FACTORS ASSOCIATED WITH NUTRITIONAL STATUS IN ELDERLY PERSONS LIVING IN KILGORIS, KENYA

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DEPARTMENT OF FOOD SCIENCE, NUTRITION AND TECHNOLOGY

FACULTY OF AGRICULTURE

2019

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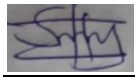
Signature  Date: 20th August 2020

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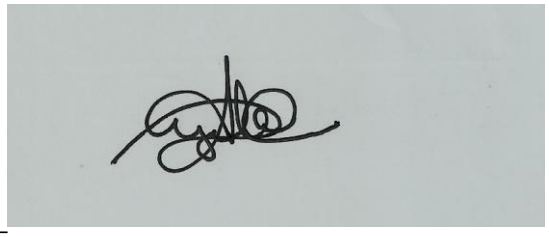
Signature__  Date _20th August 2020

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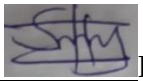
Signature  Date: 20th August 2020

DEDICATION

This dissertation is dedicated to my dear husband Isaac Leteipa and daughter Nicole Resian in appreciation of their unmatched love, encouragement and inspiration throughout my entire study period.

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LIST OF ACRONYMS AND ABBREVIATIONS

BMI: Body Mass Index

CI: Confidence Interval

DDS: Dietary Diversity Score

KDHS: Kenya Demographic Health Survey

E.S.R.C: Economic and Social Research Council

GOK: Government of Kenya

MUAC: Mid-Upper Arm Circumference

NHIF: National Health Insurance Fund

NSAs: Non-State Actors

NSSF: National Social Security Fund

ODK: Open Data Kit

OPCT: The Older person Cash Transfer programme

OR: Odds Ratio

RDA: Recommended Daily Allowance

SPSS: Social Packages for Statistical Studies

UK: United Kingdom

UNDP: United Nations Development Programme

OPERATIONAL DEFINITION OF TERMS

Ageing - Progressive generalised impairment of function resulting in a loss of adaptive stress and in a growing risk of age associated diseases.

Ageing process - Universal biological changes that occur with age and are unaffected by disease and environmental influences.

Arm span - The length of a person's outstretched arms, measured from the fingertips of the two middle fingers.

Body mass index - Is a number that reflects body weight adjusted for height.

Cachexia - Weakness and wasting of the body due to severe chronic illness.

Demographic transition – A shift from high to low fertility and mortality levels**.**

Dietary intake - The daily eating patterns of an individual, including specific foods and calories consumed and relative quantities.

Edentulous - Is being without teeth.

Elderly – Are persons aged 60 years and above.

Health - The state of being free from illness or injury

Kyphosis – Theforward rounding of the back most common in older women.

Lifestyle -The way a person lives and is expressed in both work and leisure patterns.

Malnutrition – A state of deficiencies, excesses, or imbalances in a person's intake of energy or nutrients.

Mid Upper Arm Circumference - The circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow.

Nutritional status - A requirement of health of a person convinced by the diet, balance of food consumption and normal utilization of nutrients.

Sarcopenia- The loss of skeletal muscle mass and strength as a result of ageing.

Wealth index - The household measure of living standard using the Principal Component Analysis in obtainting the items that the elderly people own.

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ABSTRACT

Nutrition plays an important role in maintaining the health of elderly people; persons aged 60 years and above; as well as in their aging process. The increasing prevalence level of malnutrition among the elderly people is becoming a concern globally. In Kenya, there is limited data on nutrition status of the elderly persons especially in the rural areas such as Kilgoris. This study was therefore done to assess socio-economic characteristics of the elderly people,dietary patterns, nutrient intake and nutritional status in Kilgoris Kenya. A cross-sectional study with analytical component was conducted among 221 elderly respondents who met the study criteria. The questionnaires were deployed through Open Data Kit (ODK) on mobile devices. Data on background characteristic, dietary patterns and nutrient intake was collected using socio-economic characteristics, a single 24-Hour dietary recall, and Dietary Diversity Score (DDS) and food consumption frequency for various food items. The anthropometric measurements of weight and height were used to compute Body Mass Index to assess nutritional status. Data analysis was carried out using SPSS version 23 software and MicrosoftExcel for graphical presentations.

The results showed that there were slightly more females (50.2%) than males. Those who were married were 89.7%and 65.6% were illiterate. The levels of illiteracy were significantly high among women (81%) than males (70%) (p value=0.022). The majority of the respondents were also unemployed (72.4%) but sale of animals (42.1%) was the main sources of income reported. Diabetes (65%), hypertension (64%), and teeth problems (62%) were major health issues that affected the wellbeing of elderly persons.Further, the prevalence's of overweight and underweight were 13% and 26%, respectively. Nevertheless, a positive association was additionally found between nutritional status and DDS (p-value=0.008) while many did not meet the Recommended Daily Allowances for energy, calcium and other micronutrients. The factors that significantly associated with overweight were high wealth index (OR =2.82, P-value =0.046), receiving pension (OR =0.14, P-value =0.001), owning means of transport (OR =1.78, P-value =0.013) and education attainment (OR =0.33, P-value =0.008). On the other hand, immobility (OR =0.94, P-value = 0.065) and loss of memory (OR =0.00, P-value =0.006), significantly associated with underweight.

In conclusion, the elderly people in Kilgoris have poor nutritional status compounded by poor dietary intakes that lead to not meeting the Recommended Daily Allowances for most nutrients. High morbidities, lifestyle behaviours and low socio-economic status also affect the wellbeing and health of the elderly. Provision of pension or cash transfer to all elderly people,

creation of income generating activities, provision of geriatrics services and adequate drugs to the elderly people are some of intervetions that can be prioritized**.**

CHAPTER 1: INTRODUCTION

1.1 Background

Aging persons are an important component of every country's demographic strata deserving good health, nutrition status and social protection like any other age group.According to the United Nations (2015), the population of elderly persons is on a rise and is projected to grow to nearly 2.1 billion globally by the year 2050. Initially, Africa was known to be a home of a relatively smaller number of elderly persons, however, the current trends indicate rapid growth of up to 105 million by the year 2030 (UNDP, 2016). Kenya is not an exception to these trends. In the 2019 Kenyan census report, the elderly persons contributed 2.4% of the population marking a gradual drop of 3.4% from the year 1970 (KNBS, 2019). However, according to the recent World Population Worksheet, the estimates of elderly people are projected to reach 7% from the current 3% in Kenya (Population Reference Bureau, 2018)

Natural aging is usually accompanied with challenges such as ill-health, becoming frail and high dependency levels, increased impairment in functional and cognitive ability, poor living conditions and inadequate social support leading to desperation among the elderly (Macigo, *et al.,*2008). In addition, during old age nutritional risks become more prone including " poverty which make it difficult to procure food and other basic needs, poor health, psychological and emotional problems, poor functional ability or disability and family lifestyle such as social support; which affect food intake and result in poor diet of the elderly population" (Odunga, 2004).

Therefore, malnutrition is also a common condition due to either deficiency or excess of nutrients (Chavarro-carvajal, *et al*., 2015). According to Odunga (2010), 29% of elderly in Kenya were malnourished. The government has been investing in programmes that provide social protection among the elderly through socal insurance schemes and safety net programmes. In the 2006 Older person Cash Transfer programme(OPCT) was initiated with the aim of improving the livelihoods of households with elderly persons who do not receive pension. Each elderly person was to receive Kenya shillings 2000 after every two months however, this was not sufficient enough to protect the elderly from a range of vulnerabilities (GOK, 2011).

At old age poverty is great impediment in terms of development and well being. According to United Nations Development Programme (UNDP) 2016, the population of elderly living below the poverty line worldwide is 45.5%. The situation is even worse in circumstances

where the about 61.3% households with elderly people, lived with many children under their care(NCPB, 2016).

About 80% of elderly people are said to live in rural areas and primarily pursue agriculture in support of livelihood (WHO, 2015). In the meantime, their contribution towards development still remains vital in the society. Over the years their roles have been seen in raising future generations whose parents are in search of jobs in urban centres or died as a result of HIV/AIDS epidemic. Also in assisting in food production, vital decisions making as well as contributing in family welfare and income (WHO, 2015). However, in circumstances where the elderly needs are compromised such as lack of physical care, altered dietary patterns or are left with no land to cultivate, their nutritional needs are altered and hence they are not able to cope with the situation (Chavarro-carvajal *et al*.,2015).

Very little interventions exist focusing on the elderly population in Kilgoris, since many stakeholders carrying out nutritional interventions have over time diverted attention to mothers and children hence ignoring the needs of the elderly. Furthermore, minimal information regarding nutritional vulnerablities in this specific age category in Kilgoris is still limited raising a critical demand for attention and follow up.

1.2 Statement of the problem

Kenya's elderly population is currently 1.8 million (KNBS 2019) and is expected to be on a rise in the near future, while at the same time, there are significant levels of malnutrition that are largely remaining unattended by nutrition actors. For instance, 82% of elderly people from Baringo County were malnourished (Odunga, 2004). Research data concerning nutritional status and factors affecting the elderly peoplein Kenya are scarce.The extent to which these factors influence the elderly people in Kilgoris is unknown. This poses a need for this study to determine dietary patterns of elderly persons, nutritional status and factors associated.

1.3 Justification

Dietary patterns are associated with poor nutrition and nutrition vulnerabilities among the elderly persons. This study will be usefulfor the Government of Kenya in implementing policies on the welfare of the elderly people and develop strategies to promote health and quality of life. The findings will also suppliment the existing knowledge among policy makers, planners and Non State Actors (NSAs) for designing, testing and adopting interventions that will improve the nutritional status and overall wellbeing of the elderly people.

1.4Aim of the study

Contribute towards an increased life expectancy among the elderly people and an increased number of healthy years.

1.5Purpose of the study

The purpose of the study is to generate data that may be used to raise awareness on nutritional needs of the elderly people.

1.6Objectives

1.6.1 General objective

To determine nutritional status and dietary patterns of elderly people in Kilgoris Narok County.

1.6.2 Specific objectives

1. To assess the demographic characteristics of the households.
2. To assess the socio-economic status and dietary patternsof the elderly persons in Kilgoris.
3. To determine nutrient intake of elderly persons in Kilgoris.
4. To assess the nutritional status of the elderly persons in Kilgoris.

1.7Research questions

1. What are the socio-demographic and economic characteristics of households with elderly persons in Kilgoris?
2. What is the prevalence of malnutrition in elderly persons in Kilgoris?
3. What factors are associated with nutritional status in elderly persons living in Kilgoris?

CHAPTER 2: LITERATURE REVIEW

2.1 Definition of elderly

Ageing is said to be when an individual becomes older where the body is accompanied with physiological, social and psychological changes. The World Health Organization (WHO) refers to persons who have reached 65 years of age as the old despite the lack of a common agreement that defines the term. Often, developing countries uses the term to mean the age at which a person retires (60 years) and becomes eligible to start receiving pension (UNFPA, 2012). In Kenya the age at which a person begins to receive this benefit is at 60 years (Mwenda, 2010). However, the society and tradition still hold an arbitrary definition of old as the period that the body becomes disabled and is prone to diseases as a result of declining mental, physical and functional capacity.

2.2 Demographics of the old population

The old population is homogenous. In the recent years the world has observed substantial increases in number of older cohorts than any other age group. Between 2015 and 2050 the estimates are expected to grow to up to 2.1 billion (United, 2011; United Nations, 2015). These proportions however are much higher in developed regions than less developed countries**.** According to surveys, Japan is indicated as the home of the oldest population having 33% of the population above 60 years (UN Economic and Social Affairs Department, 2017). Nevertheless, developing countries are said to experience a faster ageing growth trends over a short period of time. Kenya among other developing countries are collectively said to account to up to 6.3 % of the global old population by 2030 (NCPB, 2016)**.**

The larger ageing cohort constitutes of both women and men. It is said women outlive men by having a longer lifespan than women. According to the 2017 UN World Ageing Report women are said to contribute to up to 54% of the total global ageing population. Further, the 2019 Kenya population and housing census also pointed out a difference of 212,670 more women than men.

2.3 Drivers for increased population ageing

2.3.1 Shift from high to low fertility and mortality rates

Global life expectancy continues to rise increasing the proportion of older population. Declined fertility and mortality are some of the major drivers said to have resulted by countries step-ups in economic and social developments. From the UN 2015 report, a number of factors such as promotion of reproductive health and family planning have led to the efforts in reduction of birth rates while advances in public health and medical technologies as well as improved living conditions have contributed in reduced mortality. As a result, people are living longer, healthier despite advances in ages.

2.3.2 Improvements in biological age

An early investment on biological health factors that causes aging at a given chronological age is quite important. A lot of countries in the world have heavily invested in health and ageing initiatives in improving health including nutrition of its population. According to survey findings, countries such as UK and Ireland are said to have experienced drastic declines in severe disabilities (WHO, 2002). Through these the older people will significantly contribute to the society as workers, volunteers and not just recipients of care. Last but not least great savings will be made in helping them at the final stages of life and lastly individuals being highly encouraged in adopting the habit of healthy eating.

2.4 Malnutrition in the aging population

Malnutrition is a state that results from excesses or lack of nutrients making a person become poorly nourished. Any change that occurs in the intake of body nutrients and nutritional requirements usually leads to malnutrition. In this study the main focus is on undernutrition having remained published in many literatures. Ageing and malnutrition are inevitable (Hickson, 2006). Despite countries advances in medical and public health the levels of malnutrition among the elderly especially in developing countries are still high. Studies have found a strong correlation between changes that occur during ageing and malnutrition. For example ageing gradually breaks down a person’s body physical, nervous and mental capabilities (Mugo, 2015). Frequent loss of teeth, decreased physical activity, change in smell and taste often experienced during aging leading to reduced food intake (Macigo *et al*.,2008).

The levels of malnutrition also depend on the setting in which the elderly live together with the level of care provided. Multi centers surveys have indicated higher malnutrition rates among institutionalized older adults in comparison to home dwellers. However limited literature still exists on the prevalence of malnutrition among older adults dwelling in the community. For example, a French study found 40% of institutionalized adults to be undernourished unlike 3% who were living at home. Similar results were found in Norway and Canada (Chavarro-carvajal *et al*.,2015; Population Reference Bureau, 2007).

2.5 Factors that affect nutritional status in older persons

Risk factors make a person becomes malnourished. Being older alone is a risk to malnutrition. However, this single factor is not sufficient to explain the root cause of this problem. In real sense, risk factors are often said to be situation and individual specific (Odunga, 2004). The old people are said to possess certain characteristics that when they interrelate it exposes them to nutritional risks. These can be categorized into; medical, social, psychological and physical changes. Even though not all the risk factors will apply equally to all older people/persons, different risk factors may be interlinked and will have a synergistic effect, on the same note the presence of risk factors in an individual does not necessarily mean it will lead to malnutrition.

2.6 Lifestyle, socio-economic and physiologic changes

The socioeconomic factors that affect nutritional status of elderly persons include; isolation from family members, consuming less number of foods, insufficient income after retirement, lack of funds to purchase food, inability to meet medical expenses and inaccessibility to the market places (Nnakwe, 2009). All these factors impact the elderly people's ability to socialize, eat and even access and enjoy food. One study confirmed the presence of stress, loss vision, appetite and burden of diseases to be more prevalent causes of malnutrition in the list of lifestyle factors (Hickson, 2006).

Physiological body changes also occur thus decreasing body fat mass and total water body in the period of aging (Odunga, 2004). Weight loss is caused by three factors, wasting due to inadequate food intake, cachexia due to catabolism and finally sarcopenia resulting from muscles mass loss. According to the author of the book Community Nutrition third edition 2018, body weight is said to decrease by 0.5 % among 60 years of age men and 65 years of age women. However, the reasons behind weight gains are not clear, leaving a room for further studies. Further findings by Hickson associated weight to 'anorexia, sex and inflammatory status'.

2.6.1 Alcoholism among the elderly persons

The intakes of alcohol among the elderly have been found to be an onset routine habit towards late age. Women to be precise fall into these incidents having gone through stresses of retirement or as a result of losing a spouse (Nnakwe, 2009). Alcohol intake impacts the body in various ways including poor vision that leads to falls, impairing the functioning of important body organs including the liver, the functioning of drugs as well as lowering the appetite for food among the elderly. Through all these effects the elderly nutrition becomes compromised as intake of food is reduced hence increasing the risks of malnutrition.

First reduced physical activity lessens the energy needs of a person and food intake, secondly, lowered appetite for food due to tooth loss, change in taste and smell and anorexia (Caroline, *et al*,. 2013).Common health problems faced by the elderly such as anorexia and weight loss results in physiological body changes and ability of elderly to obtain right meals in abundance. Moreover, there are other difficulties experienced by the old including poverty, lack of social participation, disability and social discrimination (Macigo *et al*.,2008; Tessfamichael, *et a*l.,2014).

Other risk factors that impact nutritional status in elderly are increased use of drugs prescribed and mental health problems. Drugs are often said to reduce food intake as they are known to cause nausea and anorexia (Odunga, 2004). However, risk factors are often situation and individual specific. For intervention purpose it's important that underlying causes to vulnerability at household level and community level be examined.

2.7 Medical factors

2.7.1 Excessive use of medications

Older persons are likely to take medications due to increased health problems associated with old age. Drugs have a nutritional effect because it alters food intake patterns of a person, impacts a person's mobility, preparation and taste of food. Drugs especially obtained from the counter and prescriptions contribute to malnutrition. In addition, the use these drugs have effects such as vomiting and nausea that may result in weight and nutrients loss. Also, drugs may have unpleasant taste that can change perceptions thus producing an immediate change in food intake and decreased appetite.

Income level has also been found to impact the ability of elderly to purchase food and afford medications simply because some of them have fixed retirement income after retiring. United Nations 2007, Poverty among the old people in Latin America and Caribbean identified

factors including weak pensions systems most targeting the rich, households holding many children thus sharing the budget and lack of long-term credits market among the elderly in developing countries. According to UNDP, 2016, 46% of the world population is still living under poverty, 80 % in rural setup.

2.7.2 The elderly people oral health and dental status

Oral diseases and tooth loss generally deteriorate with aging. This loss leads to problems in chewing, reduced salivary flow rates and lowered immunity. In return the elderly are left with the option of only choosing soft diets often refined carbohydrates putting them in danger of malnutrition and illnesses (Macigo *et al*.,2008). In a survey carried out in Dagoretti area of Nairobi, established that 51.9% of elderly reported to have tooth issues and edentulousness was common. Clearly, this shows a significant effect in food intake.

2.8 Psychological factors

Losing a family member, stress, being in a low mood barely causes changes in food intake as well as altered eating behavior of a person. Despite a lack of sufficient evidence of how anxiety and food intake relates, studies have also showed that the response of people to stress and eating disorders differs needing a further research on the same (Hickson, 2006).

2.9 Nutritional recommendations for elderly people

The nutritional requirements of elderly are generally similar to those of younger adults however the aging process affects other nutrient needs for example energy. Thus, the resulting nutrient status is as a result of decreased production of digestive enzymes and drugs side effects.

2.9.1 Energy

The energy requirement at old age is said to reduce with age which is associated to less eating, reduced lean body tissue, lowered physical activities and changes in body composition (WHO, 2016). This is also dependent on sex, physical activities, body size and environmental factors in a person. Quantitatively the energy requirement in this age category remain unknown (Odunga, 2004). To supplement the energy requirements therefore the elderly should consume energy dense diets such as milk, eggs, fish, vegetables, cereals, bread that are rich in proteins, vitamins and minerals.

2.9.2 Proteins

Protein intake per elderly person is said to be 1.5g per kg of body weight. Some literatures however, signifies that the energy requirement in elderly is similar to those of young adults

while some literatures illuminates that the old people to be in need of more proteins (Odunga, 2004). Due to illnesses the protein requirements in elderly is expected to be more. Evidence shows an increase in consumption of protein than the RDA helps in increasing the body mass muscles as well as increases in immune that helps in healing wounds At old age *(*Ahmed *et al.*,2010).

2.9.3 Minerals and Vitamins

These are micronutrients that play role in sustaining, maintaining and adapt to changes that occur in the body. The recommendations for these substances remain unchanged throughout life time. Examples include calcium, iron, and other traces such as cobalt, selenium and zinc. Vitamin D in older people is greatly determined by a decreased intake of foods rather than sunlight. Its deficiency results in reduced bone density, increased falls and as well as contraction of cardiovascular diseases. Folate is also important at old age and can be obtained from green leafy vegetables, orange juice, peas or dried beans. Its deficiency can be due to insufficient diets, alcohol consumption or use of certain drugs thus increasing the risks of getting cancer, memory loss or even depression.

2.9.4 Fluid intake

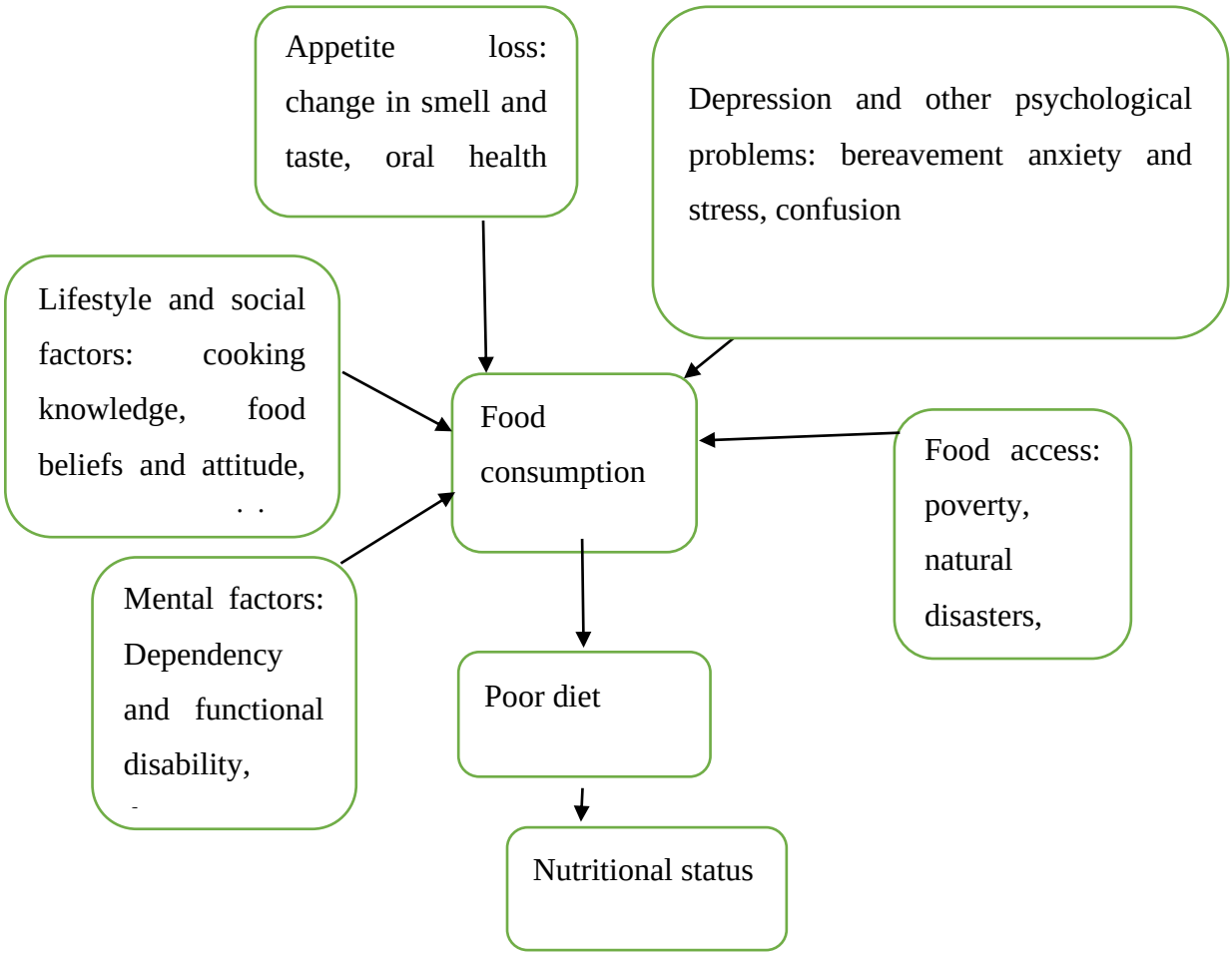
At least 1.5 litres of water daily is recommended for the elderly persons. Water is essential in maintaining body functions in elderly. It's demonstrated that a number of elderly people at old age experience reduced fluid intakes that can result in altered thirst patterns and reduced water excretion. Dehydration is a common condition dependent upon an individual's response to the thirst. The body obtains its water through fluids intake, semi solid and solids with water as well as metabolic processes (Nnakwe, 2009; Odunga, 2004).

2.10 Conceptual framework

The conceptual framework below illustrates how physiological, psychosocial, social and environmental factors interact together in lowering food intake in elderly hence determining the nutritional conditions in the end. Malnutrition at old age mainly occurs among households and individuals who are not economically empowered. The consequences are serious like any other group, without proper nutrition the bodies remain unhealthy, unable to fight diseases or deal with illnesses which already exist. It weakens the immune system and leaves the old people vulnerable to infections and slower recovery and wound healing. It also leads to weight loss and muscle loss that can lead to frailty, falls and broken bones, disability, loss of independence and disease complications among others. However, these consequences can be

detected if nutritional status are assessed using multidimensional nutritional tools and prevented on time (Guyonnet, *et al*,. 2015).

Undernutrition is as a result of increased body nutrient demands, inaccessibility and affordability of food and traditional beliefs and habits. Other underlying factors such as rural-urban migration of younger counterparts' leads to over eating of foods among this population age category resulting in development of chronic diseases such as obesity, cancer among other chronic illnesses as illustrated in the figure below;



Source: Mwenda, 2010

Figure 1*:* Conceptual model showing interacting factors that impact nutrition status

2.11 Programs existing for the elderly

2.11.1 Nutrition programs

There are relatively few programs that aim at improving nutritional status of the elderly persons owing to the little attention given by the Governments' agendas and priority in Africa. Following the refugees camps in Sudan and Mozambique food relief and supplementary feeding in old people was initiated while others address repatriation and resettlement and post-resettlement (Kimokoti, *et al,*. 2008). In addition, Kenya has programs for elderly targeted to generate income such as sale of commodities, animal and vegetable rearing, as well as relief and HIV/AIDS programs addressing nutritional and health concerns.

2.11.2 Social protection programs

The social security programs provided to the elderly in Africa are in form of earning. This has been noted to be an important way of elevating poverty in the essence improving household food security, nutritional status, and health outcomes. The schemes offered on the other hand effectively have helped mitigate the adverse impact of HIV/AIDS as well as empowering women. South Africa for example, have non-contributory means pension, Botswana universal scheme, Lesotho unlimited universal pension as well as Liberia, Mauritius and Seychelles having flat rate pensions (Kimokoti, *et al,*. 2008).

Kenya has implemented her social protection programs in various ways that is social assistance, social security and health insurance. This is aimed at providing protection on its population against vulnerabilities for examples the case of NHIF and NSSF cover (GOK, 2011). In addition, the constitution of Kenya 2010, guarantees all persons who are unable to support themselves and their dependents a social security. Moreover, apart from the government, other institutions are also involved in the provision of social protection including; private sectors, communities, households and other non-state actors (NSAs).

2.11.3 Other programs

Apart from nutrition related projects and pensions other programs exists that supplement further assessments of the existing programs for example healthcare, housing subsidies, care dependency grants, disability grants and cash transfers.

2.12 Nutrition methodological issues in elderly

Nutritional status of elderly is determined by nutritional requirements and dietary intake. The causes of malnutrition in elderly are multifactorial despite a lack of a single standard tool for nutrition screening. The tools applicable to older populations include surveys, screening,

surveillance or interventions (Guyonnet *et al*.,2015). The nutrition assessment is important therefore, because it identifies the cause of the problem and there after provide a baseline data.

2.12.1 Anthropometric measurements

2.12.1.1Body Mass Index

This is an important tool in evaluating conditions like underweight and overweight. It is obtained by taking weight and height measurements of the respondent (BMI=weight/height in M^2). Conventional BMI cut off points are then used to determine nutritional status that is BMI<18.5 representing undernutrition, BMI 19-24 for normal status and BMI >25 for over nutrition. However, the use of BMI method in assessing the elderly globally remains limited due to physiological changes in aging (Chavarro-carvajal *et al*.,2015; Mwenda, 2010).

In circumstances where the person has vertebral compression, loss of muscle tone, and postural changes, the arm span becomes an alternative estimate for the height. According to literature by Mwenda, 2010 one study found a correlation of (r=0.81 between arm span and height) as well as a BMI and BMA (r=0.99).

2.12.1.2 MUAC measurements

According to researchers this tool has been found to be an alternative for BMI in particular during acute state of emergency. The MUAC measurements are performed by use of a tape measure. However studies in Malawi and Tanzania found an association between undernutrition and functional ability using the MUAC (Charlton & Rose, 2001). Also a London study found a 21.7 cm MUAC cut-off to have 86% sensitivity compared to a BMI of 16Kg/M^2 during emergencies(Mwenda, 2010).

2.12.1.3 Nutritional risks

A side to assessing nutritional status, contributing factors to malnutrition can also be determined using questionnaires. The tool contains questions on the health and wellbeing status of a person, medical problems and diseases, lifestyle behaviors as well as use of healthcare facilities. Further the tool assesses dietary intakes patterns among the elderly people. In the literature by Mwenda 2010, it is said that a person who consumes fewer food types is at a higher nutritional risk. Dietary assessments therefore are important to determine dietary diversity in diets.

2.13 Gaps in knowledge

Nutrient requirements for older people are mostly extrapolated with almost no experience of nutrition interventions for older adults in developing countries. In Kenya no baseline data exists on the nutritional status and health status of elderly people at national and district levels. Operational research is urgently needed to assess the magnitude of nutritionalissues among elderly people, including micronutrient status, and refined techniques for the anthropometric assessment of nutritional status to fulfill the right of older adults to adequate nutrition.

CHAPTER 3: SOCIO-ECONOMIC STATUS AND DIETARY PATTERNS OF ELDERLY PERSONS LIVING IN KILGORIS, NAROK COUNTY KENYA

Abstract

The way of living affects the people's well being and quality of life lived. For elderly people,it requires that they live a life with value, purpose, sense of contentment and ability to function well.Contrarily, Kenya is unprepared to meet these demands as well as surveys carried out have given little research depth concerning theircurrent wellbeing. In Kilgoris, the extent to which these factors influence the wellbeing of elderly people is not adequately documented.

A cross sectional study was conducted among 221 rural elderly respondents in Kilgoris, where demographic characteristics, socio-economic status, dietary patterns and state of health were determined using built in open data kit (ODK) questionnaires and Focus Group Discussion guide.

Statistical data analysis was performed using SPSS version 23 software. The results showed that there were slightly more females (50.2%) than males. Those who were married were 89.7% and 65.6% were illiterate. The levels of illiteracy were significantly high among women (81%) than males (70%) (p value=0.022). The majority of the respondents were also unemployed (72.4%) but sale of animals (42.1%) was the main sources of income reported. Diabetes (65%), hypertension (64%), and teeth problems (62%) were major health issues that affected the wellbeing of elderly persons. In the dietary patterns, majority consumed more than 4 food groups rated as moderate and high. Further there was also a positive association between nutritional status and DDS (p=0.008). Finally, dental problems, disprectful helpers and fear of living alone were issues captured during Focus Group Discussions.

In conclusion, most of the elderly had low socio-economic status and received inadequate geriatric health services. Therefore, there is need to bring health services near to the community and formulate new policies targeting the health needs of elderly people.

3.1 Introduction

The elderly people play an important role in the society through their knowledge and experience that if recognised and tapped as an invaluable resource, it can positively be used as a change for future generations. Also, it will provide them a aplatform of fully playing an active role in the society that will help them retain their independence and an enhance wellbeing (Mwenda, 2010).The concept of wellbeing and quality of lifehas not yet beensufficiently understood by governments in the planning and development agendas while aiming to deliver services to the public. The living status of people affects their well being and quality of life lived (Ngatia *et al*., 2008). For older people, the quality of life lived and wellbeing means that they live a life that has value, meaning and purpose as well as having a sense of contentment and ability to function well (Waweru *et al*., 2003). The indicators to these are illustrated when the older people receive positive relationships, feel the sense of having a purpose and having control over their own lives. However, whenever these individuals experience many challenges compared to the resources they have then their wellbeing is compromised.

Although there is a lack of a proper approach of measuring the wellbeing in older people, a few indicators such as participation, inclusion, independence, healthcare and self fulfillment are helpful in monitoring their wellbeing (Wasie M., 2014). High multimorbidity have been observed to be suffered by the ageing particularly those living in the low income earning countries (Mathew,*et.al*, 2016), this is said to be attributed to factors such as dietary intake, socio-economic and living status. According to Ondigi (2012), the socio-economic status influences food intake as well as wellbeing of elderly persons. These calls for a proper health policy to address the issue among this subgroup.

The government of Kenya has made efforts by preparing a final Draft Policy on Ageing that is in line with the Madrid International Plan of Action on Ageing (MIPAA) and African Union Framework Guidelines (Ondigi M., 2012). However, more effort is required in implementing these national outcome frameworks into practice because older people tend to be faced by an array of issues such as poverty, loneliness, physical disabilities,care, housing among others (Tessfamichael *et al*.,2014). Since the number of the elderly is increasing rapidly, a critical demand pertaining to their health and social concerns raises attention.

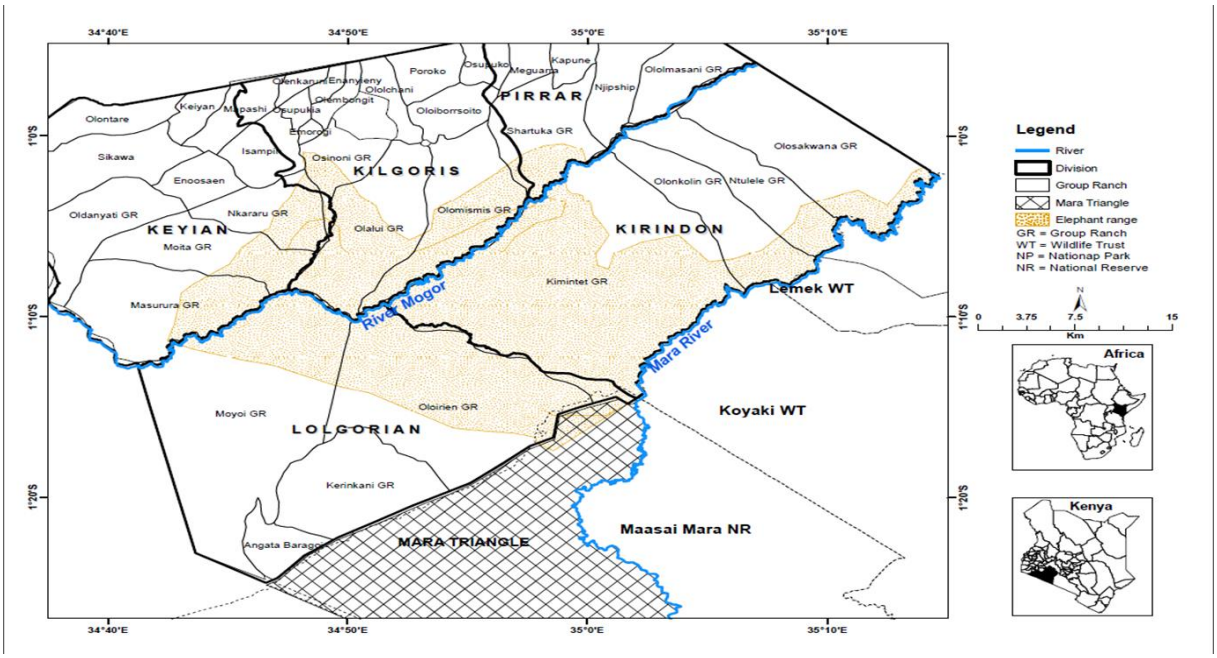
On the other hand, traditional values still hold the idea that children are supposed to support their parents financially (Ondigi M., 2012). Ideally this was meant to help this population group grow socially and economically. However, the fast changing economic status as well as

a boom in rural to urban migration among the youth, has in turn left many of the elderly persons with aburden of taking cate of dependents under their care especially young grand children. Therefore, this study examines the current status and wellbeing of elderly persons in Kilgoris Narok County.

3.2 Methodology

3.2.1 Study area and site

This study was conducted within Kilgoris Central ward, Narok County. The selected locations were Osupuko, Naronyo, Oloshaiki and Meguarra.



Source: Google maps viewed on 16th March 2019

Figure 2: The Map of Transmara showing administrative units of Kilgoris

3.2.1.1. Location and population size

Kilgoris is the capital town of the larger Trans Mara West Sub County, and is located between latitude 0° 50' and 10° 50' South and longitude 34° 35' and 35° 14' East covering an area of 2,858.3 km2. The neighboring regions surrounding the area are Narok to the East, Tanzania to the South and Migori and Kuria to the West while Gucha and Bomet lie on the northern side. According to the 2009 census, Kilgoris had a total population of 274,532 people, with a total of 4,135 residing in Osupuko sublocation. Among them are 1,157 elderly people above 60+ years of age living among the 50,923 households available in the region.

3.2.1.2 Administrative structure

Administratively Transmara west is divided into six wards namely Kilgoris Central, Keyian, Angata Barikoi, Shankoe and Kimintet. Kilgoris central has 32 locations and 67 sub-locations (Kipsisei, 2011) with a mean density of 96 persons per km2, relatively high density for a semi-arid district (KNBS, 2010).

3.2.1.3 Topography and climatic conditions

The topography in Kilgoris consists of the highland and plateau. The lowest altitude rises from 900m along the Mara River to about 1,950 above sea-level around Kilgoris Town. The plateau covers the eastern part of Kirindoni Division and the Southern parts of Lolgorian ward. The Mara River is the main River in the region originating from the Eastern highlands of the Maasai Mau Forest Complex and drains the eastern section of the district. The Mogor River also flows through the region originating from the same source and drain into Lake Victoria. Other rivers include Enkare Onkituak, Shartuka, Olerai and Sitet (Kipsisei, 2011).These rivers and streams form the major sources of water for domestic use among residents since piped water is not yet well established in the region.The rainfall in the district is bimodal ranging from 1000 mm along the Mara River and Kilgoris town with highest of about 1800 mm per year along the Kisii-Trans Mara border. March to May is a period of the long rains while the short rains fall between August and November. Mean annual temperatures in Kilgoris town range from 14.8°C to 20.3°C with January to March temperatures averaging 27°C while August to October average 11°C.

3.2.1.4 Economic activities

Given these favorable climatic conditions in the sub county agriculture and tourism constitute the predominant economic backbone for supporting livelihoods in the region.Land tenure is one of the important factors that influence natural resource management in the district. Land occupation is in three categories; the group ranches, privately owned land and community land tenure. Private land is predominant in the highlands while group ranches and trust lands are found in the lowlands. The ongoing sub-division of the group ranches into individual parcels has influenced land use patterns. About 66 % of the land in the district is communally owned and used for ranches. Ecologically sensitive areas including forests and hills are set aside for communal benefit. The Maasai are largely livestock herders while the Kipsigis combine livestock and crop farming. Settlement is sparse in livestock rearing zones compared to the crop growing areas. The Abagusii are involved mainly in cultivation through leasing. The main food crops are maize, beans, millet and vegetables. Sugarcane is grown in Keiyan

Division as a cash crop. The Mara Triangle famously known as the seven wonder of the world is also located in Trans Mara Sub County. This is a major tourist attraction in the region. Most pastoralists who rely on natural pastures and water face competition from wildlife (Kipsisei, 2011; Sitati, *et al*.,2006)

3.2.1.5 Health services

Most basic social services exist although accessibility remains a critical problem. Health services are accessed majorly through the sub county referral hospital (Transmara referral hospital), although other private hospitals are also operational such as St Joseph Mission Hospital. Despite the presence of these substantial health facilities, most lack adequate infrastructure, drugs, equipment and trained personnel to attend to some of the medical needs of the patient.

3.2.1.6 Road accessibility

Road accessibility is critical since most roads are impassable especially during the rainy season hence hampering accessibility to basic necessities. For example, a large proportion of the population (70 per cent), still travels for more than 5 kilometres to access the nearest facilities. In terms of electric connectivity, a total of 9,903 households were connected to the electricity grid (County Government of Narok (2013-2017)

3.2.2Study Design

The study design was cross-sectional in nature with a mixture of qualitative and quantitative approaches.

3.2.3 Study Population

The sampling unit for this study comprised households with elderly persons 65 years and above who resided in the rural parts of Kilgoris participating in the study.

3.2.4 Sampling Procedure

3.2.4.1 Sample Size Determination

Sampling size determination was calculated using Fisher formula for a population less than 10,000 (Fisher, *et al*.,1991). The prevalence rate was upon the 20.5 % global malnutrition of elderly people indicated in Turkana nutrition and socio-economic assessment (Odunga, 2004), given that the level of malnutrition among the elderly in Kilgoris is unknown. The sample size was as follows:

$n= (z^2pq)/d^2$

Given:

n = the expected sample size given a population of greater than 10,000

z =1.96 (standard normal deviate usually set at 1.96 corresponding to 95 % confidence interval)

p=0.205 (the proportion of elderly estimated to be malnourished 20.5 %)

q = 0.795 (1.0-p)

d = 0.05 (the degree of accuracy desired)

Thus;

n=1.96^2*0.205*0.795/ 0.05^2

n =250

Since the population of elderly people in Kilgoris Central is 1,157 which is less than 10,000 the final sample size was adjusted using the formula shown below;

nf = n / (1+ (n/N))

nf = the desired sample size (when the population is less than 10,000)

n = the desired sample size (when the population is more than 10,000)

N = the estimate of the population size (1,157)

nf = 250/1.22

=204+5 % attrition

=214

A total of **214** elders were sampled in the study.

3.2.5 Sampling Procedure

The sample size was obtained through multi-stage sampling since it involved a wide geographical area (Sub County) to the villages using administrative locations. The first stage was purposive selection of Trans Mara West sub county, Kilgoris Central Ward based on the larger numbers of elderly people 65 years and above than other wards (Narok, n.d.). This large numbers increases the probability of obtaining a sufficient sample size required for the study. Second stage involved purposive selection of locations and four locations Osupuko,

Meguarra, Poroko and Oloiborsoito were selected since the study design focused on rural setting. Two sub-locations were selected purposively in all the sub-locations including (Poroko and Oldonyorasha), (Olenkoloto and Meguarra), Kilutori, Shartuka, respectively, except Osupuko location where 3 sub-locations were selected (Osupuko, Naronyo and Oloshaiki). Thereafter the selection of villages in each sub-location was done through a random sampling technique by writing down names of all villages in small pieces of paper then folded and placed in a bowl from which two villages from each sub-location were obtained. This happened in all the nine sub-locations yielding a total of 18 villages. Finally, households' selection was done by snowballing sampling technique with the help of local leaders from the sub-locations, directing to households with person 65 years and above since they were aware of the households with elderly persons in every village.

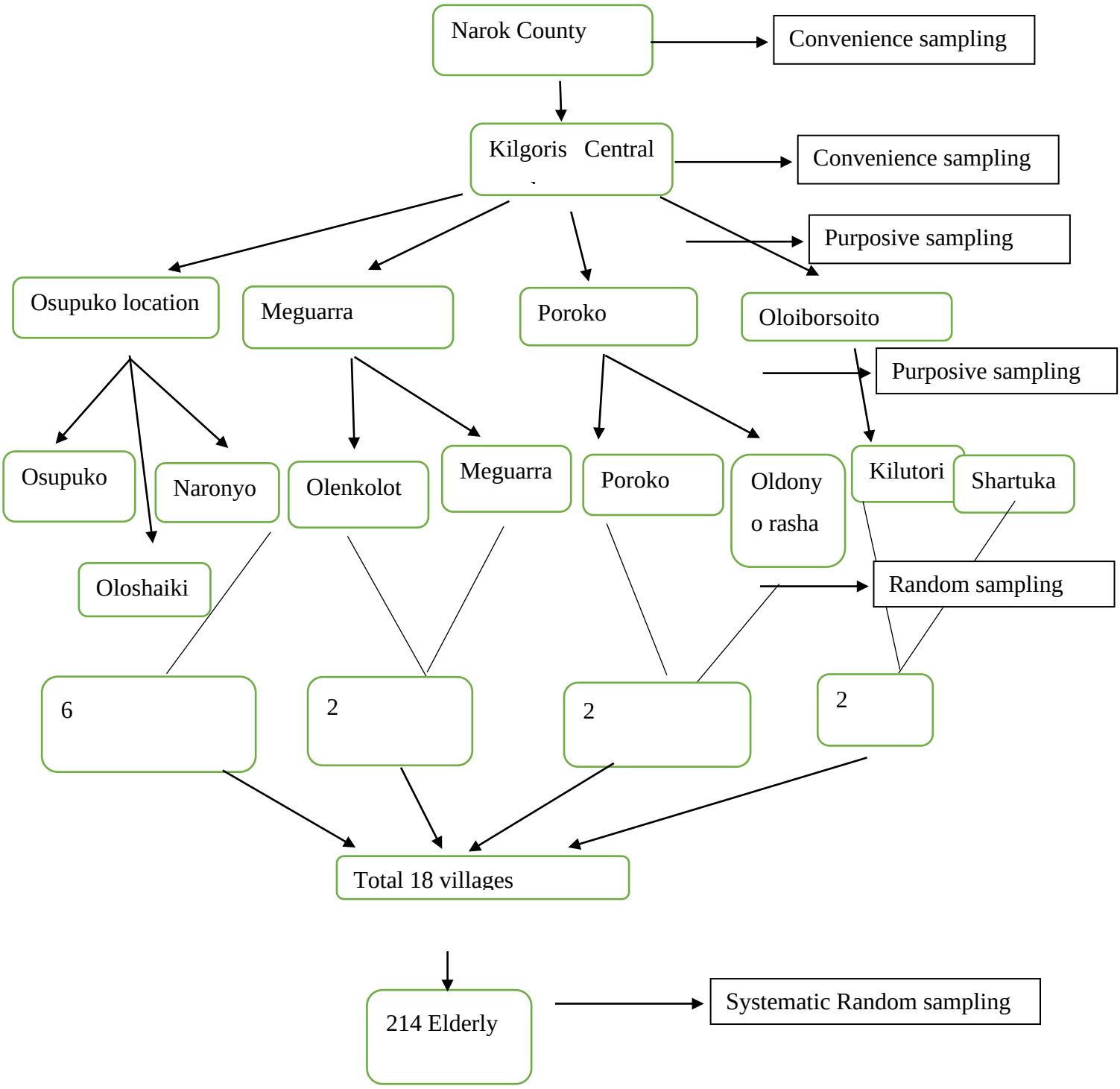


Figure 3:Sampling schema

3.2.6 Inclusion Criteria

The inclusion criteria included households with elderly persons aged60 years and above.

3.2.7Exclusion Criteria

Elderly persons who were disabled or completely bent hence would be difficult to take their anthropometric measurements, persons who were too weak, or bed bound. Those elderly persons who declined to consent were also excluded from the study.

3.2.8 Data Collection Tools and Methods

The research mainly used questionnaires to collect quantitative data while Focus Group Discussion (FGD) question guide was used to collect qualitative data.

3.2.8.1 Questionnaire

The questionnaires were semi-structured in nature and contained information on socio demographic characteristics and healthcare information regarding vulnerability to sickness in the past one month, care, transport,most common diseases,visit to a health facility, ability to take medications and dietary habits. However before the beginning of the interviews, the elderly persons were briefed on the objective of the study and their willingness to participate or withdraw from the study at any stage and this was achieved by obtaining a consent from each study subjects.

3.2.8.2 Focus Group Discussion

This was used to collect qualitative data. One focus group was conducted comprising of a total of 6 participants (including both male and female elderly persons) from the community and whose households have been excluded for the survey. A list of topics and question areas to be covered were prepared to collect quantitative data about the social participation, family care and coping strategies were sought. The group also consisted of a principal moderator who lead the interview session in assistance of two other note takers both residing within the community.

A condusive place was first identified away from any destructions that would disrupt concentration, then introductions were done for familiarization and the purpose of the group discussion stated for clarity.

3.2.9 Ethical Considerations

Ethical clearance wassought from the Kenyatta National Hospital and University of Nairobi Ethics and Research (KNH-UON) Committee. Authorization from the local authorities was also sought before the beginning of the research. Consent from the participants required them to sign the forms or state so verbally after a clear explanation of the research objectives.

Confidential information regarding the participant was handled with care with assurance given to those who consented. Also the participants were informed that there were no incentives provided for participation.

3.2.10 Recruitment and Training of Research Assistants

3.2.10.1 Recruitment

The recruitment of interviewers was done through the help of Chiefs and Assistant Chiefs, the eligibility criteria being a holder of a Kenya certificate of Secondary Education Certificate, resident of the local community, fluently speak the local language and possess excellent communication skills.

3.2.10.2 Training

After selection the enumerators were trained for two days. The training included the following:. Brief introduction to the present research study, discussion on handling and administering questionnaires especially the importance of clarity when asking questions,handling the respondent in case of giving confidential information and importance of observing research ethics while in the field.

3.2.11 Pilot study

A village next to the one included in the study was selected and 10 households were used to pre-test the questionnaires. This was mainly important to ensure a proper familiarization to the questions, using measuring tools and knowing how much time it could take to fill each questionnaire by the researcher and its assistants. The feedback generated from the pretesting was redefined accordingly by the research supervisor and used to modify and validate the appropriateness ofthe tools .

3.2.12 Data Quality Control

Research assistants were trained on standardized data collection methods particularly on feeding information in questionnaires and proper use of research instruments in overcoming observer errors.

Questionnaires were prepared in English phrased in a simple, clear language that is easy to translate into the local language and easy for comparison on consistency before the actual data collection. Further the questionnaires were pretested on 10 households on similar population who are not part of the actual sample and changes made.

Field assistants obtained proper training on administering and filling of questionnaires, interpreting and translating into the local language.

Informed consent forms for the participants was issued as well as assurance of their confidentiality in the final report by observing ethical principles, rules and conventions in conducting social science research. Respondents were first informed of the nature and purpose of the research. Secondly, respondents were asked to participate out of their own consent without any coercion and they have the right to pull out at any time if they so wished.

Lastly, the research was conducted with full knowledge and permission of government authorities.

3.2.13 Data Management and Analysis

3.2.13.1 Data entry and cleaning

Data was entered into the computer. However data coding, cleaning and validation was performed to get rid of any outliers which would likely affect the means.

3.2.13.2 Data Analysis

Statistical Package for the Social Sciences (SPSS version 20) was used for analysis. This included descriptive analysis to find out frequencies, means, standard deviation and proportions for socio demographic and economic characteristics. Ghaphical presentation was done using Excel. Chi-square analysis was also used to test the association of different variables that were not normally distributed.

Focus group discussion guide was analysed manually, triangulation done and conclusions drawn from the findings.

3.3 Results

3.3.1 Socio-demographic characteristics ofelderlypersons in Kilgoris

3.3.1.1 Marital status

A close to half of the study participants were in marriage (48.4% of the men and 40.7% of the women). However, 9% of the women were widowed compared to only 1.4% of the men. Those divorced were negligible (Figure 4).

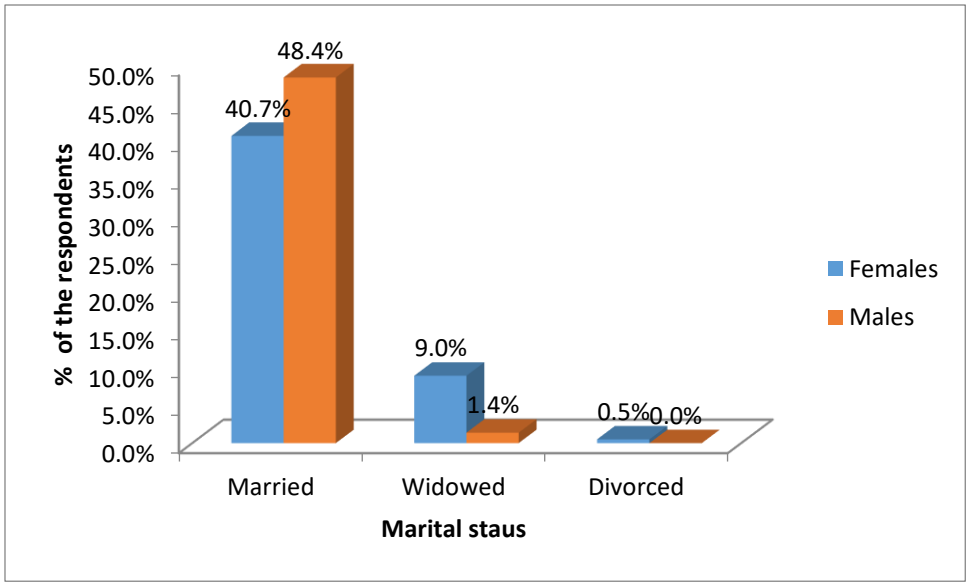


Figure 4: Distribution of respondents by marital status in Kilgoris

3.3.1.2 Age distributionamong the elderly

The age of the elderly people studied was regrouped into 5 main categories (Table 1), but, there was no statistical difference in the age categories for both men and women (p> 0.005). Majority of study participants were aged between 60 and 70 years (Table 1).

Table 1: Distribution of respondents by age groups

	Females		Males			
Age category	n	%	n	%	X^2-value	p-value
60-70	86	77.5	71	64.5	4.941	0.1764
71-80	12	10.8	22	20		
81-90	12	10.8	16	14.6		
90+	1	0.9	1	0.9		

3.3.1.3 Literacy level of the respondents

In terms of literacy, majority of the respondents never went to school (65.6%), 13.1% had primary education, 4.9% secondary and tertiary education while 3.1% had University education. There was a significant difference in the distribution of male and female education (p=0.022) with more women being illiterate compared to men (Table 2).

3.3.1.4 Type of home ownership

The main type of home ownership was self-owned homes (97.3%) of which majority of their houses were mud walled (82.2%), 80.1% had earthened floor and 82.8% were roofed with iron sheets. The building materials did not significantly differ with gender (p-value 0.539).

Table 2: Education level and home ownership of respondents

	Females		Males				
Characteristic	n	%	n	%	Total (%)	x^2	p-value
Education level						14.79	0.022
Never went to school	79	81	66	70	65.6		
PrimaryEducation	17	17	12	13	13.3		
Secondary and Tertiary	2	2	9	10	13.1		
University	0	0	7	7	4.9		
Type of home ownership						1.237	0.539
Self -owned	109	98	106	96	97.3		
Rented	0	0	1	1	0.5		
Hosted for free	2	2	3	3	2.2		
Material building walls						1.041	0.954
Mud	98	88.3	97	88.2	88.2		
Brick	13	11.7	12	10.9	13.1		
Timber	0	0	1	0.9	0.5		
Roofing						1.079	0.195
Grass	22	19.8	16	14.5	17.2		
Iron	89	80.2	94	85.5	82.8		
Floor						0.137	0.42
Earthen	90	81.1	87	79.1	80.1		
Cement	21	18.9	23	20.9	19.9		

3.3.2 Socio-economic status

3.3.2.1 Sources of income

The main sources of income were from sale of animals (42.1%), a close(21.7%) relied on crop farming, 18.5% depended on gifts from relatives while 13.1% were on pension (Table 3).

3.3.2.2 Livestock ownership

There was a significant difference in ownership of livestock between men and women (chi-value=6.91, df=3, p-value=0.075). More men owned cows (57.3%) compared to women (54.1%) but by a small margin (Table 3). The proportion of animals least owned were; donkeys and chicken that were owned by 12.2 % and 14.9%, respectively.

3.3.2.3 Household monthly income

More than three quarter (87.3%) of elderly persons earned a monthly income of between ksh100 (USD1) and ksh 20000 (USD200). There was a significant difference between the males and females (p-value <0.005). Men generally earned higher incomes than women (Table 3).

3.3.2.4 Occupation type

Most of the respondents were economically active (Table 3). However, the type of occupation differed significantly between the genders (p=0.000). About than three quarter (72.4%) had no formal employment. The number of women with informal employment was slightly higher to that of men (74.8% and 72.4%), respectively. Those in employment included; farming 11.3%, 10% dependent on pension and 5.8% were small scale traders. The women were less engaged in forms of employment compared to the men, except involvement in farming.

3.3.2.5 Wealth index

This study first established the living standards of the respondents using the Principal Component Analysis of about nine household assets owned by the elderly persons such as television, car, cell phone, plot, motorcycle, and bicycle among others. The ownership of nine household assets was narrowed in two dimensions namely; low wealth index and high wealth index. The results indicate that slightly more than half of the respondents (51.1%) were classified in the high wealth index (Table3). However, there was no significant difference between wealth indices (p>0.05).

Table 3: Socio economic status of the study respondents by gender

	Females		Males		Total (%)	X^2 value	p-Value
	n	%	n	%			
Income sources						**13**	**0.071**
Salary	4	3.6	5	4.5	4.1		
Pension	11	9.9	18	16.4	13.1		
Sale of animals	45	40.5	48	43.6	42.1		
Crop farming	30	27	18	16.4	21.7		
No income	5	4.5	0	0.0	2.3		
Gifts from children/relatives	15	13.6	21	19.1	16.2		
Business	1	0.9	0	0	0.5		
Ownership of animals						**6.91**	**0.075**
Cows	60	54.1	63	57.3	55.7		
Goats/sheep	26	23.4	12	10.9	17.2		
Donkeys	11	9.9	16	14.5	12.2		
Chicken	14	12.6	19	17.3	14.9		
Household monthly income(USD)						**5.115**	**0.077**
Lower (<2)	101	91	92	83.6	87.3		
Middle (2.01 to 4)	9	8.1	11	10	9		
Upper (>4.01)	1	0.9	7	6.4	3.6		
Wealth index						**1.638**	**0.201**
Low wealth index	59	53.2	49	44.5	48.9		
High wealth index	52	46.8	61	55.5	51.1		
Occupation						**50.85**	**0.000**
Unemployed	83	74.8	77	70	72.4		
Pension	3	2.7	19	17.3	10		
Farming	25	22.5	0	0	11.3		
Small scale trade	0	0	14	12.7	6.4		

3.3.2.6The health status of the elderly persons

Table 4 demonstrates health status of respondents. About 66.5% had been ill, two weeks preceding the interviews. The top most common prevalent diseases were diabetes (65%) and hypertension (64%). Those who consumed alcohol were 40% while tobacco sniffing and cigarette smoking were (10% and 5%) respectively. The respondents who required assistance

in performing daily activities were more than three quarter, with 77% requiring help in fetching food from the source and preparing food (50.7%). When they were asked whom they gave priority during food shortages, 74% of them said their own children while 13% said their own selves.

Table 4: Health status of the elderly persons

Characteristic	Number (n=221)	Percent
Ill the last one month		
Yes	147	66.5
No	74	33.5
Most common disease suffered		
Backache	91	41
Joint pain/athritis	118	53
Poor eyesight	122	55
Diabetes	144	65
Hypertension	143	64
Dental problem		
Yes	137	62
No	84	38
Great Social economic fear		
Living alone	78	35
Physical disability	30	13
Loss of children/spouse	75	33
Loss of land	13	5.9
Needs assistance inperforming daily activities		
yes	214	96
No	7	3
Health behaviors		
Smoking	12	5
Taking alcohol	89	40
Sniff tobacco	24	10
Food shortage		
Yes	164	64
No	57	25
Use of over the counter drugs		
Yes	155	70
No	66	29
Traditional cure		
Yes	146	66
No	75	33

3.3.2.7Transport, care and social participation

More than half (54%) of the participants walked by foot while accessing health facilities or when going to attend other daily activities compared to 39% who used motocycles (Figure 5). Those who entirely relied on their children were three quarter compared to 13.1% and 11.3%, respectively who relied on relatives and brothers/sisters for financial support (Figure 6). Contrary to the expectations, no support from Community Based Organisations (CBOs) was reported while a about half of the respondents engaging in religious and cultural activities (Table 5).

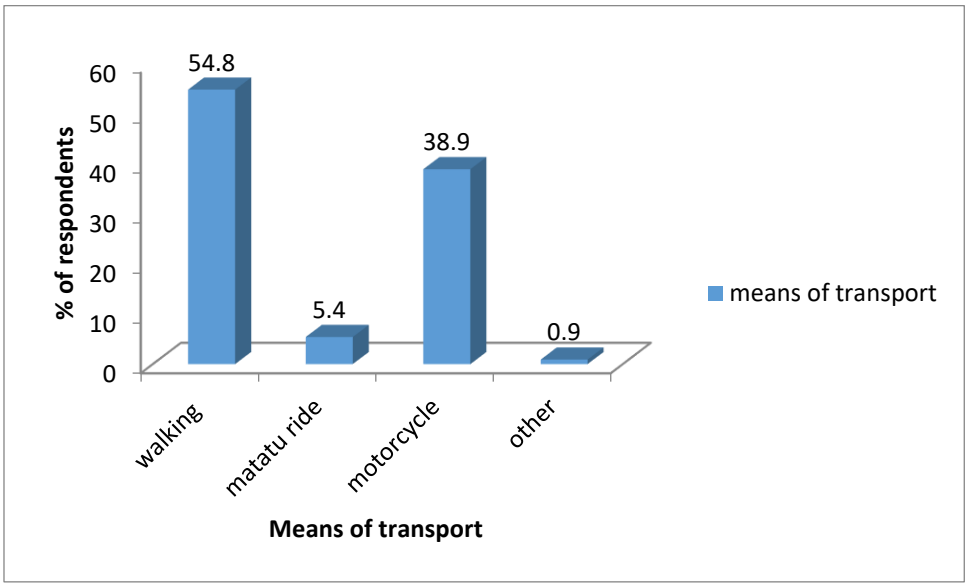


Figure 5: Distribution in means of transport

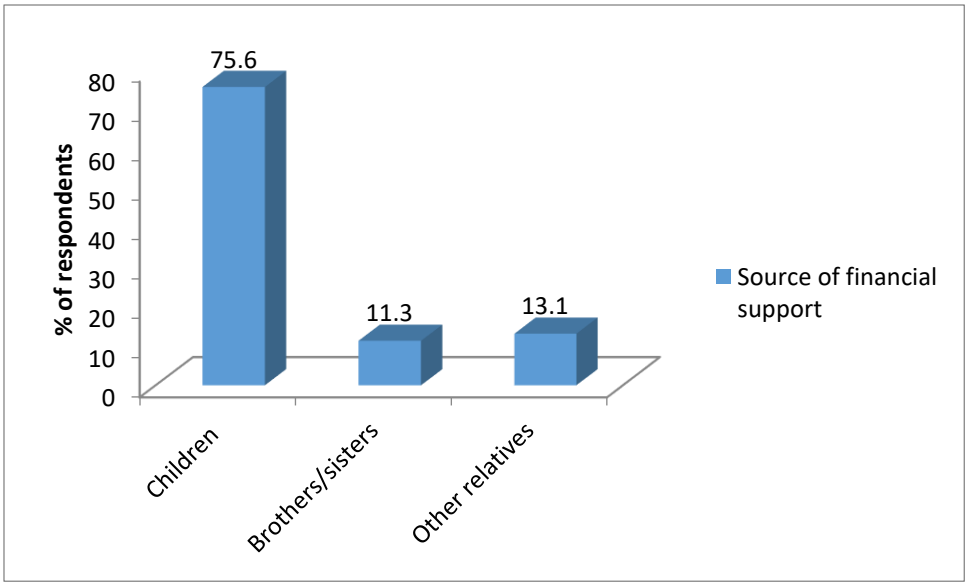


Figure 6: Distribution of respondents by financial support

Table 5: Distribution of respondents by social participation

Characteristic	Frequency	Percent (%)
Religious activities	**112**	**50.6**
Males	54	24.6
Females	58	26
Cultural activities	**95**	**43**
Males	15	7
Females	80	36
Political activities	**14**	**6.4**
Males	8	3.6
Females	6	2.8

3.3.2.8 Dietary diversity and nutritional status

This was derived from 12 respective food groups consumed within 24 hours of recall. The results showed that there was a positive association between nutritional status and DDS (p=0.008). Majority consumed more than 4 food groups; ranked as moderate and high (Table 6).

Table 6: Distribution of Dietary Diversity Score (DDS) by nutritional status of respondents

Dietary diversity	Low (%)	Moderate (%)	High (%)	Statistical test
Underweight	30.4	62.4	7.2	Fischers exact (25.475)
Normal	9.3	69.6	21.1	p=0.008
Overweight/obese	5.0	29.4	65.6	correlation r=0.684

3.4 Discussion

3.4.1Characteristics of the study elderly population

Among the demographic consequential trends underway in the world today is the ageing population and this calls for societies, families and individuals to prepare for and manage it.The size and composition at household level was first established with the aim of describing the context at which the study was carried out. The mean household size was 3.2 which is slighltly lower than the national figure of 5 (CBS, 2004). This can be attributed to that fact that the sample selected for the survey was only respresentative of the elderly persons and not the whole population. There was also a higher proportion of females than males confounding with the previous studies in Meru and Nyanza, indicative of the high number of females globally among the ageing population as well as alonger life expectancy given to females compared to males (WHO, 2015). There was also a high number of widows than widowersin the present study. The results are consistent with Aganiba *et al*.,(2015) findings in Ghana, that found high number of widows. The high number can be explainedto the fact that longer life expectancy is accorded to females than males.

Out of 221 respondents 89.1% were married majority being males and only a neglible percentage divorced (0.5%). Previous studies revealed that marriage significantly determined the psychological and emotional health of a person in later life (Aganiba *et al*.,2015) thus, a high life expectancy. This is because the availability of a marriage partner is a source of support and adds a sense of affection in later life. According to this study the demographic profiles can be attributed to the fact that majority of elderly men remained married till death.

3.4.2 Socio economic status of elderly people

Socioeconomic status is a strong determining factor of one's health and wellbeing in the future because it influences many aspects of a person's daily live. Considering factors such as, occupation, education and monthly income the results of the present study reveals that majority of the respondents earned an income of less than Ksh 20000. The findings are consistent with a study done in Nyanza where majority of older people were found to live below the poverty threshold of 1 dollar per day (Ondigi, 2012). Ideally these resource are limited and the daily needs are overwhelming which can have an affect on wellbeing (Ondigi, 2012). The results can be attributed to the fact that at old age income generating activities are likely to rapidly decline as a result of physical disabilities that increases at old age.

The study revealed that majority of the elderly respondents were not employed and therefore, many resented on the sale of animals as an income generating activity. Those on pension were only 10% therefore many could not meet their daily needs. Assessing the source of income in this study was important since it enabled us understand how the elderly population met their daily basic needs and wants. For many individuals employment provides a proper mechanism of evading poverty, also work is associated to good a source of satisfaction in one's life and social esteem. The findings are in line to (Mwenda, 2010 and Odunga, 2004), that revealed that majority of elderly persons were unemployed and were reliant on sale of animals to cater their daily needs. This can be attributed to, health related issues and reduction in physical body mass loss that occur mostly at old age therefore, employment no longer become the mainstay source of income.

Although global levels of education have risen significantly over the past years, illiteracy levels in this population cohort still tend to be high. About 65% reported no single form of formal education. This is slightly below the earlier reports by UNESCO (2005-2007) that reported 71% of global illiteracy levels among the old cohorts 65years and above. The low attainment in females might be argued to the fact that the old traditions and cultural beliefs in Kenya held that a boy child be given priority in terms of education than the girls, also given the fact that the study was carried out in the rural areas where low educational attainments are lower than urban areas. However, literacy rates are likely to grow much better among the next generation ageing due to better education currently being gained.

3.4.3 Challenges impacting the wellbeing of elderly persons

According to the vision 2030, the elderly populations were identified as a vulnerable group faced by numerous challenges ranging from need for care, poverty, transport, family and

community support among others. Similar to other countries, Kenya is not prepared enough in welcoming this increasing population cohort. The current study observed that poverty, illnesses, social isolation, health seeking behaviour and living conditions were significantly key in influencing the wellbeing of old people in the study area. In a review by United Nations Department of Economics and Social Affairs (2011), a strong association between poverty and unemployment was noted among the aging in developing countries. Cymru, (2014) further significantly noted that over a quarter of persons aged 65 years and above in Wales were unable to meet their daily needs. Access to goods and services was a greatest concern for the respondent. The Kenyan government has however, put efforts in addressing poverty in older people through the Cash Transfer Programme. Upto date only 203,111 households have been reached locking out a majority of older people. The present study revealed a significant numbers of respondents were worried of the overwhelming needs and others even forced to cut back on important commodities such as food, fuel and social activities.

Results from this study showed that 97% of the respondents lived in self owned homes although 82% of were made of mud wall and earthened floor (80%), despite the number of policies adopted by governments in ensuring the safety of the elderly people.The results are in line to a literature cited by the UK National Housing Federation, (2011) where 15% of older persons are reported to get hospitalized everytime as a result of poor housing conditions. It's crucial then, that the governmement should ensure safe, comfortable and adaptable housing conditions be secured for them because, poor housing conditions contributes to the poor health and wellbeing in older people. The results further revealed a significant proportion of respondents partcipating in religious (50%) and cultural(67%) activities. Care primarily contribute in a persons physical, mental, spiritual and wellbeing.At old age its said to reduce due to disabilities, poverty or even a loss of a spouse thus defining the quality of life lived and wellbeing. Ahmad *et al*., (2011) and Quadagno,(2002) argued that religion significantly impacted older peoples lives as a way of dealing with depression and spiritual nourishment. James et al., (2011), noted a significantassociation between socioeconomic status and social participation especially among the males.In addition, social isolation has an impact on the elderly peoples' health and to worst even leading to death. According to Shankar *et al*.,2011 and Foroushani *et al*.,2014, they argued that isolation determined the utilization of healthcare, access to food, disability, loss of moods and feelings. This therefore, explains the high dependency on the children observed for financial support and from the focus group

discussions where many mentioned the fear of ‘living alone’to be a burden. The government thus, needs to deploy interventions that will help curb loneliness and promise a better future for elderly people.

3.4.4 Health status

The health status among the aged ranges from vulnerability to diseases, hardships and dietary conditions. It’s evident from the present study that majority of respondents experienced illnesses lead by diabetes (65%) and 23% experienced declined food intake. According to UNDESA (2014), cardiovascular diseases greatly increase with old age contributing to a larger share of the overall diseases thus requiring advancements in healthcare systems. In this study, the respondents used alcohol, sniffed tobacco and used over the counter drugs (40%, 10% and 70%), respectively, had poor health status compared to those that were not using. These results are similar to a sub-Saharan survey done by Kimokoti *et al,*. (2008) where 44% of elderly persons in Kenya suffered from Cardiovascular diseases which is attributed to the lifestyle habits such as smoking, eating habits, overweight and lack of exercise.Nevertheless this is also an anciently known community believed to use traditional herbs in curing diseases. From the study a significant number (66%) used traditional medicine for cure. The results are contrary to Waweru, (2003) findings where he found a reduction in the number of traditional herbalist in Kenya. The findings can be attributed to inexistence of special health services for geriatrics as well as the low socioeconomic status held that accrued from lacking finances hence resenting for traditional cure.

The Feedback obtained during the interviews reveals that there were concerns over affordability and accessibility to major towns in search of medical attention. More than half of them reported of infrequent services to have greatly impacted their appointments with the doctors and also the longjourneys were stressful. The resultsconquer with Metz (2000) and Spinney *et al*.,(2009), who are in support of an existing relationship between mobility and quality of lifeat old age. They cited an evidence that showed the benefit of travel to health and wellbeing. Mackett (2015) on the other hand, argued thattransport helps the old people contribute in major activities such as social activities, visitations and shopping. Therefore this justifys the need for concerned participants to consider the mobility implications when making decisions that ensures transport services are availed to the older people. The pesent study also showed that 62% of the respondents had tooth issues and 74% have experienced food shortages revealing the risk associated with reduced food intake. This findings are in line with Shantia *et al*.,(2011) that found an association between dental problem and food intake

although its literature revealed three studies that did not finda significant association. The results can therefore, be attributed to nutritional problems that have effect on the health status such as tiredness, depression and decreased appetite which are detrimental to health.

3.4.5 Dietary patterns and nutritional status

From the study, carbohydrates and proteins nutrient requirements were the only met in the foods consumed. Starchy staples were highly consumed diets on a daily-basis i.e *ugali* and rice (56% and 54%), respectively. Proteins was mainly derived from animals and daily intake was also high explaining the total percentage that met protein requirements. The findings are similar to those of a research carried out in Rwanda where starchy staples were found to dominate the dietary patterns (Bulirani, 2018). These frequencies can explain the percentage of carbohydrates fully met by respondents in terms of preparation and dental status which determines the overall result of the food (texture). This study suggests that the dietary pattern can be attributed largely on locally available food items and cultural taboos that inhibit communities from consuming certain foods as well as the high prices that most rural households do not meet. Perhaps, this study reinforces previous findings where inadequate portion sizes with regard to nutritional requirements or probable nutrient losses following the mode of preparation.

3.5 Conclusion

The health status and wellbeing of the elderly people in Kilgoris is poor. The wellbeing is attributed to factors such as low socio-economic status, while health status is associated to poor health-seeking behaviours like use of over-the-counter drugs, as well as social, physical and psychological challenges faced.

3.6 Recommendations

Thereby, there is need for it's our role both as the government and the society to give back to elderly these people by making them feels that old age is not a burden but enjoyment. This can be achieved by;

1. Availing services to them such as free medical camps, rehabilitation and recreational centres.

2. Prioritising interventions that will provide pension to all older people, income generating projects, geriatrics services and adequate drugs to the elderly people.

3. Incoporating partnership between the government and other organizations in program development for elderly people and research.

CHAPTER 4: FACTORS ASSOCIATED WITH NUTRITIONAL STATUS IN ELDERLY PERSONS LIVING IN KILGORIS NAROK COUNTY

Abstract

Kenya is currently experiencing an increasing number of elderly people creating a challenge of meeting their nutritional needs. The magnitude of malnutrition in this population group at Kilgoris is underreported. This study therefore, aimed at determining the nutrition status, nutrient intake of elderly people and estimated risk factors associated. Across sectional study survey was carried out in the rural areas of Kilgoris among 221 household members (60 years and above). Data was collected using ODK questionnaires and anthropometric measurements taken using standard procedures. Dietary patterns were determined using Food Frequency Questionnaires, Dietary Diversity Score and 24 Hour Recall tools. Data analysis was performed using SPSSv23 software. The BMI results showed that majority had normal nutritional status (61%) although, underweight were13% and overweight/obese were 26%, however, there was no significant difference between males and females (p-value=0.286). Logistic regression analysis indicated that overweight /obesitywere associated with high wealth index (odds ratio (OR) =2.82), owning means of transport (OR= 1.78), anddentalproblem (OR=4.16). Education attainment (OR=0.33) and earning pension (OR=0.14) were however, significant protective factors to overweight/obesity. The factors for underweight were mental health issues (OR=0.00) and immobility (OR=1.09). Most of the Recommended Daily Allowances (RDAs) for various nutrients were not met except carbohydrates (100%) and proteins (95%). Therefore, there is need for governments to develop interventions that would lead to frequent assessments' of malnutrition in older people and intensive research on micronutrient status that still largely remain unmet through diet.

4.1Introduction

According to the United Nations2015 statistics report, the number of people aging in the world is fast growing with projections estimating an increase of upto 1.4 billion in the year 2030. In Kenya, the 2019 Population and Housing Census survey revealed a total of 1.9 million people 65 years and above (KNBS, 2019). Clearly this denotes preparedness in terms of the changing demographic trends, the challenges faced and major issues that effectively need to be addressed Malnutrition and nutrient deficiency is inevitable at old age (Hickson, 2006). The cases of malnutrition are however, true due to the naturally occurring changes that take place during aging. This occurs when the body cannot sufficiently receive the right amount of nutrients in performing its daily functions.

It's however difficult to distinguish the exact root cause of malnutrition of this population group but the FAO has it as a whole chain of factors interacting together (FAO, 2013). First and foremost aging is accompanied with a loss in body mass, reduced body weight, impaired immune function and diminished sense of taste and smell (Caroline, *et al*,. 2013). All these factors together pose the danger of nutritional risks. On the same note, the WHO highlighted most of the elderly people especially in developing world to welcome old age after a lifetime of poverty, frequent food shortages that limits the quantity and quality of food to consumed as well as nutrient inadequacies' that lead to under and over nutrition (WHO, 2002).

The consequences of malnutrition are psychological, biochemical and physiological ranging from reduced immunity, body muscle loss, change in mood and attitude or decreased social participation among others (Tessfamichael, *et al*.,2014). However, in cases of adverse manifestation, clinical interventions may be surpassed and the latter can lead to irreversible damage such as deaths (Nnakwe, 2009). Obesity at old age has been linked with some chronic diseases including hypertension, diabetes and arthritis, and the worst being a loss of lean body mass with excessive fat deposits (Lartey, 2011).

If poorly diagnosed, nutritional problems among the elderly people are capable of causing morbidity and mortality. For proper diagnosis and management sufficient knowledge is required to take preventive measures, therefore, the aim of this study was to identify the factors associated with nutritional status among elderly people living in Kilgoris Narok County.

4.2Methodology

4.2.1 Study setting and sampling Procedure

Study setting and sampling was carried out as outlined in sections of Chapter 3 i.e. study area and site, study design, study population and sampling procedure.

4.2.2 Inclusion criteria

The inclusion criteria included households with elderly persons both male and females within the selected age category. The main respondent was an elderly person at the time of the study.

4.2.3 Exclusion criteria

Elderly persons who were disabled or completely bent whose measurements could not be taken completely, who are too weak, who are bed bound and elderly person who declined to consent.

4.2.4 Data collection Tools and methods

The following tools were used during the research namely questionnnaires, anthropometric measurements,electronic weighing scales, stadiometers and 24 hour recall method.

4.2.4.1 Questionnaire

The questionnaires was semi-structured in nature and contained information on socio-demographic characteristics and information regarding dental issues, support systems,dietary practices, medication use and lifestyle based on developed literatures. However, before the beginning of the interviews, the elderly persons were briefed on the objective of the study and their willingness to participate or withdraw from the study at any stage and this was achieved by obtaining a consent from each study subjects.

4.2.4.2 Anthropometric measurements

Weighing scales and stadiometers were used to measure weight and height of the respondents according to the WHO guidelines, respectively. This included taking measurements in duplicates, calculating the average and recording to avoid unnecessary errors as well as having individuals dressed on light cloths and standing barefooted.

4.2.4.2.1 Weight Taking Procedures

Weightwas measured using a weighing scale and measurements read to the nearest 100gm (0.1kg) to obtain quality readings. The study subjects stood unsupported, upright, feet placed together and weighed while on light clothes and with no shoes at all. The scales were checked

daily by measuring a known object or weighing a team member to ensure that they were efficient.

4.2.4.2.2 Height Measurement Procedures

Height was measured using a stadiometer against a vertical wall with subjects standing upright and without shoes; the readings were read to the nearest 0.5 cm from where the skull begins to fold. The subjects were then asked to stand upright with their heels, buttocks, shoulders and the back of their head against the stadiometer. While each participant looking straight ahead at a horizontal plane, a headpiece was lowered to touch the crown of their head gently but firmly and the readings recorded in duplicates whereby the average obtained was recorded (NHANES, 2007).

4.2.4.3 24-hour dietary Recall

This method considered that the elderly person is capable of recalling past foods consumed for the last 24 hours. The respondent were asked to mention the kind of foods they had consumed under each group in the past 24 hours.

4.2.4.4 Food frequency questionnaire

A list containing 12 food groups i.e. cereals and cereal products; milk and milk products;

sugar and honey; oils / fats; meat, poultry and offal; pulses; roots and tubers; vegetables,

fruits, eggs, fish and sea foods; miscellaneous (spices, chocolates, sweets, beverages etc) was used to assess the frequency of foods consumed by households within 24 hours of recall. This equally involved naming of foods by the respondent including the one consumed by the other household member

4.2.5 Ethical Consideration

Research permit was obtained from the Government of Kenya while ethical clearance wassought from the Kenyatta National Hospital and University of Nairobi Ethics and Research (KNH-UON) Committee. Authorization from the local authorities was also sought before the beginning of the study. Consent from the participants required them to sign the forms or verbally after a clear explanation of the research objectives.

Confidential information regarding the participant was handled with care with assurance given and those who consented. Also the participants were informed that there were no incentives provided for participation.

4.2.6 Recruitment and Training of Research Assistants

4.2.6.1 Recruitment

The recruitment of interviewers was done through the help of Chiefs and Sub-Chiefs, the eligibility criteria being a holder of a Kenya certificate of Secondary Education Certificate, resident of the local community, fluently speak the local language and possess excellent communication skills.

4.2.6.2 Training

After selection the enumerators were trained for two days and all research tools and necessary presentations were given. The training included the following: Brief introduction to the present research study, discussion on handling and administering questionnaires especially the importance of clarity when asking questions, handling the respondent in case of giving confidential information, taking anthropometric measurements, administering 24-hour recall and food frequency questionnaires as well as the importance of observing research ethics while in the field.

4.2.7 **Pilot study**

A village next to the one included in the study was selected and 10 households were used to pre-test the questionnaires. This was mainly important to ensure a proper familiarization to the questions, using measuring tools and knowing how much time it could take to fill each questionnaire by the researcher and its assistants. The feedback generated from the pretesting was redefined accordingly by the research supervisor and used to modify and validate the appropriateness ofthe tools.

4.2.8 Data quality control/assurance

This was carried out as outlined in section of chapter 3 i.e. obtaining informed consent from the participants, administering and filling in questionnnaires and obtaining permission from the local authorities.

4.2.9 Data management and analysis

4.2.9.1 Data entry and cleaning

Data was entered into the computer in Microsoft Excel. However data coding, cleaning and validation was performed to get rid of any outliers which would likely affect the means.

4.2.9.2 Data Analysis

Statistical Package for the Social Sciences (SPSS version 23) was used for analysis. This included descriptive analysisto find out frequencies, means, standard deviation and

proportions for socio-demographic and economic characteristics. Ghaphical presentation was done using Excel.

To identify the associated riks factors with nutrition status, Binary logistic regression analysis was used to generate odds ratio (ORs) and expressed with 95%confidence interval (CIs) using BMI as the main outcome. Students t-test was used to compare dietary energy and nutrient intake with the Recommendended Dietary Allowances (RDAs) for the elderly people.

The nutritional status of elderly were assessed using weight and height/arm span to get the BMI i.e weight (kg)/height (m), to determine the prevalence of malnutrition. Student's t-tests was performed to compare dietary energy and nutrient intakes with the Recommended Dietary Allowances (RDA) intakes among the elderly people.

4.3 Results

4.3.1 Nutritional status

About 26% of the study participants were overweight, however, there was no significant difference between males and females (p=0.286) (Table 7). On the other hand, the prevalence of underweight among the participants was 13% with equal distribution for the two genders.

Table 7: Distribution of nutrition status of respondents by gender

Characteristic	BMI Classification							
	Underweight		Normal		Overweight			
	n	%	n	%	N	%	X^2 value	p-value
Gender							2	0.286
Female	15	13.5	62	55.9	34	30.6		
Male	14	12.7	72	65.5	24	21.8		
Total	29	13	134	61	58	26		

4.3.2 Water,sanitation and hygiene

Drinking water was sourced some distanc eaway from participants' homes.About 67% of them sourced from riversand only a few (8.1%) from the municipality tapped water. Even though most of the water was obtained from the rivers, most of the participants (66.1%)

treated their drinkingwater while, the remaining never treated water. About 79% had pit latrines and 83% burnt their garbage in the open air while the remaining did not have a defined waste disposal mechanism (Table 8).

Table 8: Distribution of respondents by source of drinking water

Characteristic	Number	Percent
Water sources		
Tap	18	8
Borehole	55	25
River	148	67
Water treatment		
Treated	146	66.1
Did not treat	75	33.9
Availability of Pit latrine	174	79
Garbage disposal		
Open air burning	183	83
Disposed anywhere	38	17

4.3.4 Distribution of nutrition status of respondents according to socio-demographic characteristics

The prevalence of overweight was high among the study participants who never went to school (60%) (Table 9). On the other hand, the level of overweight was high among the age group of 60-70 years (72%) although there was no significant difference ($p>0.05$) among various age groups. Underweight however, was high among the elderly persons who were married (90%) and with low wealth index (69%).

Table 9: Distribution of BMI by socio demographic characteristics of respondents

Characteristic	BMIclassification							
	Underweight		Normal		Overweight			
	n	%	N	%	n	%	X^2–value	p-value
Marital status							4.7	0.315
Married	26	90	123	92	48	83		
Widowed	3	10	10	8	10	17		
Divorced	0	0	1	1	0	0		
Education level							22.6	0.031
Never went to school	20	69	90	67	35	60		
Primary	3	10	14	11	29	13		
Secondary	1	3	4	3	4	7		
Higher education	5	17	26	19	7	12		
Age category							3.265	0.775
60-70	19	66	96	72	42	72		
71-80	7	24	18	13	9	16		
81-90	3	10	19	14	6	10		
91+	0	0	1	1	1	2		
Wealth index							9.68	0.008
Low	20	69	68	51	20	35		
High	9	31	66	49	38	66		

4.3.5 Nutrient adequecy of elderly people in Kilgoris

All participants met 100 % of carbohydrate daily allowance in the diets consumed. Those that met protein requirement in their diets were also high 95-98% with a mean averages of 1.8 ± 0.8grams for men and1.9 ±1.1grams for women. However, even though, carbohydrate and protein were met, energy requirements were not met by a large proportion of the elderly persons. About 25% of women and only72% of the men, did not meet energy requirements, and this had statisitical significance (p-value <0.001). Very few of the elderly persons met the micronutrient requirements, with only31% of women meeting iron RDA (Table 10 and 11).

Table 10: Mean daily nutrient intake among the respondents

	Male		Female			
	Mean	SD	Mean	SD	t-value	p-value
Energy (kcal)	2,139.4	728.1	2,043.4	708.7	1	0.34
Fat(g)	144.1	98.5	138.6	94.4	0.5	0.68
Protein(g)	1.8	0.8	1.9	1.1	-1.1	0.3
Carbohydrates(g)	70.2	22.8	71.9	26.7	-0.6	0.61
Fiber(g)	13.6	5.3	13.3	4.3	0.5	0.64
Cholesterol (g)	36.6	87.1	39.1	87.4	-0.2	0.84
Calcium(mg)	296.8	183.5	297.5	165.8	-0.1	0.98
Iron(mg)	13.5	33.8	9.5	7.1	1.3	0.23
Magnesium(mg)	110.6	33.1	115.6	38.4	-1	0.32
Potassium(mg)	664.5	232.1	664.2	204.8	0.1	0.99
Sodium(mg)	566.8	268.6	557.0	316.7	0.3	0.81
Zinc(mg)	3.1	1.5	3.3	1.8	-1.2	0.26
Vitamin A (µg)	115.6	83.4	135.6	91.7	-1.7	0.1
Thiamin(mg)	1,141.7	1,821.4	1,027.7	1,677.3	0.5	0.64
Vitamin E(µg)	0.1	0.1	0.1	0.1	0.5	0.66
Vitamin B2(Riboflavin) (mg)	0.4	0.2	0.4	0.4	-1.8	0.09
Vitamin B3 (Niacin) (mg)	3.5	2.2	3.9	2.6	-1.3	0.21
Vitamin B6 (Pyridoxine) (mg)	0.1	0.2	0.0	0.1	2.2	0.03
Folate (g)	117.5	69.4	127.4	82.7	-1	0.35
Vitamin C (mg)	47.6	42.1	48.6	40.8	-0.2	0.87
Selenium (g)	14.9	10.9	18.2	14.9	-1.9	0.07
Vitamin B 12 (g)	3.4	16.9	2.0	11.0	0.8	0.48

Table 11: The average percentages of RDAs met for macronutrients and micronutrients by elderly persons in Kilgoris.

	Female		Men			
	n=107	%	n=100	%	Chi-value	P-value
Energy (kcal)	80	75	28	28	43.4519	0.00*
Protein (g)	102	95	98	98	0.4602	0.50
Carbohydrates(g)	107	100	100	100	0.0000	1.00
Iron (mg)	33	31	23	23	1.2376	0.27
Calcium (mg)	1	1	2	2	0.0035	0.95
Zinc (mg)	13	12	7	7	1.0359	0.31
Magnesium (mg)	2	2	0	0	0.4394	0.51
Selenium (g)	2	2	1	1	0.0035	0.95
Potassium (mg)	0	0	0	0	0.0000	1.00
Sodium (mg)	2	2	1	1	0.0012	0.97
Vitamin A(µg)	2	2	1	1	0.0000	1.00
Vitamin C (mg)	0	0	0	0	0.0228	0.88
Vitamin B1 (thiamin)(mg)	46	43	45	45	0.0024	0.96
Vitamin B3 (niacin)(mg)	36	34	33	33	0.0012	0.97
Folate (g)	1	1	0	0	0.2090	0.65
Vitamin B6 (pyridoxine) (mg)	59	55	51	51	0.0000	1.00

*level of significance <0.05

4.3.6 Dietary intake patterns of elderly respondents

The main staple food was maize. Most of the respondents consumed ugali daily (56%) followed by rice (54%). The main sources of proteins were milk and meat. Eggs and fish were the least consumed by participants (2%). The most frequently consumed vegetables were cowpeas and kales (sukuma wiki) with most people consuming more than five times a week. Some of the fruits frequently consumed were oranges and ripe bananas with a close to half (46%) of the respondents consuming oranges on a daily basis (Table 12).

Table 12: Frequency of foods consumed by elderly people

Frequencies in percentage (N=221)

Type of food	Daily	1-2 times a week	3-4 times a week	5-6 times a week	Do not use
Carbohydrates					
Ugali	56	17	10	16	1
Chapati	28	49	16	2	5
Githeri	16	3	12	7	62
Irish potatoes	30	39	2	27	2
Sweet potatoes	10	38	1	2	49
Rice	54	20	5	8	13
Proteins					
Meat	44	42	4	9	1
Plain milk	61	28	6	5	0
Eggs	2	20	24	0	54
Fish	2	9	12	3	74
Beans	3	27	25	10	35
Vegetables					
Kales	34	24	14	10	18
Cow peas	67	6	7	20	0
Terere	66	11	11	10	2
Cabbage	2	48	41	5	4
Fruits					
Oranges	46	27	14	10	3
Bananas	15	53	18	10	4

4.3.7Risk factors associated with nutritional status of elderly people

4.3.7.1 Risk factors for Obesity

Mixed backward and forward selection multivariate logistic regresssion analysis was carried out to estimate the association and direction of the relationship between dependent variable overweight/obese and several predictor variables. Predictors that had p-values greater than

0.5 were sequentially removed from the model until p-values of less or equal to 0.2 were left and then added back potential predictors that had p-value greater than 0.2. The significant risk factors obtained for obesity were high wealth index (odds ratio (OR) =2.82, P=0.046, 95% CI=1.02 to 7.82), owning means of transport (OR= 1.78, P=0.013, CI= 1.12 to 2.67) and dental problem (OR=4.16, P= 0.036, CI=1.1to15.78). The protective factors that were significantly associated with obesity were earning pension (P=0.001, OR=0.14, 95% CI=0.04 to 0.44) and education attainment (P=0.008, OR=0.33,95% CI=0.06 to 0.66**).** In addition, owning a kitchen garden (OR=0.28; P=0.245; 95% CI=0.04 to 2.44) and food shortages (OR=0.62; P=0.633; CI=0.09 to 4.42) were potential protective factors since they were not significant but the ORs were quite high (Table13).

Table 13: Binary Logistic Regression resultsfor overweight and obesity

			97.5% CI for OR	
Risk factor	OR	P>value	Lower	Upper
Frequent food shortages	0.64	0.435	0.21	2
With missing teeth	1.88	0.263	0.63	5.66
Household members>5	0.91	0.367	0.75	1.12
Monthly income<20,000	1.01	0.06	1	1.01
Pension/social protection cover	0.14	0.001	0.04	0.44
Food shortage	0.62	0.633	0.09	4.42
Give others priority during food shortage	1.71	0.16	0.81	3.61
Food secure	1.38	0.423	0.63	3.03
River as water source	1.45	0.322	0.7	2.98
Distant water sources	1.03	0.368	0.98	1.07

			97.5% CI for OR	
Risk factor	OR	P>value	Lower	Upper
Owned cars	1.73	0.013	1.12	2.67
Ill the last 30 days	0.2	0.049	0.11	1
Had dental problem	4.16	0.036	1.1	15.78
Place of treatment	0.64	0.332	0.26	1.59
Had Mentalproblem	0.6	0.371	0.2	1.85
Eating less	2.3	0.118	0.82	6.53
With economic fear	1.08	0.548	0.85	1.37
Memory perception over the past 1 year	0.28	0.065	0.07	1.09
With dependants	1.12	0.509	0.81	1.55
Need support	0.67	0.305	0.32	1.45
Needed help carrying out daily activities	1.56	0.111	0.91	2.67
High wealth index	2.83	0.046	1.02	7.82
With kitchen garden	0.28	0.245	0.04	2.44
Age	0.81	0.519	0.42	1.56
Females	0.37	0.028	0.15	0.9
Attained education	0.33	0.008	0.06	0.66
>2 elderly person in a household	0.56	0.277	0.2	1.6

4.3.7.2 Risk factors for underweight

Missing teeth was a strong potential risk factor to underweight, however, not significant (OR=0.36 P=0.505, 95% CI=7.84 to 1.69) (Table 13).After adjusting to remain with the plausible variables, the most critical factors found to be associated with underweight were mental health issues and immobility (OR=0.00, P=0.006, 95% CI=0.3 to 0.02 and OR=0.94, P=0.065, 95% CI=8.56 to 2.83), respectively. Participants with difficulty in mobility were

more likely to be underweight than their counterparts (OR=1.09, P=0.05, 95% CI= 7.69 to 2.9) while mental health issues was protective against underweight however, the difference was statistically significant (OR=0.000, P= 0.005, 95% CI= 0.29 to 0.02) (Table 14).

Table 14:*Binary Logistic Regression results for underweight*

				95% CI		
	Cor-coef	std err	OddsRatio	5%	95%	P-value
Household number >5	0.071	0.084	0.91	1.27	1.07	0.398
Gave out priority	-0.176	0.417	0.37	1.9	0.84	0.673
Food secure	-0.0751	0.462	0.38	2.29	0.93	0.871
Owned car	0.4695	0.253	0.97	2.63	1.6	0.064
Experienced illness	-0.5553	0.63	0.17	1.97	0.57	0.378
Missing teeth	0.5221	0.784	0.36	7.84	1.69	0.505
Memory loss	-4.1948	1.524	0.000	0.3	0.02	0.006
Ate less	-0.9152	0.667	0.11	1.48	0.4	0.17
Immobility	1.0408	0.564	0.94	8.56	2.83	0.065
Require help	-0.1897	0.267	0.49	1.39	0.83	0.477
High wealth index	-0.7775	0.553	0.16	1.36	0.46	0.16
Feminine	-0.4701	0.518	0.23	1.72	0.62	0.364
Never attained education	-0.809	0.548	0.15	1.3	0.45	0.14
Intercept	10.4492	3.242	59.98	-	-	-

After adjusting to remain with the plausible variables for underweight.The critical factors for underweight were mental health and immobility. Participants with difficulty in mobility were more likely to be underweight than their counterparts (OR=1.09, P=0.05,95% CI= 7.69 to

2.9)while mental health issues was protective against underweight however, the difference was statistically significant(OR=0.000, P= 0.005, 95% CI= 0.29 to 0.02)(Table 15).

Table 15:Binary Logistic Regression results for underweight after adjusting

Independent variables	coef	std err	P-value	OddsRatio	5%	95%
Household number >5	-1.4406	1.121	0.199	0.03	2.13	0.24
Transport ownership	0.2811	0.233	0.228	0.84	2.09	1.32
Experienced illness	-0.6976	0.548	0.203	0.17	1.46	0.5
Mental health	-4.0072	1.416	0.005	0.000	0.29	0.02
Immobility	1.0647	0.498	0.032	1.09	7.69	2.9
High wealth index	-0.7599	0.473	0.108	0.19	1.18	0.47
intercept	4.8491	1.965	0.014	2.71	6006.6	127.63

4.4 Discussion

Malnutrition is a state of being either undernourished or over nourished. Very few studies in Kenya exists assessing malnutrition in elderly people. The overall prevalence of malnutrition in this study among the respondents was 39%, 13% were underweight (BMI<18.5). This is a lower figure compared to a study done among the Tugen and Pokot (82.4%) (Odunga, 2004). The results are further consistent with findings by (Kimokoti *et al*.,2008) and (Mwenda, 2010) that noted low levels of underweight.On the other hand, the levels of overweight /obese in this study was (26%). This figure is also slightly lower compared to previous study(Mwenda, 2010) findings done among the Meru where 38% of elderly people were found overweight. Contrary results were nevertheless indicated among the elderly Ghanaians with high overweight (Aganiba *et al*.,2015).

The results of this study showed high levels of overweight/obese carried among the rural elderly persons. This was similar to a study in Chad among rural elderly persons (HelpAge International, 2010). Nevertheless, contrary findings in South Africa and Coimbatore India revealed a high prevalence of overweight among the urban elderly persons than in the rural areas (Charlton et al.,2001; mathew et al.,2016). The high prevalence in the rural areas could be attributed to poor access to information as a result of informal nature of their settlements.

This study results has showed that majority of women (30.6%) were overweight/obese than males. A similarity trend was observed in Nairobi and Machakos (Wagah et al., 2000). However, (Wassie, 2014; Odunga,2010)in their findings were contary as more men(36%) wereoverweight/obese than women in Northwest Ethiopia and Meru respectively. Nani, 2016, argues that nutrition education which is mostly given to women has an influence on making decision preferably in making food choices and diets to be consumed. Futher ,Cetin et al., 2014; Charlton et., 2001; Tayie et al., 2004 added thatweight gain at old age occur when more calories are consumed than burnt, reduced physical activities and lowered metabolic rates. Therefore, the high prevalence of excess weight gained observed in the study requires a government's interventions aimed at bringing a change in individual dietary practices and physical activities.

This study's findings also revealed that an increase in age did not significantly determine the nutritional status of the respondents. However, the risks of malnutrition were higher among elderly persons aged 60-70 years. The results confounded to study by Busolo, 2001. Kabiru et al.,2003 on the other hand, observed high rates of underweight commonly among elderly people aged 65 years . The findings of this study can be attributed to factors that interact together such as knowledge, dietary habits and pension mainly earned after the retirement agehence determining the nutritional status of elderly people.

In this study, underweight was high among the marriedparticipants (90%) than the widowed and majority were in the low wealth index. Previous findings in Ghana were contrary, where a majority of those married had normal nutritional status compared to widows and theassociation was attributed to better food choices among those who had spouses, increased morbidities after death of spouse as well as disabilities (Barrientos et al.,2015). According to (Aganiba et al.,2015) women are believed to have a longer life expectancy hence remain in good health longer whereas the males are said to remain married till they die. The disparities observed in the present study can be attributed to the low wealth index among a majority of married elderly people just had a negative impact on their nutritional status.

4.4.1 Dietary patterns and nutrient adequacy among the participants

Good nutrition is important at old age because it maintains good health and enhances tissues functionality. In this study, the average food intake of elderly participants failed to meet the Recommended Daily Allowances. On average carbohydrates and proteins nutrient requirements were the only met in the foods consumed. The highly consumed diets were starchy staples i.e ugali and rice, respectively with individuals consuming it daily (56% and 54%). Irish potatoes werealso a frequently consumed starchy staples. However, *Githeri* was least consumed with 62% of respondents not consuming at all. The findings are similar to those of a research carried out in Rwanda where starch staples were found to dominate the dietary patterns Bulirani, (2018).The high intake of start staples lead the elderly persons to meat daily carbohydrate requirements. However, this were preferred based on ease in preparation and also due to dental problems they experience. Therefore, the choice of food was determined by texture which interfers with chewing. For instance, low intake of *Githeri*that is boilied mixture of dry maize seeds and beans or peas) was observed.

Secondly, the consumption of Ugali was accompanied by leafy vegetables including kales, amaranth and cowpeas which were frequently consumed on a daily basis. Proteins were mainly derived from animal protein and daily intake were also high explaining the total percentage that met protein requirements. Nevertheless, majority hardly consumed fish and eggs at all (74% and 54%). This study suggests that the dietary pattern can be attributed largely on locally available food items and cultural taboos that inhibit communities from consuming certain foods as well as the high prices that most rural households do not meet. High intake of animal protein may not be applicable to other regions in the country, because, their is a culture of meat and animal husbandry among the Masaai community. Most respondents consumed less than half of the fruits i.e oranges and bananas on a daily basis. This can explain the low calcium and other macronutrients that were least met by majority of the respondents. These results conquer a research done among Sub-Saharan Africans where consumption of fruits was low among Kenyan elderly people while low micronutrients intake was reported among South Africans (Kimokoti *et al.*,2008). The seldom consumption can be explained to the high prices that cannot be met and inaccessibility of these commodities among the rural households. Lastly, Energy requirements were not met and this was significantly different among the males and females (p=0.00). This confirmedother studies for instance, Charlton *et al*., (2001) reported low energy intakes (36% women and 27% men)

among South Africans while (Kigutha, 2000) pointed out weight losses were associated with low energy intakes among elderly women and men (3% and 7%), respectively. In addition, the present study also demonstrates that morbidities experienced by the participants, contribute in weight losses and might also lead to decrease in energy intake. Despite the average dietary diversity score among the elderly people, the prevalence of malnutrition was still high. Perhaps, this study reinforces previous findings where inadequate portion sizes with regard to nutritional requirements or probable nutrient losses followingthe mode of preparation (Mulili,2013).

4.4.2Factors associated with nutritional status of elderly people

Genetics over time have played a role in bringing about obesity however, less that can be done to do away with it but its important that other factors be looked after in addressing this issue. The factors found to be associated with overweight and obesity in present study were high wealth index, having pension and education attainment. Those in the high wealth index were 2.8 times likely to be overweight and obese than their counterparts. This findings concur with (Jensen, 2014) findings in Ghana and Russian where a higher BMI and high odds of overweight were observed among the wealthier elderly people. However, a contrary literature highlighted high estimates of obesity among low socio-economic disadvantaged elderly in developed countries (Lartey, *et al*.,2010). (Tessfamichael *et al*.,2014) argues that the high wealth index has an influence on dietary choices. Therefore, these findings can be attributed to the same fact whereby being wealthier is associated to leading a better life compounded of a wider choices of food preferences and havingenough to eat unlike their counterparts.

The results also showed that education attainment was positively correlated with BMI although the relationship was weak. This is in line with Ahmed, *et al*., (2010) and Tessfamichael, *et al*., (2014) that stated that elite people are more likely to be overweight than those who had no formal education. This results suggest that those literateare likely to live better with a change in feeding practices. The level of knowledge also influences the choice of foods and dietary patterns. Knowledge is gained through learning, radio and television media. This study therefore, is in opinion of encouraging more adult education and interventions in order to enhance nutrition education.

In this study, the presence of pension was found to have a significant association with obesity though the correlation was weak in the present study. According to studies in Brazil and Chile pension was reported to have helped in eradication of poverty and improving household income to upto 3.7% and 4.5%, respectively. According to Gaspariniet al., (2007), pension

contributed in an increase in the household income which in turn promoted a high consumption of unhealthy energy dense diets. Similarly, Cetin, (2014) argues that weighing more has a likely impact on the knees due to fat deposit on adipose tissues which can leave more serious effects like disabilities and impairments. Therefore the high levels of obesity observed in this study can be suggested to improvements in economic status in the presence of pension cover as people tend to experience a change in lifestyle in the name of wishing for abetter life that is mostly affiliated with changes in eating habits. This study in return encourages that elderly people be empowered on nutrition knowledge and efficient planning for balanced diets using the pension money in improving the health status. In addition, owning a kitchen garden by the participants was protective to obesityas illustrated by a weak odds ratio.

The present study revealed that personal means of transport had a strong positive significant correlation with obesity. Those with private means of transport were more likely to be at risk of overweight. Waweru *et al*.,(2003) agrees with this statement by noting that walking enhances the quality of life and is a protective against aging. Also a study in Ghana found a significant association of increased prevalence of obesity among urban elderly people due to long hours spent in cars and traffic (Lartey *et al*.,2019). Systematic literatures further noted that difficulties in walking increases the odds of acquiring obesity (Jenkins,2004). The findings can be explained to the fact that own means of transport likely limits the time for engaging in physical exercises such as walking as much time is spent ondriving and remaining seated.

Underweight on the other hand was significantly associated with immobility. Movement is necessary in looking, accessing as well as preparing foods (Macigo *et al*.,2008). This also conquers with Kimokoti *et al*.,(2008) where about 80% of physical disabilities such as those in movements inhibits food procurement among the older people thus affecting food preparation and intake. The levels of underweight observed can be explained by the fact that majority who required support for movement encountered difficulties in walking and even preparing meals for themselves that many at times ended up in inadequate food intakes.

In the multivariate analysis in our study a positive correlation between mental health and underweight was found. Poor nutritional status has an impact on functionality status and quality of live lived (Rasheed *et al*.,2013; Ruiz-Lopez *et al*., 2003; Suominen et al.2005). Depression is the main contributor to mental illness underweight due to weight loss (Feldblum *et al*., 2007). The poor self-perceived memory recorded in the present study among the

participants is indicative of the association that exists between mental health and underweight. According to Affoo *et al*., (2013), dementia causes a reduced food intake indicated by difficulties in swallowing. Therefore, this study suggests that the poor mental issues found to be likely associated with underweight in this study could be hyperactivity that brings about moreexpenditure in energy in the body and thus loss in weights.

During Focus Group Discussion in this study the respondents noted that poverty affected their quality of life, lack of resources limited access adequate food and healthcare. Other factors were psychological problems caused by lack of care and respect from family and community. Among the mentioned mechanisms that would help them cope with challenges were establishment of homes for the elderly in the area, where they could be taken care of. At county level, elderly persons said that they would likea certain amount of monthly cash transfer in order to meet their needs and thoseof their dependants.

4.5 Conclusions

Most of the elderly persons are not meeting energy requirements and a good number are underweight, even though more than a quarter of the elderly persons are obese. Elderly persons are alsonot meeting daily requirements for micronutrients. Important risk factors for overweight and obesity are high wealth index, literacy, pension and owning a means of transport. On the other hand, immobility and mental issues wereimportant risk factors for underweight.

4.6 Recommendations

1. This therefore calls for nutrition interventions and policymakers to come up with programs aimed at improving the wellbeing and healthstatus of old people in the communities.

2. An early detection and screening of malnutrition in this population group by nutrition actors especially the micronutrient status which largely remain unknown.

3. Introduction of nutrition suppliments with key to vitamins and minerals as seen to boost immune responses especially by the government in collaboration with other actors.

CHAPTER 5: GENERAL DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 General Discussion

According to the vision 2030, the elderly population were identified as a vulnerable group faced by numerous challenges ranging from need for care, poverty, transport, family and community support among others. Similar to other countries, Kenya is not prepared enoughin welcoming this increasing population cohort. The current study observed that poverty, illnesses, transport, social isolation, health seeking behaviour and living conditions were significantly key in influencing the wellbeing of old people in the study area. This study has demonstrated that majority of the elderly people just lived within the poverty threshold meaning they are virtually not better off in practice.A number of policies have been adopted by governments in ensuring the safety of the elderly people. Housing condition and community amenities influence how active and comfortable the old people can live thus it is crucial that safe, comfortable and adaptable housing conditions can be secured for them.

However difficult to distinguish the exact root cause of malnutrition in this population groupthe FAO indicated that it is a whole chain of factors interacting together (Mathew *etal*.,2016). First and foremost aging is accompanied with a loss in body mass, reduced body weight, impaired immune function and diminished sense of taste and smell (Ogunniyi*etal*.,2001). All these factors together expose the danger of nutritional risks. Factors found to be associated with overweight and obesity among the elderly people in Kilgoris in this current study were high wealth index, presence of pension cover, literacy and owning means of transport while critical factors found to be associated with underweight were mental health and immobility.

5.2 General conclusions

1.Majority of the elderly persons in Kilgoris County have normal nutritional status, however, the prevalence of overweight and obesity was greater than underweight.

2.The majority of elderly persons in Kilgoris do not meet the Recommended Daily Allowances of nutrients.

4. The risk factors for overweight among elderly people living in Kilgoris comprise high wealth index, pension cover, literacy and owning means of transport while important risk factors for undernutrition are mental health and immobility.

5. Diabetes, hypertension and joint pains as well as dental problems are the most important morbidities of the elderly in Kilgoris. Access to health services is also a challenge.

5.3 General Recommendations

1. A fortified blended food that is easy to cook should be introduced by nutrition actors in the County for elderly people.
2. Older people like women and children should be prioritised to receive supplement of blended food or other nutrient dense food through the national goverrnment in collaboration with the county government.
3. There is neeed for urgent nutrition awareness campaigns through communty health volunteers aimed at offering nutrition education in improving the knowledge on diet related diseases.
4. There is need for development of geriatrics health care system by county government that are accessible and affordable to all.
5. Urgent formulation and implementation of nutrition education policies targeting elderly people by government in ensuring a healthy aging poupulation in Kenya.
6. Need to design programmes by county government in collaboration with other organisation such as community based organisations, aimed at improving the living conditions such as houses, and provision of care for older people.

REFERENCES

1. Ahmed, T., & Haboubi, N. (2010). Assessment and management of nutrition in older people and its importance to health. DOVE Press Journal, 5, pp.207–216.
2. Aganiba., Wb, O., & Dittoh, S. (2015). 4 3 2 1. Nutrition and Development .African Journal of Food Agriculture,15(4), pp.10198–10216.
3. Barrientos, Armando (2015). Ageing, poverty, and public policy in developing countries.Retrieved from http://www.eldis.org/vfile/upload/1/document/0708/DOC22602.pdf.
4. Bulirani. (2018).Influence of nutrition knowldedge on dietary patterns and nutritional status of women of reproductive age in Denza district, Malawi. Msc dissertation, University of Nairobi.
5. Busolo, D. (2001). Nutrition and Health condition of older people:International African Regional Development Centre, Nairobi Kenya Pp 48-51
6. Caroline, E., Fátima, M. De, Coqueiro, S., & Rodrigues, A. (2013). Nutritional status in the oldest elderly and associated factors. Rev Assoc Med Bras, 59(1), pp. 40–47. https://doi.org/10.1590/S0104-42302013000100010
7. CBS (2004). Kenya Demographic and Health Survey. Ministry of planning and National development. Government Printer, Nairobi Pp 15
8. Cetin, D. et al. (2014). Obesity in the elderly. Clinical Journal of Medicine, 81(1), pp. 51–61. https://doi.org/10.3949/ccjm.81a.12165
9. Charlton KE, Rose D.(2001). Nutrition among older adults in Africa: the situation at the beginning of the millennium. American Society for Nutritional Science.;131:S2424–S2428.
10. Chavarro-carvajal, D., Reyes-ortiz, C., Samper-ternent, R., Arciniegas, A. J., & Gutierrez, C. C. (2015). Nutritional Assessment and Factors Associated to Malnutrition in Older Adults : A Cross-Sectional Study in Bogotá , Colombia. Journal of Aging and Health, vol.27(2), pp. 304–319. https://doi.org/10.1177/0898264314549661
11. County Government of Narok(2013-2017): County integrated development plan (CIDP) Economic Transformation for a Shared Prosperity. Nairobi.
12. Feldblum I, German L, Castel H et al., (2007). Characteristics of undernourished older medical patients and the identification of predictors for undernutrition status. Nutr J;6:37.

13. Fisher, A.A.. Lang, E.J., Stoeckel, E.J. and Townsend, W. J. (1991). Handbook for Family Planning Operations Research Design(2nd edition). New York: The Population Council.
14. GOK. (2011). Kenya National Social Protection Policy. Nairobi.
15. GOK (2007). Ministry of planning and National Development and the National Economic and Social Council, Vision 2030 1st edition. Government of the Republic of Kenya Pp 114-115
16. Guyonnet, S., & Rolland, Y. (2015). Screening for malnutrition in older people malnutrition nutrition screening elderly. In Clinics in Geriatric Medicine.https://doi.org/10.1016/j.cger.2015.04.009
17. HelpAge International. (2000). Aging Issues: Nutrition Training of Trainers Workshop Report. Nairobi, Kenya Pp 10
18. HelpAge International. (2011). Nutrition and baseline survey of older people in three refugee camps in Dadaab.
19. HelpAge International (2012). Nutrition and baseline survey of older people in Haraze Albiar,Chad.
20. HelpAge International. (2004). Summary of Research Findings on the Nutritional Status and Risk Factors for Vulnerability of Older People in Africa. Report prepared by: HelpAge InternationalAfrica Regional Centre. Available at: http://www.helpage.org/Worldwide/Africa/Resources?autocreate_RelatedHelpagePublicationList_start=11.Accessed 10November 2019.
21. Hickson, M. (2006).Malnutrition and ageing. pp. 2–9. https://doi.org/10.1136/pgmj.2005.037564
22. Jenkins KR. (2004).Obesity's effects on the onset of functional impairment among
23. older adults. Gerontologist; 44:206e16
24. Jensen TR .socioeconomic status, nutrition and health among elderly. In: Perspectives on the Economics of Aging. 2004.
25. Kabiru, E. W., & Some, E. S. (2003). Health status and health seeking behaviour of the elderly persons in Dagoretti Division , Nairobi. East African Medical Journal, 80(2.8647). https://doi.org/10.4314/eamj.v80i2.8647
26. Kigutha, H.N; Van Staeveren and Hautvast (2000). Seasonal Changes in Food Availability and Nutritional Status of the Elderly in Kenya, Unpublished Research.
27. Kimokoti, R. W., & Hamer, D. H. (2008). Nutrition , health , and aging in sub-Saharan Africa. 66(11), pp. 611–623. https://doi.org/10.1111/j.1753-4887.2008.00113.x

28. KNBS. (2010). Kenya Population and Housing Census 2009. Nairobi. Retrieved from www.knbs.or.ke.
29. KNBS. (2014). Kenya Population and Housing Census 2009. Nairobi. Retrieved from www.knbs.or.ke.
30. KNBS.(2019). Kenya Population and Housing Census 2019. Nairobi. Retrieved from www.knbs.or.ke.
31. Kipsisei, G. C. (2011). Environmental Degradation and Social Conflict in Trans Mara District, South Rift Valley of Kenya. University of Nairobi.
32. La, A. (2011). Factors associated with undernutrition and overweight in elderly patients presenting at a primary care clinic in Nigeria. S Afr Fam Pract, 53(4), pp. 355–360.
33. Lartey et al. (2019). Rapidly increasing prevalence of overweight and obesity in older Ghanaian adults from 2007-2015 : Evidence from WHO-SAGE Waves. WHO-SAGE Waves 1 & 2, 14(8), pp.1–16. https://doi.org/. https://doi.org/10.1371/journal.pone.0215045
34. Macigo, F. G., Mulli, T. K., Mutara, L. N., & Wagaiyu, E. G. (2008). Nutritional and oral health status of an elderly population in Nairobi. East African Journal, 85(8), pp. 378–385.
35. Margaret, B. (2018). Influence of Nutrition Knowledge on Dietary Patterns and Nutritional Status of Women of Reproductive Age in Dedza District Malawi. University of Nairobi.
36. Mathew et al. (2016). Prevalence and Correlates of malnutrition among elderly in an urban area in Coimbatore. Indian Journal of Public Health, (41.207.67.109), pp.112–117. https://doi.org/10.4103/0019-557X.184542
37. Milne AC, Potter J, Vivanti A, Avenell A. (2009). Protein and energy supplementation in elderly people at risk from malnutrition.Cochrane Database Syst; 15(2):CD003288. DOI: 10.1002/14651858.CD003288.
38. Mugo, W. J. (2015). Association of Functionality and Nutritional Status of Elderly: A Comparison Between Institutionalized and Non-Institutionalized Elderly in Nairobi County,in Kenya. Kenyatta University.
39. Mulili,E.(2013). Dietary patterns and the nutritional status of elderly persons in Nziu Makueni County.Msc dessertation, University of Nairobi.
40. Mwenda, M. (2010). Role of social protection on nutritional status of elderly persons:The case of imenti North district,Kenya. University of Nairobi.

41. National Council for Population and Development (2013). Kenya Population Situational Analysis.Pg. 130.
42. NCPB. (2016). National Council for Population and Development. Kenya Policy brief(pp. 51–54).
43. Nyaruhucha CN, Msuya JM, Matrida E. (2004).Nutritional status, functional ability and food habits of institutionalisedandnon-institutionalised elderly people in Morogoro Region, Tanzania. East African Medical Journal; 81:248–253.
44. Nnakwe, E. N. (2009). community nutrition : planning health promotion and disease prevention(Third edit; T. M. Sean Fabery, Ed.). Burlington: Jones & Bartlett Learning.
45. Odunga, P. (2004). Factors affecting the nutrition status of the pokot. Msc dissertation, University of Nairobi.
46. Ogunniyi A, Baiyewu O, Gureje O, et al.(2001). Morbidity pattern in a sample of
47. elderly Nigerian resident in Idikan community Ibadan. West Afr J Med.;20: 227-231.
48. Ondigi, A. N. (2012). The Influence of Poverty and Well Being of the Elderly People in Nyanza Province, Kenya. Asian Social Sciences, 8(2), 211–220. https://doi.org/10.5539/ass.v8n2p211
49. Population Reference Bureau, (2007). Underweight, under nutrition and the Aging.
50. population Reference Bureau,(2018):https://interactive.prb.org/2020-wpds/
51. Ruiz-Lopez MD, Artacho R, Oliva P, Moreno-Torres R, Bolanos J, de Teresa C, et al. (2003) Nutritional risk in institutionalized older women determined by the mini nutritional: What are the main factors? Nutrition; 19:767-71.
52. Sitati, N.W.Walpole, M. J. (2006). Assessing farm-based measures for mitigating human elephant conflict in Trans Mara DistrictNo Title (No. 40). Nairobi.
53. Suominen M, Muurinen S, Routasalo P, Soini H, Suur-Uski I, Peiponen A, Finne-Soveri H, Pitkala KH (2005). Malnutrition and associated factors among aged residents in all nursing homes in Helsinki. European Journal of Clinical Nutrition, ;59: 578–583.
54. Tayie, F., Adjetey-Sorsey, E., Armah, J., Busolo, D. & Imaya, E. (2004). Prevalence of under nutrition among elderly persons in Accra. Ghana Medical Journal Pp 51 -54
55. Tessfamichael, D., Gete, A. A., & Wassie, M. M. (2014). High Prevalence of Undernutrition among Elderly People in Northwest Ethiopia : A Cross Sectional Study.
56. UN Economic and Social Affairs Department. (2017). “World Population Ageing”.
57. UNESCO (2005-2007).https://whc.unesco.org

58. UNDP, (2016). Ageing, older persons and the 2030 agenda for sustainable development. New York.
59. UNDESA. (2014). Cardiovascular disease statistics. Retrieved from https://www.researchgate.net/publication/295547934.
60. UNFPA. (2012). Ageing in the Twenty-First Century:A Celebration and Challenge. London.
61. United, N. (2011). Current status of the social situation, wellbeing, participation in development and rights of older persons worldwide. https://doi.org/ST/ESA/339
62. United Nations. (2012): Population Division DESA.
63. United Nations. (2015). World Population Ageing. https://doi.org/(ST/ESA/SER.A/390).
64. Waggah M, Ochola S and Omalla J (2001).Assessing the nutritional vulnerability, income and risk factors for older people in Nairobi and Machakos District, Kenya. Workshop report on sharing research findings on nutrition for older people. Nairobi: HelpAge International.
65. Waweru LM, Kabiru EW, Mbithi JN, et al. (2003). Health status and health seeking behaviour of the elderly persons in Dagorettidivision Nairobi. East African Medical Journal; 80: pp.63–67.
66. Wassie, M. (2014). High prevalence of undernutrition among elderly people in Northwest Ethiopia : A Cross Sectional Study. Journal of Nutritional Health & Food Science Open, 2(3), pp.1–6. https://doi.org/10.15226/jnhfs.2014.00131
67. WHO. (2002). Meeting the nutritional needs of older persons. Malta.
68. WHO. (2016). Nutritional requirements of older people: Seminar held on the 13th May 2016. (May), pp.1–8.
69. WHO. (2015). World Report on Ageing and Health.Retrieved from www.who.int/ageing/publications/world-report-2015

APPENDICES

Appendix 1:HOUSEHOLD SURVEY QUESTIONNAIRE

UNIVERSITY OF NAIROBI

DEPARTMENT OF FOOD SCIENCE, NUTRITION, AND TECHNOLOGY APPLIED HUMAN NUTRITION PROGRAMME

FACTORS ASSOCIATED WITH NUTRITIONAL STATUS IN ELDERLY PERSONS LIVING IN KILGORIS KENYA

Hello, my name is Yvonne Suke. I am a student at the University of Nairobi doinga course in Nutrition. In order to get information about factors that determines nutritional status and food intake among the elderly people 60 years and above in Kilgoris, I am conducting a survey in this area and your household has been selected among households with elderly persons above 60 years in this area.

The information you provide will be useful in improving knowldege and understanding of nutritional needs and food intake patterns of elderly in the community and help the government in planing and implementing its policies on its big four agendas including nutrition and food security. A copy of this report will be submitted to your community leaders who may use it for planning of development project in this area.

All information you give will be confidential. The information will be used to prepare general report but will not include any specific name. There will be no way to identify that you are the one who gave the information.

We encourage you to participate in this study and your cooperation will be highly appreciated.

If this is okay with you, may we proceed to ask you some questions related to family planning and health in your household?

Respondent agreed to be interviewed_____1 = Yes 2 = No

Signature of interviewer_____ Date_____

HOUSEHOLD IDENTIFICATION

Household no..... Village name..... sub-location..... Location.....

Interviewer ..... Date of interview.....

The questions in this survey are for the elderly person. If there is more than one elderly person sin a household both will be interviewed about his / her household

1. HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS (where necessary, tick as appropriate)

1.1 Name of Household member (Optional).....

1.2 Gender (1) Male (___)(2) Female (___)

1.3 Date of birth _____

1.4What is your religion?

1.5 Level of educational attainment (1) None____ (2) Primary___(3) Secondary___(4) Post Secondary ___ (5) Others (specify) _____

1.6 Position in the Household (1) Husband __ (2) Wife __ (3) Child ____

1.7 Number of people living in the home _____

1.8 Do all the members belong to one family? (1) Yes (_____) (2) No (__)

1.9 How many people in the household are over 60 years?_____

1.10 Marital status (1) Single ____ (2) Married_____(3) Divorced _____(4) Separated ___(5) Widowed_____

1.11 Relationship to household head _____

1.12 what is your cuurent occupation_____1=unemployed 2=housewife and farming 3=herding 4=business 5=small scale trade/ juakali 6=casual labour 7= salaried 8=student

2. SOCIO-ECONOMIC CHARACTERISTICS

2.1 Are you a native born of this land (1)=yes___ (2)=No ___

2.2 **Describe the ownership of the home you live**_____ (1) self owned (2) rented (3)hosted by parent for free (4) hosted by relative for free (5) hosted by brother /sister (6) hosted by friend (7) other_____

2.3 Describe the type of house you live(observe)

Material	Roofing	Wall	Main house floor
Tick	1= grass 2=iron 3=tiles	1=mud 2=brick 3=stone 4= iron sheet 5=timber 6=other	1=earth 2=cement 3= tiles 4= other

2.4 **Do you own cultivated land?** _____1=yes 2= No

2.5 Do you have a kitchen garden? _____1= yes 2= No

2.6 Which domestic animals do you keep ?

Type of livestock	Number
1. Cows 2. Goats/sheep 2 Camels 4. Donkeys 5. Chicken 6. Others	

3. SOURCE OF INCOME

3.1 **List your main sources of income**_____1. salary 2. Pension 3. sale of animals 4.Crop farming 5. no income 6. Gifts from children/relatives / friends 7. Business 8. Others 9. (specify)_____

3.2 **What is the estimated combined household incomein a month**_____1. less than 10,001 2.10002-20000 3.20002-30000 4.30002-40000 5.40002-50000 5. 50002-60000 6.60002-70000 7.70002-80000 8.80002-90000 9.90002-100000 10.Over 10000

3.3 If employed what was your occupation before retirement?____

3.4 Are you on pension / other forms of social protection?_____(1) Yes (2) No

3.5 **If yes above, which form?**____1= Public 2= Private 3=Cash transfers or other Non governmental Agencies

3.6 **Who supports you financially?**_____ 1. your children 2. brothers/ sisters 3. community members 4. other relatives 5. Self

3.7 Do you have any problem with your teeth?_____ (1. yes 2. no)

3.7.1 **{If yes} which one?** _____1. missing teeth 2. decayed teeth 3. dentures

4. FOOD SECURITY

3.7 Have you had any food shortages in the last one month?.....(1) Yes (2) No

4.2 **If yes how often?** _____ (l)rare (2) sometimes (3) often

4.3 When there is food shortage whom do you give first priority?____1. children 2. women 3. self 4. men 5. others)

4.4In which of these categories would you place your household?____ l=food secure 2= food insecure 3=don't know

5. WATER AND HEALTH FACILITY

5.1 **What is your main source of drinking water?---------** 1 =tap 2—borehole 3=river 4=others(specify)----------

5.2 **Do you treat your drinking water**?----------l=yes 2=no If yes how (specify)----------

5.3 **How far is the water source?_____**KM_____minutes (to reach)

5.4 Do you have access to health facities?_____1=yes 2=No

5.5 How far is the nearest health facility?_____KM_____minutes

5.6 **Which means of transport do you use to get there?_____**1=walking 2=bicycle 3=matatu ride 4=motorcycle 5=others(specify)_____

5.7 Is the distance near or far according to you?_____1= near 2=far

5. MORBIDITY

5.1 Have you experienced any illness in the last 30 days? ____1=Yes 2=No

5.1.1 **If yes, what were you suffering from?_____1=** Back pains 2= Abdominal pain 3= Joint pains/arthritis 4=Fever/malaria5= Poor eyesight 6= Poor chewing 7= Coughing 8=Scabies 9=Constipation 10=Hypertension 11=Headache 12=Diabetes 13= Ulcers 14=Cancer 15= Any other

5.2 **Where do you to betreated when sick? _____1=**Health Facility 2=Private 3=Traditional 4=Self 5=Spiritual 6=None 7=Other____

5.3 Diagnosed of mental problem?_____1=yes 2=No

5.4 **Reason for not going to Health Facility in last 30 days**1=No money 2=Weak 3=Too far 4=Use traditional medicine 5=Not sick

5.5 **Do you use ?** Alcohol=1 Smoke=2 Drugs=3 Sniff tobacco 4 Chew miraa=5None of above=6 Other(specify)

5.6 **Observe any signs** Edema=1Immobility=2 Extreme weakness=3 Dehydrated=4 Kyphosis(bent back)=5 Mental disability=6

5.7 **How many meals do you have daily?____** (1) One(2) Two(3) Three

5.8 Have you evereaten less due to tooth issues the last 12 months Frequently=1 Rarely=2Never=3

5.9 Doyou have any dentures _____1=yes 2=No

5.10 Have you hadweight loss for not eating the past 11 months? 1=yes 2=No

6.10.1if yes how many? _____1)=btn 1 and 3 kg 2)=more than 3kg3)=don't know how many

6. PSYCHOLOGICAL AND CONCERNS OF ELDERLY

6.1 **What is your greatest social economic fear?_____ 1=**living alone **2=**physically disabled **3**=care of children/spouse **4**= loss of children/spouse **5**=loss of land **6**=loss of animals **7**=chewing difficulties

6.2 Self-perception of health status alone compared to others of your age?____ Worse=1 the same=2 better=3

6.3 Self-perception of health status compared to that of others of your age?____ Poor=1 Fair/good=2 Very good=3 Excellent=4

6.4 **Self-perception of memory?_____** Poor=1 Fair/good=2 Very good=3 Excellent=4

6.5 Self-perception of memory compared to a year ago? _____1=worse 2= better

6.6 **Perception about helpers____?1**=respectful **2**=respects beliefs **3**= respects privacy **4**=consults us **5**= not kind **6**=other specify

7. CARE AND FUNCTIONAL ABILITY QUESTIONNAIRE

7.1 Tick the table below appropriately_____

No	No.of dependents under your care	Mobility	Able to	Need help to	Who helps
		l=Uses support **2** = < l km **3=**1-2km **4**=>2km	**l**= Cook **2**=Feed **3** =Dress **4** =Bath **5**=Shop **6**=Take medications alone	**1**= Get food from source **2**= Get water from the source **3**=Food preparation **4** =Get fuel **5** =Milling **6** =No need **7**=Other specify	**l** = Husband **2** =Wife **3** =Son **4** =Daughter **5** =Brother **6** =Sister **7** =Neighbor **8**= Daughter in law **9** =Son in law **10**=Community **11**=Grandson **12**=Grand daughter **l3**=NSAs

9. ANTHROPOMETRY

Older person name	WEIGHT (Kgs)	HEIGHT (Cms)	MUAC (Cms)	ARMSPAN (Cms)	HALFSPAN (Cms)

Appendix 2:24-HOUR RECALL QUESTIONNAIRE

Please describe the foods (meals and snacks) that you ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning up to the last meal of the day before going to sleep.

Period	Dish Name/Volume	Name of ingredients	Amount of ingredients used in Household measures	Amounts in standard units(grams)	Amount consumed in grams	Primary Source of food
Breakfast						
Mid-morning						
Lunch						
Afternoon						
Dinner						
After dinner						

Key

Codes for indicative local measure for food

1=Handful, 2= Cupful, 3= Spoonful, 4=Plateful, 5= ½ cup, 6=1/2 plate, 7=Counts (Eggs/Slices), 8= others (Specify)

Codes for sources of food

1=Kitchen garden/Own production, 2= Bought, 3= Donation, 4= others (Specify)

Appendix 3:Food Frequency Questionnaire

How many times do you consume the following foods? [Fill in the table below] (Interviewer should assess if the previous 24-hour meal was either usual or normal)

Q No	Food group	Examples	1=yes 2=No	Daily	1-2 times a week	3-4 times a week	5-6 times a week	Weekly	Fortnight	Monthly	Never/ rarely	1=own 2=purchase;3 =gift;4=other
1	Cereals	bread, biscuits, cookies or any other foods made from millet, sorghum, maize, spaghetti, Irish potatoes, rice, wheat, ugali, porridge or pastes or other locally available grains										

2	Vitamin A rich vegetables and tubers	Pumpkins, carrots, squash, or yellow fleshed sweet potatoes that are orange + any other locally available vitamin A rich vegetables										
3	White tubes and root	White sweet potatoes,white potatoes, white yams, cassava, or foods from roots										
4	Dark green leafy vegetables	Sukuma wiki, spinach, cabbages ,cassava leaves, pumpkin leaves,										

		cowpeas leaves ,indigenous green vegetables, bean leaves, terere, dhania, spider plant, black night shade (managu)										
5	Other vegetables	Tomato, onion, eggplant, green pepper										
6	Vitamin a rich fruits	Ripe mangoes,papay asPassion fruit										
7	Other fruits	Banana, mkwaju, oranges, Avocado, guava, apple										

8	Organ meat(iron rich)	Liver, kidney, heart or other organ meats or blood-based foods										
9	Flesh meats	Beef, pork, lamb, goat, rabbit, wild game, chicken, duck, or other birds, edible insects										
10	Eggs											
11	Legumes, nuts and seeds	Beans, green grams (ndengu),dried peas, lentils, green peas, mbaazi, groundnuts,										

		simsim										
12	Fish	Nile perch, tilapia, omena, fresh or dried fish										
13	Milk and milk products	Milk, cheese, yoghurt, , mala and other milk products										
14	Oils and fats	Oils, fats,ghee butter added to food or used for cooking										
15	Sweets	Sugar ,honey, sweetened soda or sugary foods e.g. chocolates, sweets or candies										

16	Spices, condiments, beverage	Spices(salt, black pepper) condiments(soy sauce, hot sauce), royco, curry powder, coffee, tea, alcoholic beverages or local examples										

Did you eat anything (meat or snack) or supplements outside home yesterday?

Appendix 4:FOCUS GROUP DISCUSSION GUIDE

Topic: Factors associated with nutritional status in elderly persons living in Kilgoris Kenya

Time duration: 45 minutes

INTRODUCTION

Introduce team, participants and the general purpose of the discussion

MAIN DISCUSSION

General

• Who do you think older people are?

• What is the role of older people in the home, in the community? (Probe care for

Children, food preparation, and household custodian)

• To what extent do you think older people normally contribute to household food resources / decision making?

• How do older people perceive their changing roles/statuses? (Probe for changing access to resources)

• How do old people cope with these changes? (Probe for coping mechanisms)

Care and support

• How are older men and women normally taken care of in the household and Community?

• How do older men and women feel about themselves? (Probe for physical, Psychological and social perceptions)

• What happens to properties such as land as couples grow old in your community?

• What role do children play in the care of older men and women? (Probe for direct children and grandchildren)

Do you believe that the time of your generation has been more problematic than any other times in the past? If yes please give reasons?

• What are the opinions of older men and women on support and care they receive? At home, community and health facilities?

• What would you like to see done for the aged persons in your community?

CONCLUSION

Summarize discussion

Thank participants and give permission to leave

Team members

1. Facilitator

2. Note taker

3. Observe