per sub-location in the study area (Table 4.12).

#### 4.6.2 Frequency of Vitamin A Supplementation

WHO (2011) recommends that infants aged 6-11 months to be given Vitamin A supplementation (100 000 IU [30 mg RE]) once in a period of six months. On the other hand children aged 12-59 months should be given Vitamin A (200 000 IU [60 mg RE]) supplementation every 4–6 months. This frequency is recommended in areas having high incidences of VAD due to lack of foods rich in Vitamin A. In this regard this study sought to establish the frequency of Vitamin A supplementation for children aged 12-59 months in the study area in the last 12 months (Figure 4.6).



**Figure 4.6: Frequency of Vitamin A supplementation**

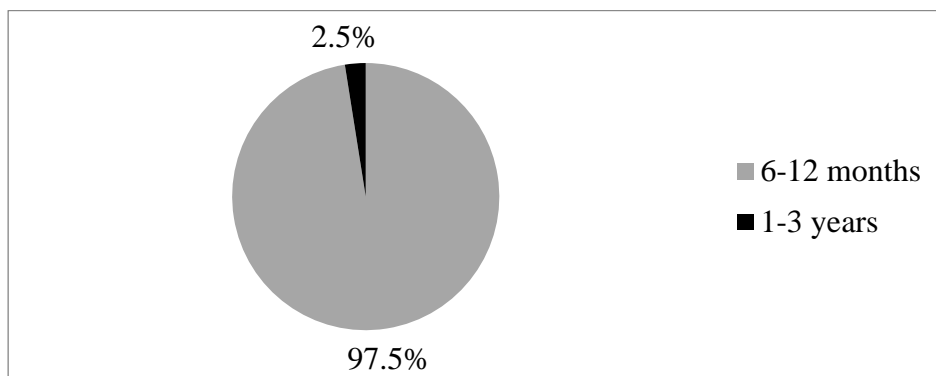
As presented in Figure 4.6 majority (56.4%) of the respondents confirmed that the target children had received Vitamin A supplementation once for children ages 12-59 months. About 35.6% received twice while only 1.2% had been supplemented four times. It can be argued from the above findings that the children aged 12-59 months received at least one Vitamin A supplementation. The findings also revealed that the coverage in the previous 12 months only 35.6% of the children had received two (2) times Vitamin A

supplementation dosages. These findings are contrary to WHO (2011) recommendation on frequency of Vitamin A (200 000 IU [60 mg RE]) supplementation. These guidelines require that for every 4–6 months children aged 12-59 months should be given Vitamin A supplementation two times (WHO, 2011).

It was also established that 7.9% of the children received more than two times doses of Vitamin A supplementation. This could be attributed to situation where the child may have been suffering to ailments which required prescription of Vitamin A. This could also be attributed to lack of proper records to monitor previous supplementation. This could happen if the caregivers lose the child clinic attendance booklet or the health worker fails to record previous supplementation.

#### **4.6.3 Age at which the Child was first given Vitamin A Supplementation**

The respondents were asked to indicate the age of the child when they first received Vitamin A supplementation. This was necessary in order to determine if the supplementation was done at the right age according to WHO (2011) guidelines which recommends first supplementation to start at 6 months (Figure 4.7).



**Figure 4.7: Age at which the baby was first given Vitamin A supplementation**

As presented in Figure 4.7, majority (97.5%) indicated they received first Vitamin A supplementation at the age of 6-12 months while the remainder at the age of 1-3 years. The above findings confirm that the majority of the target children received their first

Vitamin A supplementation at the correct recommended age as per WHO (2011) guidelines.

#### 4.6.4 Decision Maker on Giving Children Vitamin A Supplementation

The respondents were asked to indicate who made the decision that the child be given Vitamin A supplementation (Table 4.12).

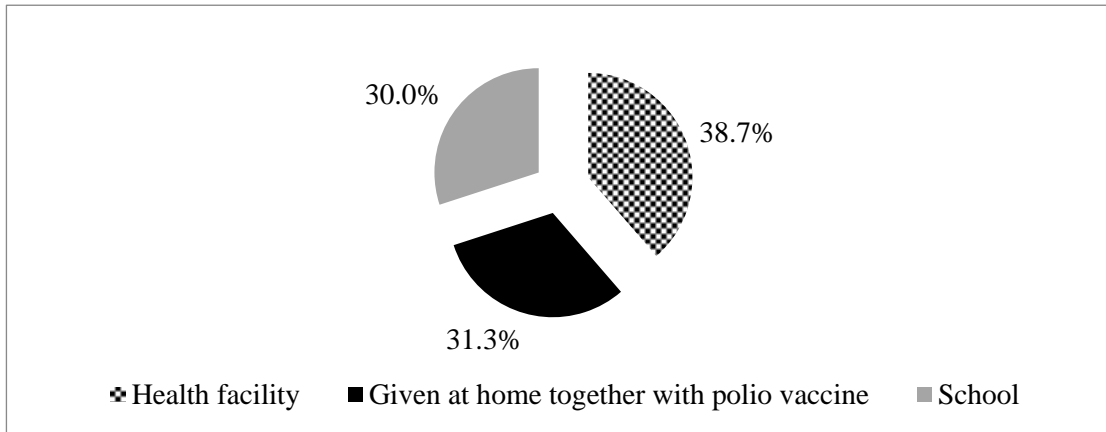
**Table 4.12: Decision maker on giving children Vitamin A supplementation**

	Responses		Percent of Cases
	N	Percent	
Health practitioner	163	78.7	100.0
Teacher	21	10.1	12.9
Friends	14	6.8	8.6
My husband	5	2.4	3.1
Myself (mother)	4	1.9	2.5
<b>Total</b>	<b>207</b>	<b>100.0</b>	<b>127.0</b>

As presented in Table 4.13, majority (78.7%) of the respondents indicated that the health practitioners decided on giving of Vitamin A supplementation followed by teachers at 10.1%. These findings imply that health practitioners play a critical role in making decision on health matters. This can be attributed to the authority and expertise vested in them. Individual decision to have the child be given Vitamin A supplementation was very low at 1.9%. This revelation implies that the respondents lack adequate information on Vitamin A that would make them make individual decision on their children health. It means that the respondents are not empowered to make individual decisions.

#### 4.6.5 Location of Vitamin A Supplementation

The study found it worthy to establish the location where Vitamin A supplementation was done. This was necessary in order to determine the importance of such location in ensuring wide coverage (Figure 4.8).

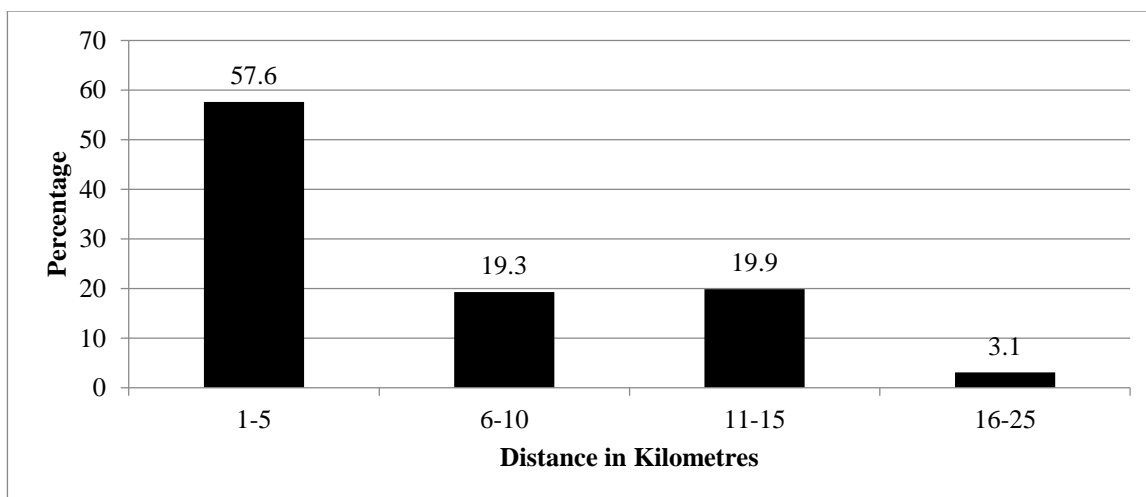


**Figure 4.8: Location of Vitamin A supplementation**

As presented in Figure 4.8, most (38.7%) of the respondents indicated that Vitamin A supplementation was done in the health facility. This is mostly done when caregivers take children for health services. About 31.3% received Vitamin A dosage during the national polio vaccination exercise. The remaining 30.0% got Vitamin A supplementation in schools. The above revelations imply that polio vaccination exercise provide an opportunity for wide coverage of Vitamin A supplementation. It also implies that health practitioners take advantage of giving Vitamin A supplementation when babies are taken for other health matters in health facilities.

#### **4.6.6 Distance to the Nearest Health Facility**

Distance to a health facility is critical in ensuring access to health services. According to Jordan, Roderick, Martin and Barnett (2004 long distance to the health facility discourages persons from seeking health facilities. In this regard this study sought to establish the distance to the nearest health facilities and discern its effect on Vitamin A supplementation (Table 4.9).



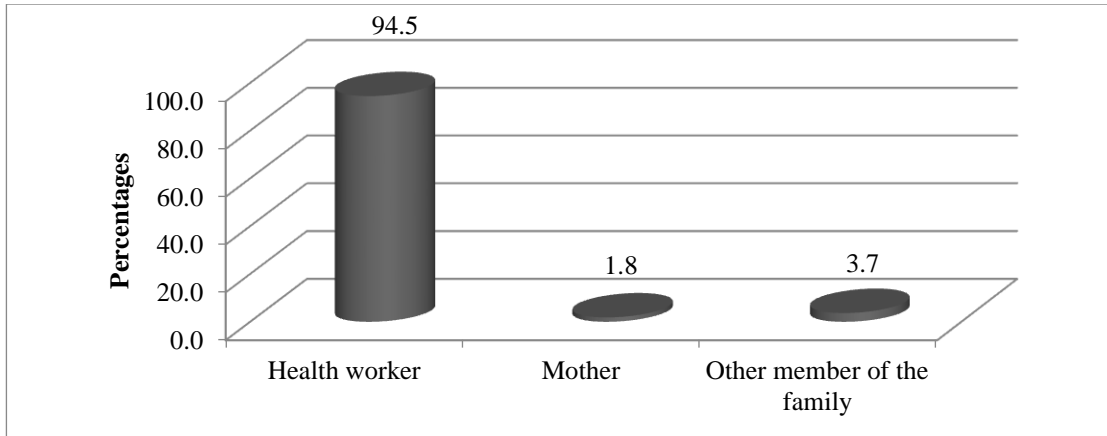
**Figure 4.9: Distance to the nearest health facility**

**Further analysis:** Mean = 6.42, Mode = 1, Minimum = 1, Maximum = 25, Standard deviation = 4.912

The analysed data in Figure 4.9 shows that majority 57.6% are within 1-5 kilometres to the nearest health facility. On average the respondents were 6.42 kilometres to the nearest health facility. It can be implied that 57.6% of the caregivers lived five (5) kilometres or less which is within the WHO recommended distance to a health facility.

#### **4.6.7 Source of Information on Vitamin A Supplementation**

The study found it prudent to establish the source of information on Vitamin A supplementation. Relevant source of information on Vitamin A supplementation has been found to be critical in ensuring high uptake and wide coverage in developing countries. It is this in mind this study sought to establish the sources of information on Vitamin A supplementation among the respondents (Figure 4.10).

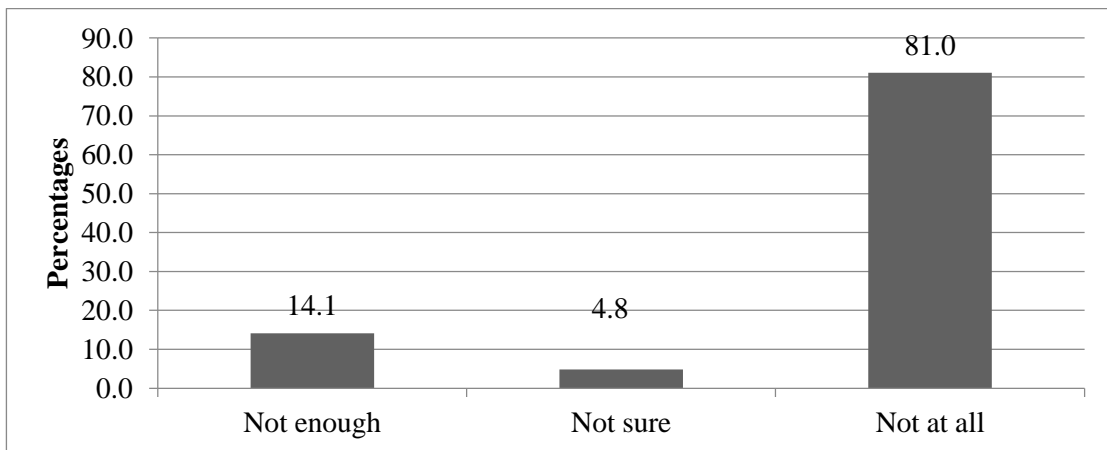


**Figure 4.10: Source of information on Vitamin A supplementation**

The data presented in Figure 4.10, shows that overwhelmingly majority (94.5%) of the respondents received information on Vitamin A supplementation from health workers. The rest 3.7% and 1.8% received information on Vitamin A supplementation from their mothers and other members of the family respectively. The findings above imply the health workers are the major source of information on Vitamin A supplementation.

#### 4.6.8 Adequacy of Information on Vitamin A Supplementation

The study sought to establish the adequacy of information received from different sources regarding Vitamin A supplementation (Figure 4.11).



**Figure 4.11: Adequacy of information on Vitamin A supplementation**

The findings in Figure 4.11 clearly show that majority (81.0%) of the respondents did have adequate information on Vitamin A supplementation. These findings imply that there



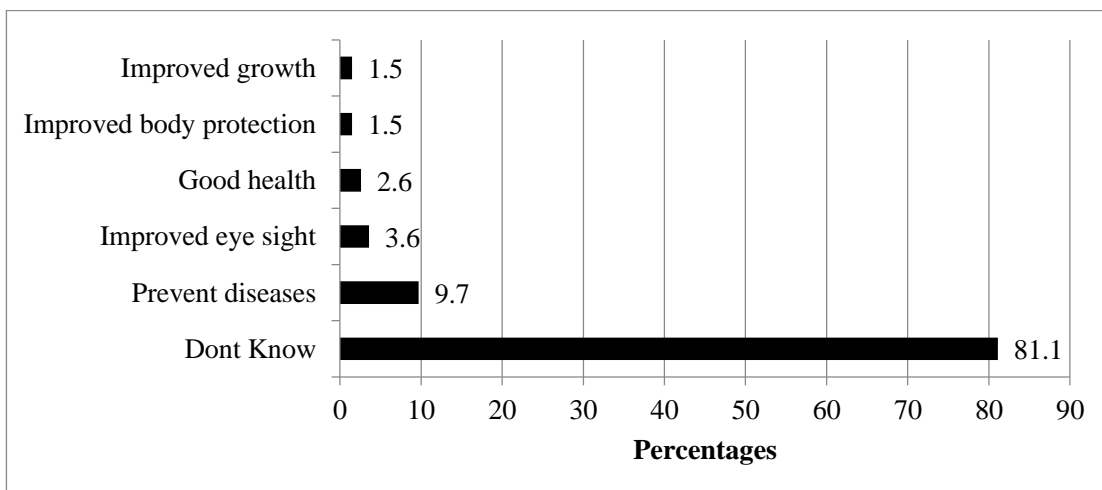
is no deliberate effort to dissemination information on Vitamin A supplementation. These findings are supported by the revelation of one of the health worker who reported the following;

“.... There are no specific interventions dealing with Vitamin A supplementation unlike other interventions accorded to Polio and TB, which are vigorously done throughout the country. This is done at the health facilities for both Polio and TB and during scheduled campaigns for TB. (Informants OI, Gatunga Ward: September, 2016).

The above revelation can be attributed to lack of specific programmes for addressing holistically the Vitamin A issues.

#### 4.6.9 Benefits of Vitamin A supplementation

The study asked the respondents to indicate the benefits of Vitamin A supplementation. This was necessary in order to establish if the respondents had knowledge on the benefits of Vitamin A (Figure 4.12).



**Figure 4.12: Benefits of Vitamin A supplementation**

Figure 4.12 show that 81.1% of the respondents did not know the benefits of Vitamin A supplementation. Only 3.6% of the respondents were aware of the benefits of Vitamin A in improving eyes sight. The findings above imply that to a large extent the respondents do not have information on the benefits of Vitamin A supplementation. This can be attributed

to lack of specific interventions programmes by the government and stakeholders as much attention is given to other areas of health concern like TB, polio, hepatitis B, pneumonia, tetanus, diphtheria among others.

#### 4.6.10 Challenges of Accessing Vitamin A Supplementation

The study sought the views of the respondents on the challenges faced in accessing Vitamin A supplementation. This was necessary in order to determine the nature of challenges (Table 4.13).

**Table 4.13: Challenges of accessing Vitamin A supplementation by the respondents**

<b>Challenges</b>	<b>Frequency</b>	<b>Percent</b>
Lack of adequate information	195	62.7
Long distance	53	17.0
Lack of bus fare	35	11.3
Lack of Time	28	9.0
<b>Total</b>	<b>196</b>	<b>100.0</b>

The data in Table 4.13 shows that lack of adequate information (62.7%) was the major challenge facing Vitamin A supplementation. This was followed by long distance (17.0%) while lack of time (9.0%) was the least identified challenge facing Vitamin A supplementation. The above findings were supported by the observation of one public administrator. He confided the following;

“..... there are several factors that prevent the caregivers from accessing Vitamin A supplementation. One of the major challenges that affect Vitamin A supplementation is lack of adequate information. Caregivers are aware of the most publicised diseases like TB, Polio, Measles and Pneumonia. The long distances to health facilities where on average distance to the health facility is 8 to 10 kilometres - has also contributed to caregivers not accessing Vitamin A supplementation. The lack of enough rainfall and low income levels has also led to low intake of Vitamin A-rich foods. ....” (Informants OI, Gatunga Ward: September, 2016).

The above sentiments imply that Vitamin A supplementation faces challenges that are intuitional and caregiver centred. The lack of vigorous sensitization campaigns

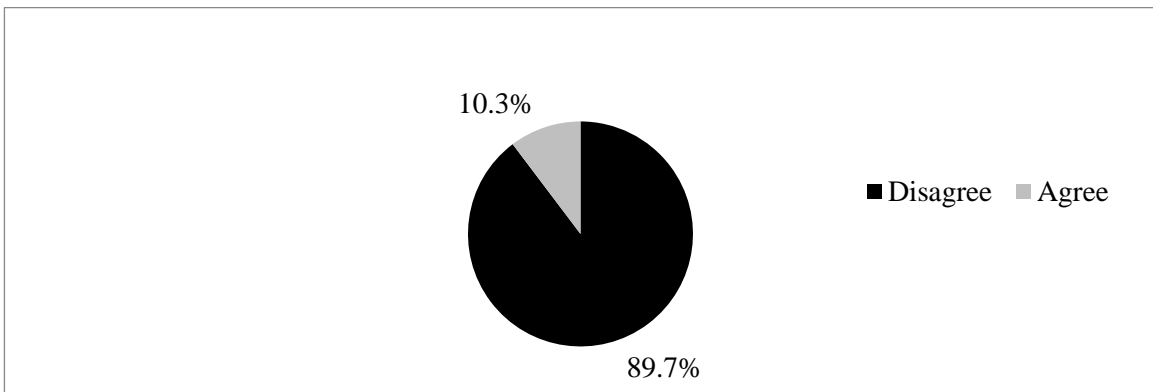
specifically to provide adequate information on Vitamin A supplementation could be attributed to these challenges.

#### **4.7 Factors influencing Vitamin A intake**

The fourth objective sought to establish factors influencing Vitamin A intake among children aged 12 to 59 months in the study area. This study assessed the influence of demographic variables of the caregivers. These variables included; age, education, marital status, gender and religion. Other variables explored included caregiver income and distance to the health facility. Each statement or item was analysed and discussed separately in sections below.

##### **4.7.1 Age of caregivers and dietary intake of Vitamin A**

The study found it worth to establish the influence of caregiver age on the dietary intake of Vitamin A. A statement “the age of the caregiver does not influence the intake of Vitamin A” was posed to determine if there is a relationship between age of the caregiver and Vitamin A intake. Figure 4.13 presents the results.



**Figure 4.13: Age of caregivers and dietary intake of Vitamin A**

From Figure 4.13, 89.7% of the respondents disagreed with the statement that “the age of the caregiver does not influence the intake of Vitamin A” while the rest (10.3%) agreed with the statement. An interview with a community nutrition officer affirmed the above

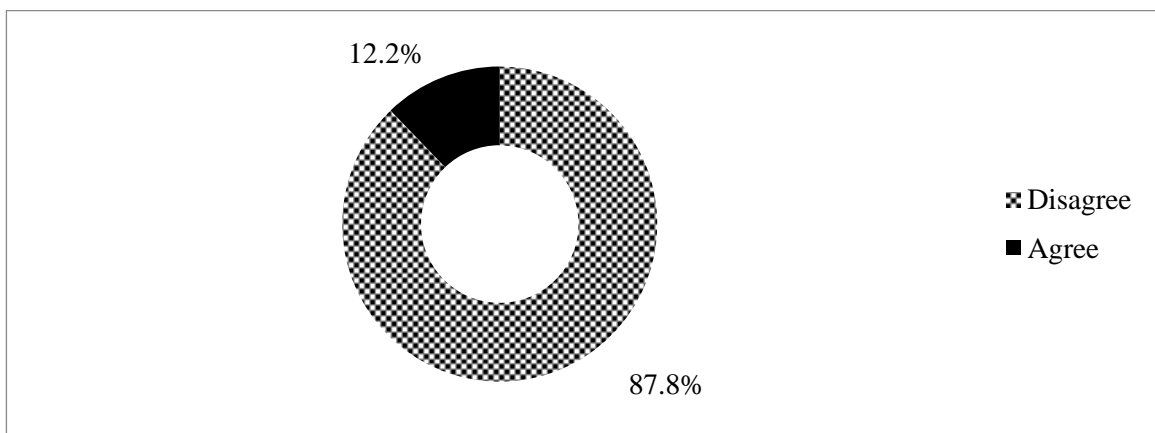
findings that the ages of the caregivers do not influence on the uptake of Vitamin A. A key informant expressed the following:

“.... in my over 12 years working experience, I have noted that older mother who have more than two children normally have more knowledge of Vitamin A as compared to young mothers. The older mothers due to experience with the first child upbringing they tend to follow advice given by health practitioners. The older mothers are more equipped with information to deal with misinformation like myths and fear which is mostly associated with young mothers”. (Informants OI, Gatunga Ward: September, 2016).

The above sentiments reinforce the study findings in this study that the age of caregivers influences the uptake of Vitamin A.

#### 4.7.2 Caregivers education status and child’s dietary intake of Vitamin A.

The study found it worth to establish the influence of caregiver age on the child’s dietary intake of Vitamin A. A statement “education levels does not influence dietary intake of Vitamin A” was posed to determine if there is a relationship between caregiver education and Vitamin A intake. The findings are presented in Figure 4.14.



**Figure 4.14: Caregivers education status and dietary intake of Vitamin A.**

From Figure 4.14, 87.8% of the respondents disagreed that education levels of the caregiver does not influence dietary intake of Vitamin A. From these results, it can be inferred that education status of the caregiver is important in ensuring dietary intake of Vitamin A. An oral interview with health practitioner in one of the health facility

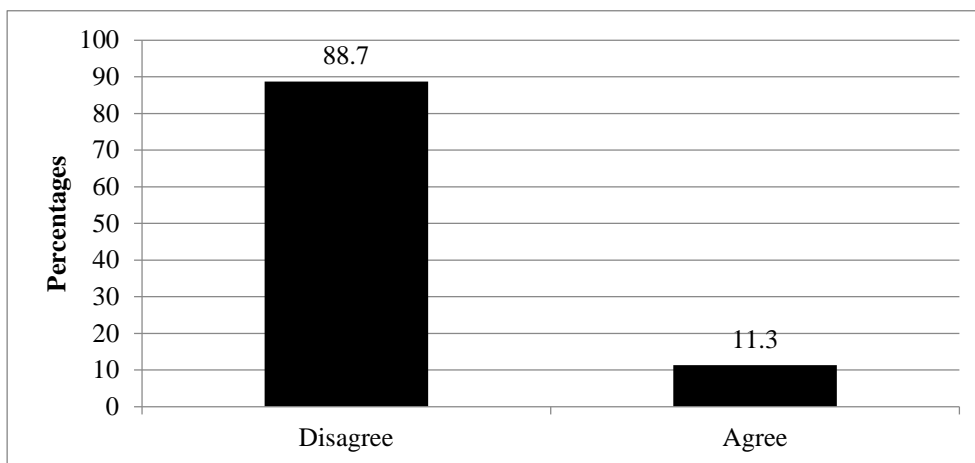
confirmed that the level of the caregiver positively influenced the uptake of Vitamin A. A key informant interviewed confided the following regarding the influence of education status on Vitamin A.

“... I have noted during my duty as health promoter that educated mother especially with secondary education assimilates quickly information on health matters as compared with those with no education at all. I have also noted that those mothers who completed primary education understands and keep information impacted as compared with those who don't have education or have some primary school education. I also noted that educated mother especially with secondary education and above would seek more information on any health matters after and education session. I would for sure confirm that education levels of caregivers have influence on the uptake of Vitamin A in this region.”(Informants OI, Gatunga Ward: September, 2016).

The above revelation is a proof that the levels of education of caregivers are critical in addressing VAD since it influences Vitamin A intake.

#### 4.7.3 Marital Status and Dietary Intake of Vitamin A

A statement “caregiver marital status does not influence dietary intake of Vitamin A” was posed to determine if this variable (marital status) has influence. The findings are presented in Figure 4.15.



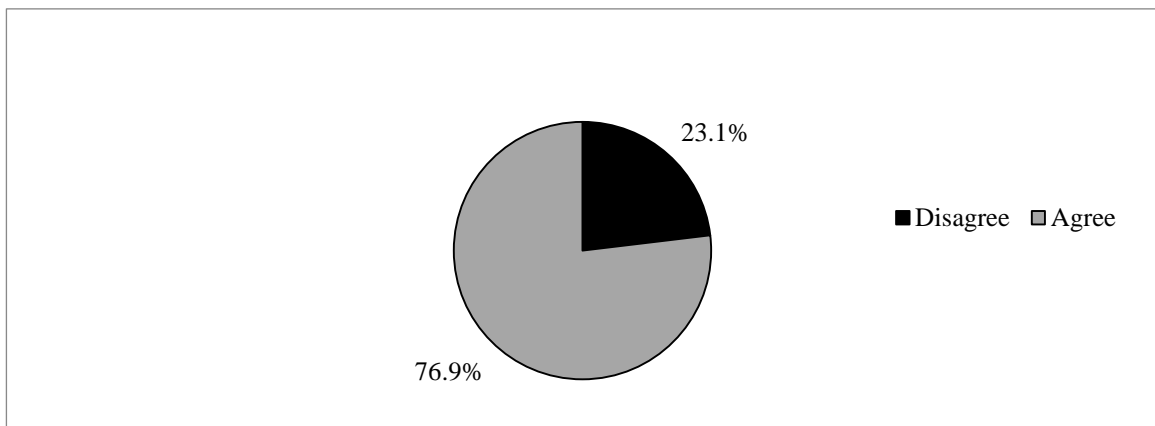
**Figure 4.15: Marital status and dietary intake of Vitamin A**

The findings in Figure 4.15, majority (88.74%) of the respondents disagreed that caregiver marital status does not influence dietary intake of Vitamin A. Only a small

proportion (11.3%) agreed that caregiver marital status don't influence dietary intake of Vitamin A. From these results, it can be inferred that marital status of the caregiver influences intake Vitamin A.

#### 4.7.4 Caregiver Sex and Vitamin A Intake

Gender has been found to have influence on the feeding patterns especially in the rural population due to cultural beliefs. The respondents were asked to indicate the influence of gender on the uptake of Vitamin A based on the statements; “the gender of a caregiver does not influence dietary intake of Vitamin A”. Study results are presented in Figure 4.16.



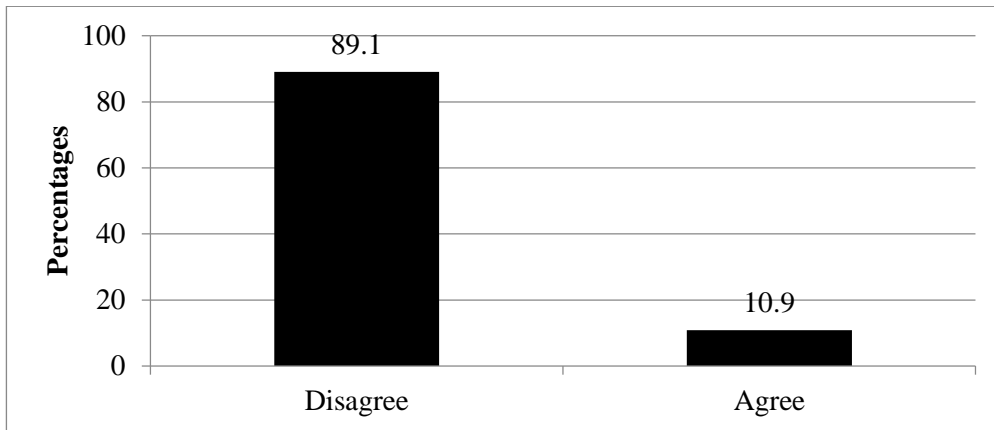
**Figure 4.16: Caregiver gender and Vitamin A intake**

The findings in Figure 4.16, shows that majority (76.9%) of the respondents agreed the caregiver gender does not influence dietary intake of Vitamin A. On the other hand, 23.1% of the respondents agreed that gender of the caregiver influence dietary intake of Vitamin A. From these results, it can be implied that being woman or a man does not influence dietary intake of Vitamin A.

#### 4.7.5 Caregiver Income Levels and Vitamin A Intake

This study sought to establish the influence of income levels among the caregivers and dietary intake of Vitamin A in the study location. This was done by posing a statement that

“lack of adequate income among the caregivers do not influence dietary intake of Vitamin A” (Figure 4.17).

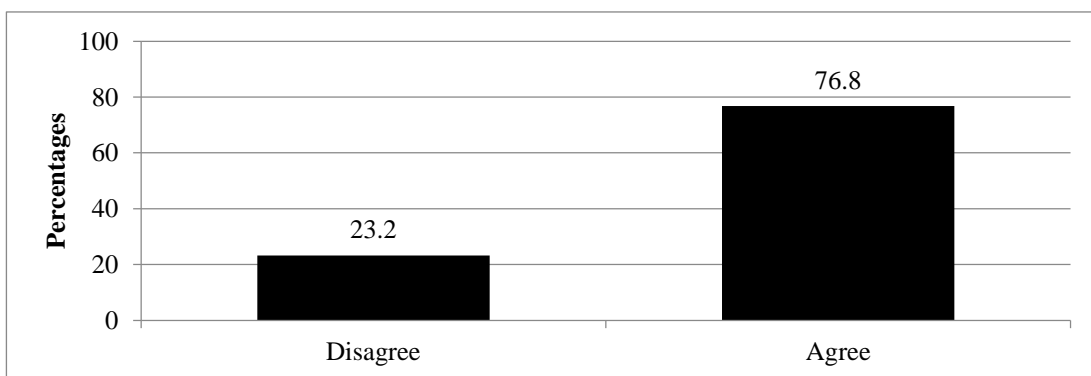


**Figure 4.17: Caregiver income levels and Vitamin A intake**

The analysed data in Table 4.17 indicated that 89.1% of the respondents disagreed that lack of adequate income among the caregivers do not influence dietary intake of Vitamin A. On the contrary a partly 10.9% agreed that lack of adequate income among the caregivers do not influence dietary intake of Vitamin A. These findings imply that income levels are a major factor responsible for influencing Vitamin A intake among children.

#### 4.7.6 Religion on Vitamin A Supplementation

The respondents were asked to respond to a statement “religion does not influence supplementation of Vitamin A”. This was necessary in order to establish if religion affects coverage of Vitamin A supplementation (Figure 4.18).



**Figure 4.18: Religion and Vitamin A supplementation**

The analysed data in Table 4.18 indicate that majority (76.8%) agreed that religion does not affect supplementation of Vitamin A supplementation. On the other hand, 23.2% affirmed that religion effects Vitamin A supplementation.

#### **4.7.7 Hypothesis testing on the influence of socio-demographic characteristics on the uptake of Vitamin A**

**H0:** Socio-demographic characteristics do not influence Vitamin A intake among children aged 12 to 59 months in Gatunga Ward.

This hypothesis was tested using Chi square statistics to determine the influence of socio-demographic characteristics and the uptake of Vitamin A. The significance level was set at 0.05 ( $p < 0.05$ ) meaning that if calculated p-value is equal or less than 0.05 (significance) the null hypothesis is rejected and alternative hypothesis accepted. This hypothesis was tested based on the following statements;

- i) the age of the caregiver does not influence the intake of Vitamin A
- ii) education levels do not influence dietary intake of Vitamin A
- iii) caregiver marital status does not influence dietary intake of Vitamin A
- iv) the gender of a caregiver does not influence dietary intake of Vitamin A
- v) lack of adequate income among the caregivers do not influence dietary intake of Vitamin A
- vi) religion does not influence supplementation of Vitamin A

The findings in Table 4.14 shows that age, education, marital status and income levels returned a  $p < 0.05$  and in turn the null statements were rejected and alternative accepted. This implies that age, education, marital status, income levels and distance to the health facility influenced dietary intake of vitamin. On the influence of gender and religion on Vitamin A supplementation, Chi-Square test returned  $p > 0.05$  thus accepting the null



statements. This implies that sex and religion did not influence Vitamin A supplementation.

**Table 4.14: Test on the influence relationship between social-demographic characteristics and the uptake of Vitamin A**

Variables	Category	Influence		Chi-Square test	Remarks
		YES n (%)	NO n (%)		
Age	Below 18	5(1.7)	7(2.4)	$\chi^2 = 12.0545$ df= 2 p< 0. 002*	Rejected
	18-35	18(6.2)	172(59.1)		
	Above 35	9(3.1)	80(27.5)		
Education	No education	5(1.7)	8(2.7)	$\chi^2 = 10.880$ df= 2 p< 0. 004*	Rejected
	Primary	28(9.5)	173(58.8)		
	Secondary	5(1.7)	75(25.5)		
Marital status	Single	6(2.0)	24(8.1)	$\chi^2 = 18.928$ df= 2 p< 0.001*	Rejected
	Married	96(32.4)	124(41.9)		
	Divorced/ separated	32(10.8)	14(4.7)		
Gender	Man	18(6.1)	5(1.7)	$\chi^2 = 0.0776$ df= 1 p>0.781	Accepted
	Woman	221(74.4)	53(17.8)		
Income levels	Below Ksh 5700	10(3.3)	180(59.8)	$\chi^2 = 5.158$ df= 1 p< 0.023*	Rejected
	Above Ksh 5700	14(4.7)	97(32.2)		
Religion	Protestants	181(61.4)	48(16.3)	$\chi^2 = 2.5-5$ df= 1 p>0.107	Accepted
	Catholics	58(19.7)	8(2.7)		
	6-10 Km	86(30.4)	123(43.5)		
	Above 10 Km	22(7.8)	15(5.3)		

*NB: \* Indicate significant p<0.05 Values*

## **CHAPTER FIVE: DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

This chapter presents the summary of the main findings, discussions as well as the conclusions drawn from the assessment of Vitamin A and supplementation in Gatunga Ward. It also presents the recommendations in light of the findings and areas for further research.

### **5.2 Discussions**

#### **5.2.1 Social Demographic Information**

Questionnaires were used to collect primary data from caregivers while structured interview schedules were used to solicit data from the key informants. The key informants included the community health promoters, nutritionists and chiefs. The study results show that majority (93.2%) of the respondents were women as compared to 6.8% men. These results were expected in a rural African society where women are largely responsible for taking care of children as caregivers. The study also revealed that majority (74.0%) of the caregivers were married. These findings are in agreement with Littrell et al., (2012) who observed that women are the majority of caregivers in the rural areas of Malawi. On religion the study found that 100% were Christians with Protestants (77.8%) being the majority. The age of the caregivers ranged from below 18 years and above 43 years. The ages between 23-37 constituted the largest number of caregivers – most people bear children within these years. This can be attributed to the fact that it is this age which comprises of the active child bearing cohort. The older caregivers (Above 43 years) accounted for 10.0% and comprised mainly of grand parents a common occurrence in rural African societies. The study findings revealed that majority had a low education level where 51.4% had not completed primary education, 24.1% had completed primary education and 7.4% had no formal education at all.

It can be concluded that only 13.9% of the caregivers had attained secondary education and above while the rest (86.1%) had primary education level or had not completed primary and secondary education or had no education at all. These findings are an indicator of a population that may face difficulties of assessing relevant information from published sources. This may perhaps imply that the caregivers may be facing challenges of assessing adequate information on Vitamin A. These findings concur with an observation by the KNBS and ICF Macro (2010) report which noted that lack of adequate education among the caregivers has a negative effect on nutrition knowledge.

On the source of income, majority (77.5%) depended on farming with mean monthly income of KSh3937.8. Majority (mode = 200) of the respondents indicated that they earn KSH 200 per month which, which is very little. The study site being an arid area where arable farming is minimal it will mean that the monthly income of the majority of caregivers was not enough to buy foods rich in Vitamin A. On the household size the study established that majority had three members (mode = 3) with over 69% having four (4) and above. These revelations imply that due to the large household sizes coupled with low income levels and inadequate education the intake of Vitamin A was likely to be negatively affected. The Socio-Demographic characteristics of the respondents explored were critical in assessing Vitamin A intake and supplementation as discussed in the subsequent sections.

### **5.2.2 Vitamin A-rich Foods Consumed by Children Aged 12 to 59 Months in Gatunga ward, Tharaka-Nithi County.**

From the study it emerged that the caregivers had little knowledge of the foods rich in Vitamin A which they feed the children. This was so because only a small proportion (N=78) responded to the questions posed. It also emerged that the respondents were not aware that there are plant based foods as source of Vitamin A. This was evidenced by the

fact no caregiver identified such foods. The study also revealed that the caregivers only identified meat based food sources for Vitamin A. This was attributed to lack of adequate knowledge of the diversity of sources of Vitamin A. This was confirmed by one of the health promoters who indicated that caregivers have a notion that Vitamin A can only be found in meats. This observation explains why most of the respondents identified eggs and meats as the major foods rich in Vitamin A. These findings are in agreement with research findings on the deficiency of Vitamin A intake by agriculturalist communities which established that the mothers have a notion that only meat contains Vitamin A nutrients

Fruit as a source of food rich in Vitamin A was not highly consumed as compared to meat sources. Fish as source of food rich in Vitamin A source was low, accounting for 5.1%. This low contribution can be attributed to cultural beliefs where the Meru community do not include fish in the diet. The Meru people traditionally do not consume fish despite of its availability in the major rivers found in the region. The small proportion of fish as source of Vitamin A can be attributed to the availability of fish reared in pond through economic stimulus interventions by the National Government.

On the source of Vitamin A rich foods, it was established that chicken meat and eggs were obtained from the farms while beef meat was bought from butcheries. The study also found that caregivers buy vegetables from market and neighbours (23.4%) as compared to 8.1% who grew in their farms. These can be attributed to the arid nature of the study area which does not support arable farming. These findings are supported by the report on drought situation in Tharaka Nithi County by National Drought Management Authority (NDMA) of 2017. The report noted that Gatunga ward does not receive adequate rainfall to support crop growing and as a result children suffer from inadequate supply of food nutrients.

The study revealed that only a small number 32(3.4%) of the respondents bought meats as source of Vitamin A. This can be attributed to low income come levels as noted by this study. It can be argued that the sources of Vitamin A are obtained from the farms and by purchasing. Plant based Vitamin A source foods are mainly cheap and can be readily availed through cultivation in a kitchen garden. This study established that 29.1% of the caregivers bought vegetables and fruits to provide Vitamin A-rich foods. This observation would mean that the children in the study area were likely to suffer from low Vitamin A intake since they have to purchase such foods. This study established that the household income was low (Table 4.6) which was not enough to buy specific vitamin rich foods and other household items. These findings are supported by the study by Lorch (2005) on causes of VAD found that the lack growing of garden green leafy vegetables and fruits has a profound effect on the intake of adequate Vitamin A.

On food diversity the study established that the children consumed 15 different foods rich in Vitamin A. The frequency of consumption of food diversity had mixed outcomes with tomatoes (83.0%), vegetable oil (64.0%) and green leafy vegetables (58.5%) being the most consumed food. When the foods were grouped as per FANTA (2009) Vitamin A-rich food groups, Vitamin A-rich plant based foods groups were mostly consumed at 58.5% followed by eggs (52.1%) while fruits based food groups were the least consumed at 7.2%. The child dietary diversity score established that only 41.8% of the children consumed more than five groups of Vitamin A-rich foods. These revelations mean that majority (58.2%) consumed less than four groups of foods rich in Vitamin A. These findings imply that the children in the study area were fed with limited number of Vitamin A-rich foods. It can be argued from the above findings that children aged between 12-59 months studied did not have adequate intake of Vitamin A.

### **5.2.3 Knowledge of Vitamin A among the Caregivers**

It emerged from the study that the majority (62.9%) of the caregivers received information on Vitamin A from health workers. These findings imply health workers are the major source of information on Vitamin A. This is attributed to their role for educating caregivers especially mothers during anti and post-natal clinics. This was confirmed by health promoters and medics in health facilities who confided that health practitioners have the responsibility of educating mothers on the nutritional requirements of children. However, the study also established that due to distance to the health facilities, poverty and remoteness of the study location, caregivers rarely attend pre and post-natal clinics regularly.

The study revealed that husbands, friends and caregivers' mothers, mass media (Radio) and religious leaders contributed minimal in providing information on Vitamin A accounting to less than 10%. This could be attributed to lack of relevant information on the sources of food rich in Vitamin A and their benefits. VAD thought a major problem facing developing countries especially in the arid rural areas where information on vitamin is not readily available.

On the benefits of Vitamin A it was established that only 23.5% of the caregivers were conversant. This number is very low and can be attributed to low education revealed in this study (Table 4.5). The lack of knowledge of Vitamin A to the child explains the reason for low responses and knowledge of the foods rich in Vitamin A as depicted in Table 4.8. When asked to indicate on the adequacy of information they have on Vitamin A the respondent indicated they had inadequate information. This was so because majority (86.8%) indicated they had no information at while only 10.9% had some information though was not enough. The lack of adequate information on Vitamin A explains why just only 23.5% were conversant of the benefits of Vitamin A. This revelation implies that

information in possession by caregivers was not adequate to ensure they feed their children with right foods to alleviate VAD.

It emerged from the study that the caregivers spend very little on buying food rich in Vitamin A in a month with majority spending KSh. 80. This expenditure is quite little to buy enough Vitamin A-rich foods. This amount is too little to buy meat based sources. It can be argued that lack of adequate information on Vitamin A coupled with lack of cultivation of green leafy vegetables and fruits in their farms and low income the children in the study are likely to suffer from VAD.

The tested hypothesis on the influence of Vitamin A knowledge of the uptake of vitamin using Chi square test returned  $p > .004$ ). These results show that the knowledge on Vitamin A among the caregivers was not adequate to influence Vitamin A uptake in Gatunga Ward. These revelations are an indicator caregiver's lack adequate knowledge of Vitamin A. This explains why caregivers had insufficient information Vitamin A-rich foods, sources of food rich in Vitamin A, and the benefits of Vitamin A as noted in the study.

#### **5.2.4 Supplementation Coverage of Vitamin A**

This objective sought to assess the supplementation coverage in the study area. The study established that majority (97.5%) of the children received first Vitamin A supplementation from six and 12 months. This is impressive which means that supplementation started at the right age. This could be attributed to the government efforts through the Kenya Expanded Programme of Immunization (KEPI) which makes mandatory for children aged 6-59 months to be given Vitamin A doses whenever they visit a health facility. The *Malezi Bora* initiative of the Ministry of Health (MoH) aimed at improving the nutritional status of mothers has also contributed to early Vitamin A supplementation. Also during polio eradication campaign Vitamin A supplementation is done.

As expected the study found that majority (61.3%) of Vitamin A supplementation was done in health facilities. Kamau et al., (2012) in their study of factors affecting Vitamin A supplementation in Kenya found that most of the children were given Vitamin A supplements during routine clinic visits in health facilities. This is a strategy used by the government to ensure wide coverage of supplementation. Another strategy is coverage during polio eradication campaign targeting children in their homes, schools or in children care day centres. This intervention measures have resulted in an impressive wide coverage country wide. The outcome of the study revealed that on average the respondents were 6.42 kilometres to the nearest health facility. It also emerged that most of the caregivers lived one kilometre from the health facilities. Only 57.6% of the caregivers lived within the WHO recommended distance of five (5) kilometres and below to a health facility. The remaining number (42.3%) which is a big number lives over five (5) Kilometres from the health facility. It can be argued that due to long distances to the health facility the caregivers may find it difficult to visit health facilities to have their babies to have Vitamin A supplementation unless the child is sick. The long distance to a health facility and lack of adequate income to spare for bus fare was cited as some of the challenges that hindered caregivers from accessing Vitamin A supplementation.

On the source of information on Vitamin A supplementation majority (94.5%) indicated they received from health workers with a partly 1.8% from mothers. These findings were a replica of the findings on the sources of information on Vitamin A-rich foods in this study. It is evident that the health workers are the major source of information regarding Vitamin A intake. These revelations are an indicator of a population with limited information on Vitamin A which is a tragedy in case the health services breakdown. It also presents a danger in the study area where 42.3% of the caregivers live more than five (5) kilometres from the health facility. The long distances which were identified by this study as one of



the challenges of visiting health facility would mean that caregivers are likely not to get Vitamin A information from the health workers. To make the matter worse the study established that the information received from the health workers was not adequate. This was so because not a single caregiver indicated that he or she had adequate information. Majority (81.0%) indicated that information received was not adequate at all. These revelations are an indictment of a community which is not empowered on issues of nutrition. It can be concluded based on these findings that the interventions done by stakeholders regarding eradication of VAD in the study area do not address the knowledge creation.

The lack of adequate information on Vitamin A explains why 81.1% of the respondents indicated they didn't know the benefits of Vitamin A. The study established that there were a number of challenges that faced intake of Vitamin A. The major challenge (62.7%) was lack of adequate information on Vitamin A while the rest were distance based. The lack of adequate information challenges is addressed would solve the distance ones as the caregivers will be empowered. With adequate information on the benefits of Vitamin A, caregivers will find it worthy to go for Vitamin A supplementation even when the child is not sick.

The study found that health practitioners were the major decision makers (78.7%) in ensuring children are given Vitamin A supplements. Teachers (10.1%) and friends (6.8%) made decisions on Vitamin A supplements. These revelations portray a population which is not empowered with information on Vitamin A to assist them make informed decisions. These findings are in line with observation by Kamau *et. al.*, (2012) in their study on the factors that influence Vitamin A supplementation. They noted that caregivers accepted to have their children take Vitamin A because the health practitioners told them to do so. The study also established that the health promoters in most cases do not educate the

caregivers the benefits of Vitamin A supplementation. These observations confirm why the health practitioners are the major decision makers on matters of Vitamin A supplementation. This is a worrying scenario if not addressed it will lead to a perpetual VAD among the caregivers with little access to Vitamin A information.

It also emerged from the study that overall in all sub-locations in Gatunga Sub-County had a Vitamin A coverage of 52.4%. This is way below the world recommended coverage rate of 80% for a country to alleviate VAD. According to the Kenya National Bureau of Statistics (KNBS) of 2014 nationally 72% of the children aged 6-59 months received Vitamin A supplements. With 52.4% Vitamin A coverage in the study area was low as compared to national coverage and previous coverage in 2014 at 74.3% for entire Tharaka Nithi County (KNBS, 2014). These findings can be attributed to lack of adequate information on Vitamin A, poverty and low education levels among the caregivers. This observation is support by the study findings by Kamau, Makokha, Mutai and Mugoya (2012) in found that lack of information on Vitamin A (41%) and lack of time (5%) to visit health facilities are some of the reasons of low coverage.

It emerged that majority (56.4%) of the children received Vitamin A supplementation. WHO (2011) recommends an 80% Vitamin A supplementation coverage to ensure adequate intake. The low supplementation was attributed to lack of adequate information and long distance to the health facility. WHO (2011) recommends that a child aged 12-59 months be given Vitamin A supplementation one every 4-6 months. This recommendation implies that in 12 months a child would have received Vitamin A supplementation twice. However, only 35.6% received Vitamin A supplementation twice. Due to low (35.6%) twice supplementation it can be argued that the target children were not cushioned against VAD. This was attributed to caregivers' failure to take children to hospitals after completing the mandatory national immunizations.

### **5.2.5 Factors Influencing Vitamin A Intake among Children Aged 12 to 59 Months in Gatunga Ward**

The study established that different variable explored in this objective had influence on the uptake of Vitamin A. The study established that majority (61.7%) disagreed with the statement “the age of the caregiver does not influence the intake of Vitamin A”. This implies that age plays a role in influencing intake of Vitamin A. This finding is in agreement with a study by Jemberu et al. (2017), who established that older mothers with two or more children normally have more information on Vitamin A as compared to mothers with one child. Young mothers or first-time mothers are likely to lack adequate information, are subject to myths, misinformation and fear which leads to low uptake of Vitamin A. The sentiments of the nutrition officers in this study are a testimony that age critical on VAD challenges. However, Rahman and Sapkota (2014) in a study in Nigeria on the Knowledge of Vitamin A foods found that young mothers had more knowledge as compared to old mothers. This was attributed to the high literacy levels of young mother which helped them to seek information from literature, books among others.

It emerged from the study that caregiver education levels influence uptake of Vitamin A. Education is meant to equip a person with knowledge, skills and attitudes to help one make informed decisions. This explains why educated cares givers have a high likelihood of taking adequate Vitamin A-rich foods. These findings are supported by Fombang *et. al.*, (2016) in Ghana on a study on Vitamin A revealed that the high education status of caregivers positively influenced Vitamin A intake either from foods consumed or through supplementation.

On marital status, it was established that caregivers marital influences uptake of Vitamin A. Single parents and divorced caregivers are likely to have low income levels and in turn affects negatively intake of Vitamin A. Previous studies in Cameroon by Fombang *et. al.*,

(2016) found that marital status had insignificant influence on uptake of Vitamin A. However, in Ghana, marital status was found to have significance on the intake of Vitamin A (Hadz *et. al.*, 2016). Married caregivers were found to have regular and adequate income which gives them ability to buy Vitamin A foods. On the other hand, single and divorced caregivers were found to lack adequate income which prevents them from buying Vitamin A-rich foods especially milk, eggs and meat.

It emerged that from the study findings that gender influence intake of Vitamin A. Women are more informed on Vitamin A issues as compared to men. Due to the social role of women of taking care of children like taking them to hospitals, cooking, purchasing of food stuffs they are highly conversant of the nutritional requirements as compared to men. In this regard women acquire more health information regarding their children from health facilities, fellow mothers and friends which in turn empower them. This empowerment results in women making informed decisions regarding children nutrition which results in increase in uptake of Vitamin A. These observations agree with the study findings by Ngaha *et. al.*, (2016) and Kamau *et al.*, (2012) in their studies found that more male caregivers lack knowledge of Vitamin A as compared to women which in turn hinders its uptake.

It was revealed by this study that levels of income among the caregivers influenced the uptake of Vitamin A. It was established from this study (Table 4.6) that the caregivers have a low monthly income with majority earning Ksh.1,000.00 per month. This amount is not adequate to buy Vitamin A-rich foods especially meat based ones. Due to limited income and lack production of Vitamin A-rich foods in the farms it can be concluded that target children suffer from VAD.

It emerged from the research that 58.2% of the respondents agreed religion does not influence uptake of Vitamin A among the caregivers. In case of feeding children with

Vitamin A-rich foods religion might not have large influence since most of the recommended foods such as green leafy vegetables, eggs, milk, animal meats. In Meru community which is predominantly Christians culturally these foods are acceptable, there lack of consumption can only be blamed on other factors. It can be therefore argued that VAD in study area can be due to lack of adequate information, lack of adequate income and lack of production of Vitamin A-rich foods from the farms.

Distance to the nearest health facility was found to influence uptake of Vitamin A especially the issue of supplementation. Vitamin A supplementation is mostly given to children in the health facility. Children would have an opportunity of getting Vitamin A supplementation when they are taken for routine visits to health facility for KEPI programmes. The mandatory KEPI programme last nine (9) months after this duration majority of the children are not taken to hospital unless they are sick which in turn results in many not receiving Vitamin A supplementation. The long distance to the health facility has been blamed on the failure to take children for Vitamin A supplementation. Long distances would translate into paying bus fare which most of the caregivers cannot afford. It will also require the caregivers to forego their daily activities of fetching water, looking for firewood and grazing cattle which are given first priority. Long distance will also mean that caregivers will be missing opportunities of receiving health education is mostly conducted in health facilities. The long distance therefore prevents the caregivers from accessing health education, children not getting routine health screening and misses Vitamin A supplementation. Based on the above observation, it can be argued that long distance to a health facility has great influence (78.4%) on Vitamin A uptake.

In summary, the tested hypothesis on the influence of socio-demographic characteristics on the uptake of Vitamin A with the help of Chi square test returned  $p < 0.05$  for age, education, marital status, income levels and distance to the health facility. This implied

that age, education, marital status, income levels and distance to the health facility influenced dietary intake of Vitamin A.

### **5.3 Conclusions**

This section highlights the main conclusions drawn from the research findings per each objective of the study.

#### **5.3.1 Household Vitamin A-rich Foods Consumed**

From the study it can be concluded that the caregivers had limited knowledge on the foods sources rich in Vitamin A. Most of the caregivers thought that only meat, eggs and milk are the foods that are rich in Vitamin A. It can also be concluded that the residents of the study area depend on purchased foods to provide Vitamin A nutrients. Due to the arid condition of the study area the residents do not grow adequate vegetables and fruits as source of Vitamin A.

It also concluded that health workers as the major source of information regarding Vitamin A as compared to other sources. On the benefits of Vitamin A, the study concludes that the caregivers have low understanding of its value. On purchase of food rich in Vitamin A, the study concludes that the caregivers had little capacity based on the little amount spent on such foods. Finally, the study also concludes that the information available on Vitamin A among the caregivers was not adequate to help them make decision on issues of Vitamin A intake. On Vitamin A-rich food diversity, the study concludes that the children were fed with less dietary food diversity with green leafy ones being mostly consumed. Animal based foods were less consumed. Lack of adequate income and lack of reliable rainfall to support growing of food rich in Vitamin A like fruits and vegetables contributed little dietary diversity. Overall based on the above conclusions the children aged 12-59 months does not adequately get Vitamin A from the foods they consume.

### **5.3.2 Knowledge of Vitamin A among the Caregivers**

From the study it can be concluded that the health practitioners were the major source of Vitamin A information as compared to husbands and friends. The mass media plays little part in disseminating Vitamin A information. It is also concluded that information available on Vitamin A was not adequate and did not inform the caregivers on the benefits of this vitamin. In summary the study found that there is little knowledge of Vitamin A and as result the children in the study site had low intake.

### **5.3.3 Supplementation Coverage of Vitamin A**

From the research outcome on the sources of information on Vitamin A supplementation, health practitioners contributed the most at 94.5%. However, the available information was not adequate. It can be concluded that due to lack of adequate information on Vitamin A supplementation led to 81.1% of the caregivers having no knowledge of the benefits of Vitamin A to the health of the child. On the first Vitamin A supplementation this study concludes that the children were supplemented on the correct ages as per WHO (2011) recommendations since 97.5% were in the ages of 6-12 months. However, the supplementation coverage for the study region was 52.4% which was below the recommended coverage by WHO (2011) of 80 %. On the recommended two times Vitamin A supplementation in a period of 12 months, only 35.6% of the children met the threshold.

Lack of adequate information on Vitamin A, long distances to the health centre and low income were found to be the major challenges that was responsible for low coverage in the study region. Based on the findings on various variables explored to address Vitamin A supplementation it is concluded that the Vitamin A supplementation coverage was low to ensure protection of children from diseases associated with VAD.

### **5.3.4 Factors influencing Vitamin A Intake among Children Aged 12 to 59 Months in Gatunga Ward**

From the study findings for this objective it is concluded that age, education status, gender and marital status influences Vitamin A uptake. The older the caregiver the more she/he have information on Vitamin A and subsequently increase its uptake. The more one is educated beyond primary level lead to increased uptake of Vitamin A. It is also concluded that women and married caregivers was found to positively influence uptake of Vitamin A.

However long distance to the health centres, low income and arid condition of the study area had negatively influenced uptake of Vitamin A. Lastly religion was found to have little influence on the uptake of Vitamin A supplementation.

### **5.4 Recommendations**

The study recommends the following to help improve Vitamin A intake in children ages 12 to 59 months in Gatunga Ward.

1. The study found that the caregivers have in adequate information on the sources Vitamin A-rich foods and Vitamin A supplementation. To address this gap, the study recommends that the government and stakeholders need to develop a policy of ensuring caregivers are adequately educated on the Vitamin A-rich foods, the benefits and the importance of supplementation.
2. The study established that lack of adequate income negatively influenced uptake of Vitamin A. This study therefore recommends for interventions for improving the income of caregivers. Interventions such as forming self-help groups which will provide platforms of starting of income generating activities. The income generating activities like investing in production of green vegetables, fruits and chicken to improve on Vitamin A.



3. The study noted that caregivers have a notion that only meat based foods were rich in Vitamin A. The study recommends dissemination of the correct information of the different sources of plant based Vitamin A-rich food by the relevant stakeholders.
4. It was found that caregivers had no knowledge of the benefits of Vitamin A to the health of their children. This study recommends on the government to come up with strategy of ensuring the caregivers are informed of the benefits of Vitamin A and not concentrate on just giving out supplements.

### **5.5 Recommendations for further research**

The following areas may require further research;

1. Carry out a study to establish the extent of influence of lack of adequate income on the availability of Vitamin A-rich foods
2. Establish the factors leading to inadequate information on Vitamin A among the caregivers.
3. Establish the effects of low consumption of Vitamin A-rich foods and low coverage of Vitamin A on the nutritional status of children age 12- 59 years.

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## **APPENDICES**

### **Appendix I: Key Informant Interview Guide**

1. What is your designation?
2. How long have you worked for in the public sector? (Probe on which department and their roles).
3. What tasks do you engage in the course of duties (probe on which department and their roles).
4. Have you ever participated in any Vitamin A sensitization campaigns (Probe on when it was conducted, who were the stakeholders, role played, vitamin supplementation etc.)
5. What are sources of Vitamin A-rich foods (Probe on availability of animal and plant based food, most consumed types, challenges of availability etc.)
6. Please comment on the knowledge of caregivers on the types of foods rich in Vitamin A (probe of the sources of information, adequacy of information, reasons of adequate or inadequacy of information etc.)
7. Do you think the caregivers provide variety of Vitamin A-rich foods to children aged 12 to 59 months (probe on the variety Vitamin A-rich foods, frequency of feeding per day and in a week, where they get the foods from etc.)
8. Please explain whether arid condition of Gatunga Ward has effect of Vitamin A uptake
9. Please comment on the Vitamin A supplementation in Gatunga Ward (probe on when, where it's done, who are the target children, their ages, who gives out supplementation etc.
10. What are the hindrances of Vitamin A supplementation (probe on lack of adequate information, distance to the health facility, influence of socio-economic factors etc.
11. Suggest ways of improving Vitamin A uptake in Gatunga Ward



**Thank you for your time and valuable contribution**

**Appendix II: Caregivers Questionnaire**

Tick the most appropriate answers applicable to you by the use of options corresponding to your choice where necessary or by writing on the dotted spaces provided.

**SECTION A: BACK GROUND INFORMATION**

1. Please indicate the number of children in the following ages?
  - i) 3 months – 12 months \_\_\_\_\_
  - ii) 1 – 2 yrs. \_\_\_\_\_
  - iii) 2 - 3 yrs. \_\_\_\_\_
  - iv) 3 - 4 yrs. \_\_\_\_\_
  - v) 4 - 5 yrs. \_\_\_\_\_
  - vi) Above 5 yrs. \_\_\_\_\_
  
2. Please indicate your gender (**caregiver**)
 

[ ] Woman [ ] Man
  
3. Please select one option to describe your relationship with the child you are taking care of
 

[ ] Mother [ ] Father [ ] Sibling [ ] Grandparent [ ] House help

Others please indicate \_\_\_\_\_
  
4. Please indicate your faith (**caregiver**)
  - i) Protestant [ ]
  - ii) Catholic [ ]
  - iii) Muslim [ ]
  - iv) No religion [ ]

Others please indicate \_\_\_\_\_
  
5. Please indicate your age in years (**caregiver**)
  - i) Below 18 years [ ]
  - ii) 18 - 22 years [ ]
  - iii) 23 - 26 years [ ]
  - iv) 28 - 32 years [ ]
  - v) 33 - 37 years [ ]
  - vi) 38 - 42 years [ ]
  - vii) Above 43 years [ ]

Please indicate the child mother/father marital status

- i) Married [ ]
- ii) Single [ ]
- iii) Separated [ ]
- iv) Widowed [ ]
- v) Divorced [ ]

6. Please indicate your highest level of education attained by the mother/father of the child you are taking care of. (*One option only*)

- i) No education [ ]
- ii) Primary School (Completed) [ ]
- iii) Primary School (Not completed) [ ]
- iv) Secondary School (Completed) [ ]
- v) Secondary School (Not completed) [ ]
- vi) Tertiary [ ]
- vii) Others indicate \_\_\_\_\_

7. Please indicate your occupation (*One option only*)

- i) Not employed (No work at all) [ ]
- ii) Casual labour at times [ ]
- iii) Formal employment (with monthly pay) [ ]
- iv) Self-employment [ ]

8. I would like you to tell me your monthly income level

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9. What is your main source of income?

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10. What is the total number of your house hold members?

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**SECTION A: DIETARY INTAKE OF VITAMIN “A” AMONG CHILDREN  
AGED 12 to 59 MONTHS**

11. Please mention five food types rich in Vitamin A that you feed your child with

- i) \_\_\_\_\_  
 ii) \_\_\_\_\_  
 iii) \_\_\_\_\_  
 iv) \_\_\_\_\_

12. How do you get the food rich in Vitamin A

- i) Grow vegetables in my farm [ ]  
 ii) Buy from the market [ ]  
 iii) Keep chicken/rabbit [ ]  
 iv) Keep cows/goats for milk [ ]  
 v) Grow fruits in my farm [ ]  
 vi) Buy meat/liver from butchery [ ]

Other please indicate \_\_\_\_\_

13. Where did you get information on Vitamin A? (more than one option applicable)

- i) Health worker [ ]  
 ii) Media [ ]  
 iii) Mother [ ]  
 iv) Husband [ ]  
 v) Mother-in-law [ ]  
 vi) Pastor/Priest/Imam [ ]  
 vii) Friends [ ]  
 viii) Pre-natal and Post-natal visits [ ]  
 ix) Internet [ ]  
 x) Cultural requirement [ ]  
 xi) My family [ ]  
 xii) Other relatives [ ]

14. Do you know the benefits of giving your baby Vitamin A foods

Yes [ ] No [ ]

15. Do you think you have adequate information on the foods rich in Vitamin A?

- i) More than enough [ ]
- ii) Just enough [ ]
- iii) Enough [ ]
- iv) Not Enough [ ]
- v) Not sure [ ]

16. How much do you spend on buying Vitamin A-rich foods in a month

\_\_\_\_\_

17. Please let me know how often you gave the following foods to your child in the last 1 week

<b>Food eaten</b>	<b>Food eaten</b> 1 = yes 2 = no	<b>No. of days the food was consumed</b>	<b>Source of food</b> 1. Produced 2. Purchased 3. Food aid 4. Others (specify)	<b>Amount taken</b>
Green leafy vegetables				
Pink sweet potatoes				
Fruits mangoes				
Pawpaw				
Watermelon				
Fats				
Vegetable oils				
Margarine				
Ghee(Traditional)				
Eggs				
Beef				
Chicken				
Pumpkin				
Sweet potatoes				
Milk				

**SECTION C: SUPPLEMENTATION COVERAGE OF Vitamin A AMONG CHILDREN AGED 12 to 59 MONTHS**

18. (a) Has your baby been given Vitamin A supplement in the last one (1) year [ ] Yes [ ] No

(b) If yes, how many times? (*Probe number of times in the last 12 months (confirm from the card)*)

19. At what age was the baby given Vitamin A (*One Option*)

- i) Less than a month [ ]
- ii) 1 – 3 months [ ]
- iii) 4 - 6 months [ ]
- iv) 6 - 12 months [ ]
- v) 1 – 3 years [ ]
- vi) 4 - 5 years [ ]
- vii) Above 5 years [ ]

20. Who **decided that** you give your baby Vitamin A?

- i) Myself (Mother) [ ]
- ii) Myself (Father) [ ]
- iii) My husband [ ]
- iv) My wife [ ]
- v) My mother [ ]
- vi) Mother in law [ ]
- vii) Health practitioner [ ]
- viii) Friends [ ]
- ix) Others (indicate)\_\_\_\_\_

21. Where did you Vitamin A supplement from

- i) From the health facility [ ]
- ii) Given together with polio vaccine [ ]
- iii) Bought from the chemist [ ]

Other sources please indicate\_\_\_\_\_

22. Where did you get information on Vitamin A supplement? **(more than one option applicable)**

- i) Health worker [ ]
- ii) Media [ ]
- iii) Mother [ ]
- iv) Husband [ ]
- v) Mother-in-law [ ]
- vi) Pastor/Priest/Imam [ ]
- vii) Friends [ ]
- viii) Pre-natal and Post-natal visits [ ]
- ix) Internet [ ]
- x) Cultural requirement [ ]
- xi) My family [ ]
- xii) Other relatives [ ]

23. Do you think you have adequate information on Vitamin A supplement?

- i) More than enough [ ]
- ii) Just enough [ ]
- iii) Enough [ ]
- iv) Not Enough [ ]
- v) Not sure [ ]

24. How far is the distance from your home to the nearest health facility where you can get Vitamin A supplements \_\_\_\_\_

25. What are the benefits of Vitamin A supplementation?

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26. What challenges are you facing/faced or you may when accessing Vitamin A supplementation?

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**SECTION D: SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS  
INFLUENCING Vitamin A INTAKE AMONG CHILDREN AGED 12 to 59  
MONTHS**

Using a the table below please indicate by ticking in the appropriate box whether socio-economic and demographic characteristics has influenced Vitamin A intake

	<b>Socio-Economic and Demographic Characteristics</b>	<b>Agree</b>	<b>Disagree</b>
	The age of the caregiver does not influence the intake of Vitamin A		
	Education levels does not influence dietary intake of Vitamin A		
	Caregiver marital status does not influence dietary intake of Vitamin A		
	The gender of a caregiver does not influence dietary intake of Vitamin A		
	Lack of adequate income among the caregivers do not influence dietary intake of Vitamin A		
	Religion does not influence supplementation of Vitamin A		
	Distance to a health facility does not influence supplementation of Vitamin A		

**Thank you for your support**

**Appendix III. Map of Kenya Showing Tharaka-Nithi County**



**Location of Tharaka-Nithi County**





## **Appendix V: Introduction and Consent**

Hello, my name is..... on behalf of Nkingo Christine Kananu who is currently a student at Kenyatta University pursuing Master's degree in Public Health (Monitoring and Evaluation), we are conducting a survey on Status of Vitamin A intake among children aged 12 to 59 months in Gatunga ward, Tharaka North district.

This survey will inform the ministry of public health and sanitation and the different stakeholders who may be willing to partner with this community in improving the nutrition status. The survey will takes between 30 to 45 minutes to complete.

All information you provide will be treated with total confidentiality and the person's identity will remain concealed.

Participation in this survey is voluntary and no Vitamin A supplement or reward whatsoever will be provided, and if we should come to any question you don't want to answer, just let me know and I will go on to the next question; or you can stop the interview at any time. However, we hope that you will participate in this survey since your views are important.

At this time, do you want to ask me anything about the survey?

May I begin the interview now?

Signature of interviewer:

Date:

For inquiries please contact; Christine Kananu

Tel no: 0725697925

RESPONDENT AGREES TO BE INTERVIEWED . . . 1

RESPONDENT DOES NOT AGREE TO BE INTERVIEWED . . . 2 END

**Appendix VI: Kenya University Graduate School Research Proposal Approval  
Letter**



**KENYATTA UNIVERSITY  
GRADUATE SCHOOL**

E-mail: [kubps@yahoo.com](mailto:kubps@yahoo.com)  
[dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)  
 Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P.O. Box 43844, 00100  
 NAIROBI, KENYA  
 Tel. 810901 Ext. 57530

**Internal Memo**

**FROM:** Dean, Graduate School

**DATE:** 7<sup>th</sup> April, 2013

**TO:** Ms. Nkingo Christine Kananu  
 C/o Community Health  
KENYATTA UNIVERSITY

**REF:** P57/PT/13551/09

**SUBJECT:** APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting of 20<sup>th</sup> March 2013 approved your Research Proposal for the M.PH Degree Subject to Editing the title to read "Assessing Vitamin A Intake Among Children Aged 12 to 59 Months in Gatue Division, Tharaka Nithi County Kenya".

You may now proceed with your Data Collection.

**DAVID NJOROGE**  
**FOR: DEAN, GRADUATE SCHOOL**

c.c. Chairman, Foods, Nutrition & Dietetics Dept.

Supervisors:

1. Prof. Judith Waudu (PhD)  
 Foods, Nutrition & Dietetics Dept.  
KENYATTA UNIVERSITY
2. Dr. Eunice Njogu (PhD)  
 Foods, Nutrition & Dietetics Dept.  
KENYATTA UNIVERSITY

DN/cao

## Appendix VII: Kenya University Ethics Review Committee Ethical Clearance Letter



KENYATTA UNIVERSITY  
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575  
Email: [kuerc.chairman@ku.ac.ke](mailto:kuerc.chairman@ku.ac.ke)  
[kuerc.secretary@ku.ac.ke](mailto:kuerc.secretary@ku.ac.ke)  
Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P. O. Box 43844  
Nairobi, 00100  
Tel: 8710901/12

Our Ref: KU/R/COMM/51/197

Date: July 24<sup>th</sup>, 2013

Nkingo Christine Kananu  
School of Public Health  
Kenyatta University  
P. O. Box 43844, Nairobi.

Dear Ms. Nkingo,

APPLICATION NUMBER PKU/126/I111 OF 2013 – ‘ASSESSING VITAMIN A INTAKE AMONG CHILDREN AGED 12 TO 59 MONTHS IN GATUE DIVISION, THARAKA NITHI COUNTY KENYA.’- *VERSION 2.*

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic, ‘Assessing Vitamin A intake among Children Aged 12 To 59 Months in Gatue Division, Tharaka Nithi County Kenya’, version 2 dated July 23<sup>rd</sup> 2013.

2. APPLICANT

Nkingo Christine Kananu  
School of Public Health  
Kenyatta University  
P. O. Box 43844, Nairobi.

3. SITE

Gatue Division, Tharaka Nithi County, Kenya

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines, and is of the view that against the following elements of review,

- (i) Scientific design and conduct of study,
- (ii) Recruitment of research participant,
- (iii) Care and protection of research participants,
- (iv) Protection of research participant’s confidentiality,
- (v) Informed consent process,
- (vi) Community considerations.

AND APPROVED that the research may proceed for a period of ONE year from July 24<sup>th</sup>, 2013.

5. ADVICE/CONDITIONS

- i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
- ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
- iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
- iv. Submit an electronic copy of the revised proposal to KU-ERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.



**PROF. NICHOLAS K. GIKONYO**  
**CHAIRMAN: KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE**

I Christine Kanany Nkingo  
accept the advice given and will fulfill the conditions therein.

Signature [Signature] Dated this day 26 of 07 / 2013.

cc. Vice-Chancellor  
Director: Institute for Research Science and Technology

**Appendix VIII: National Commission of Science, Technology and Innovation**

**Approval Letter**



**NATIONAL COMMISSION FOR SCIENCE,  
TECHNOLOGY AND INNOVATION**

Telephone: +254-20-2241349, 20-267 3550,  
0713 788 787, 0735 404 245  
Fax: +254-20-2213215

Email: secretary@nacosti.go.ke  
Website: www.nacosti.go.ke

When replying please quote

Our Ref: **NCST/RCD/12A/013/140**

Christine Kananu Nkingo  
Kenyatta University  
P.O.Box 43844-00100  
Nairobi.

9<sup>th</sup> Floor Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Date:

**14<sup>th</sup> October, 2013**

**RE: RESEARCH AUTHORIZATION**

Following your application dated *21<sup>st</sup> August, 2013* for authority to carry out research on "*Assessing vitamin A intake among children aged 12 to 59 Months in Gatue Division, Tharaka Nithi County, Kenya,*" I am pleased to inform you that you have been authorized to undertake research in **Tharaka Nithi County** for a period ending **31<sup>st</sup> December, 2013**.

You are advised to report to **the County Commissioner and the County Director of Education, Tharaka Nithi 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.

**DR. M. K. RUGUTT, PhD, HSC.  
DEPUTY COMMISSION SECRETARY  
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION**

Copy to:

The County Commissioner  
The County Director of Education  
Tharaka Nithi County.

National Commission for Science, Technology and Innovation

**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 Officers 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.

*Chickaa*

**NACOSTI**

REPUBLIC OF KENYA

**National Commission for Science, Technology and Innovation**

**RESEARCH CLEARANCE PERMIT**

Serial No. A 00433

**CONDITIONS: see back page**

**PAGE 2** **PAGE 3**

**THIS IS TO CERTIFY THAT:**

**Prof./Dr./Mr./Mrs./Miss/Institution**

**Christine Kananu Nkingo**

**of (Address) Kenyatta University**

**P.O. Box 43844-00100, Nairobi.**

**has been permitted to conduct research in**

**Location District**

**Tharaka Nithi County**


**On the topic: Assessing vitamin A intake among Children aged 12 to 59 Months in Gatue Division Tharaka Nithi County, Kenya.**

**for a period ending: 31<sup>st</sup> December 2013.**

**Research Permit No. NCST/RCD/12A/013/140**

**Date of issue** 14<sup>th</sup> October, 2013

**Fee received** KSH. 1000



**Applicant's Signature** *Christine Kananu Nkingo*

**For: Secretary** *[Signature]*

**National Commission for Science, Technology & Innovation**