

**FACTORS AFFECTING THE NUTRITION STATUS OF THE POKOT
AND THE TUGEN ELDERLY IN THE DROUGHT PRONE AREAS OF
BARINGO DISTRICT**

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**BY
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THIS THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
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DEPARTMENT OF FOOD TECHNOLOGY AND NUTRITION, FACULTY OF
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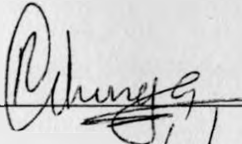
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DECLARATION

I, PAULINE ODUNGA hereby declare that this thesis is my original work and has not been presented for a degree in any other university.

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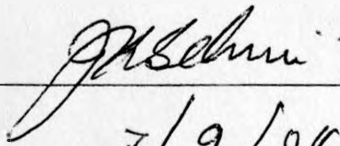
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DEDICATION

This thesis is dedicated to my husband Geoffrey, son Alex, daughter Cheryl, my father Gaetano and mother Emma.

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OPERATIONAL DEFINITIONS

Arm-span: anthropometric measurement of the distance from tip of the middle finger of the left arm to the tip of the middle finger of the right arm with the arms stretched out.

Body Mass Index: (weight /height ²) is a measure of chronic energy deficiency in adults.

Carer: individual identified in the community to take specific responsibilities in assisting an isolated older person with daily activities.

Coping strategy: means of diversifying strategies to access food.

Demi-span or half span: measurement taken as the distance from the tip of the middle finger of the out-stretched left arm to the top of the sternum (or chest).

Elderly: Age defined in terms of number of years. WHO defines Older people as those being 60 years or older. Some older people will not necessarily remember their exact year of birth but will recall their age in terms of being born around the time of a significant event. For example, when a war occurred, severe food shortage or significant political event. Definition of “elderly” reflects average life expectancy of the region concerned: They range from the age of 46 in Ethiopia to 71 years in Mauritius (HelpAge International, 1999) In this study the retirement age of 55 years in Kenya was considered as the working definition.

Mid-Upper Arm Circumference (MUAC): is a measurement of “the circumference of the left arm taken at the mid-point between the elbow and the shoulder.” It is usually used for screening purposes.

Recommended Dietary Allowance (RDA): An RDA is designed explicitly to be applicable to population rather than to individuals i.e. accounts for variability in need among subject. RDAs are intended to prevent nutritional deficiency and are usually defined as “safe Intakes” RDA, is the intake that reduces the prevalence of nutrient deficiency to some desired proportion of the population while avoiding excess intake.

Social support: Support systems in place that care for elderly members that includes family, community, self-reliance NGOs, etc.

ABSTRACT

A cross-sectional study was conducted between January and March 2001 to assess the risk factors to nutritional vulnerability of elderly people. In this context, the “elders” are defined as people with 55 years and over. Since few Tugen and Pokot elderly knew their age, most related the dates of their births to family, local or national events. The research was carried out among Tugens and Pokot tribes living in the drought prone areas of Baringo district. Socio-demographic, socio-economic, anthropometric and dietary data were collected in 250 households of elderly population (90 Tugens and 180 Pokots). Most people (87.2%) depended on food relief provided by World Food Programme.

The results of the study revealed that the overall nutritional status was poor. The majority of the elderly (82.4%) had a Body Mass Index of less than 18.5 (about 78.8% and 88.9% respectively for Pokots and Tugens). Food intakes were poor in quality and in quantity. Slightly less than a quarter of the population (24.5%) took at least 2 meals per day. Most nutrient intakes were below 50% of requirements except for iron (75.2%) and vitamin A (65.6%) whose source was cereals and vegetables.

Dental problems were common for most of the elders (in 88.4%), which affects their chewing ability.

There was an association ($p < 0.05$) between malnutrition and marital status, animal ownership, taking care of young children, size of the household and taking lunch.

Moreover it was found that when the population grows old, it tends to skip some meals therefore decreasing the number of meals eaten. Body muscle loss increased significantly as the population grew old.

Social factors such as taking care of young children or living in large households were associated with high prevalence of malnutrition. Loneliness was a risk factor only for the elderly who lost their partners. The number of cows owned and the capacity to care after oneself, showed a positive impact on current BMI status.

Compared to the Pokots, Tugen elders reported higher proportion of malnutrition, about 2 times more likely to be malnourished (OR: 2.2; 95% CI: 1.1-4.6). The findings of the study showed that the difference in nutritional vulnerability among the two communities may be due to the gap in socio-economic factors such as marital status, household size, access to food and source of income; and in their eating habits.

In conclusion, the study revealed associations between poverty, psychosocial/emotional, family life, and food intake factors with nutritional status among elderly living in Baringo district. Compared to the Pokots Tugen elders are at high level of nutritional vulnerability. The findings suggest that more nutrition education and feeding programmes targeting old people need to be designed and implemented in Baringo District.

CHAPTER ONE: INTRODUCTION

1. 1. Background

The world population aged over 60 years has been estimated to increase from 590 million (of the end of 2000) to 1.2 billion by the year 2025 (ACC/SCN, 1999). Since last century, 80 % of this increase has been taking place in developing countries. Although the proportion of the elderly in African population is much smaller than in Europe and North America where there is a decline in fertility, the estimate increase will go up to 200% in the next 25 years in some developing countries (ACCN/SCN, 1999). The change in population structure is explained by the effect of many factors such as multiple improvements in health interventions - preventive, curative and promotional measures, which result in decline in mortality and increase in life expectancy (Roe, 1987; Longhurst, 1989; Young et al, 1987). In Kenya, the elderly constitute about 2 million of the total population and estimated to increase to 4 million by 2005.

Ageing process occurs to human beings with irreversible and progressive slowdown of body activities involving the physical, social, mental and psychological effects and making the person to be considered as vulnerable (Ismail, 1999; Bermudez & Dwyer, 1999). Chronic diseases and malnutrition are commonly found especially during emergencies (disaster or famine). The elderly are a vulnerable group in which early effects of under nutrition and multiple deficiencies manifest themselves. According to Ethangatta (1988), 29% of the elderly in Kenya are malnourished. The risk factors to nutritional vulnerability are 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 (Ismail & Manandhar, 1999; Roland, 1984; Eschleman, 1984; Young et al., 1989).

Most of the elderly in developing countries do retire and continue to make a vital contribution to the family income through the provision of essential childcare or by helping with household activities (Ismail, 1997). A number of studies show that older people are more likely to be givers rather than receivers of aid. In situations of deaths of younger adults (from AIDS or other diseases) or as young people move to look for jobs in urban area or for pasture for cattle the elderly remain behind taking care of young children (Peachey, 1999; Pieterse, 1997; Ismail, 2000). Social support mechanisms to the elderly are eroded in case of population displacement, social mobility and economic decline. The disruption of these important social support systems is likely to have unfavourable impact on the ability of the elderly to cope, as well as affecting their ability to meet their nutritional needs.

Unlike children and mother for whom many programmes are designed to tackle their problems in order to control for their vulnerability, very little has been done for the elderly population. Organisations working in emergency and conflict situations do not consider the special food requirements of the elderly. Moreover information on this category of people is scarce. This needs to be reassessed and updated.

1. 2 Statement of the problem

The elderly population in Kenya is projected to increase in the next twenty years. Yet most programmes designed to assess nutrition situations are often targeting children and women.

The survey on the elderly population conducted in Nairobi in 1988 (Ethangatta, 1988) showed that the prevalence of malnutrition among males was 39% and 17% among females and about 63.6% were anaemia cases.

Despite their poor nutrition and health status, the elderly are victims of social discrimination. The traditional support that existed in Africa is being diminished because of changing lifestyle and socio-economic crisis in developing countries. After retirement age at 55 years in Kenya, the elderly realize that their saving might not be enough to secure their living. Matters are made worse because as in many sub-Saharan countries, Kenya is facing drought and tribal clashes. In some areas, the population can totally depend on food aid. Yet no nutritional assessment has been carried out in Baringo district for the age category of the elderly and no nutritional intervention focuses on them.

When the young adults go to look for new pasture, or to urban center for employment, or after death from clashes or AIDS, the old people are left behind taking care of younger children.

Social disintegration, economic problems, natural calamities and man-made conflicts may not only affect nutritional status but also the life expectancy of the elders. There is little effort to develop/implement intervention programmes for the elderly.

Some institutions, churches have taken up tasks of improving support required to some extent to the elderly population (e.g. Help Age International). Those charity organizations mostly operate in urban centers and rely more on external funding.

In rural areas such as Baringo, there was no specific program designed for the elderly during the drought period (of no rain for the last past three years). International organizations and NGOs operating in the area do not have any targeted intervention including the elderly. The elderly receive general ration as the younger adult. Given the severity of the drought, the loss of animals, absence of farming, tribal clashes make them more vulnerable to malnutrition.

This study is devoted to assess the nutritional status and the risk factors to nutritional vulnerability and hopefully will help to create awareness towards improving health and welfare of the elderly in emergencies.

1.3 Justification of the study.

While older people are commonly accepted as being a vulnerable group, at present, very little is done to meet their particular needs, or to recognize their unique capacities and contribution. Interventions often ignore special needs of the elderly. The interventions discriminate against and on occasion, undermine their capacity to support themselves (Help age International, 1999). Though agencies have spent significant resources in developing and improving best practice protocols for emergency nutrition intervention for children, it is

widely recognized that significant gaps exist in knowledge skills and capacity of the humanitarian agencies to respond to the nutritional needs of older people.

Health services in Kenya have not been tailored to the needs of the elderly due to lack of data on the needs demands and problems of the elderly.

1.4 Objectives

The general objective was to determine the factors affecting the nutritional status of the Tugen and the Pokot elderly in drought situation in Baringo district.

Specific objectives were:

1. To determine socio-demographic characteristic of families of the elderly.
2. To determine socio-economic characteristics of the household members including the elderly person.
3. To determine types of support systems in the community
4. To assess the dietary intake of the elderly persons.
5. To assess the nutritional status of the elderly.

1.5. Hypotheses

1. There is no association between household income and nutritional status of the elderly population.
2. Food intake patterns do not affect nutritional status of the elderly population in Baringo district.

1.7 Expected benefit of the study

The findings will hopefully, help improve the subject's welfare. It will also encourage the humanitarian agencies and relevant institutions to respond more effectively to nutritional needs of older people affected by emergency situation and take up the tasks of providing adequate food and other form of support that may be required by the elderly people who have no one to take care of them in the community.

CHAPTER TWO: LITERATURE REVIEW

2.1 Definition of the elderly

There is no clear defined classification of those who belong in the elderly group. Some authors stated that the elderly, the old, and the aged are relative terms without clear definition while others refer to the retirement age for classification. According to Staveren et al, (1994), the society and tradition have provided an arbitrary age of 65 years as a demarcation between middle age and old age that has no basis in the study of human ageing processes. Further, Staveren et al (1994) explains how this lower limit was set by Otto Von Bismarck (who died at the age of 83) in 1898; decided that this was the age appropriate for retirement. At that time life expectancy of a European aged 65 was seven years but nowadays it is more than 14 years. The upper limit of 75-80 years is often considered because until recently the proportion of population aged more than 80 years was very small and tends to get more handicaps, which make it difficult to participate in nutrition survey.

In some studies carried out in India, in Malawi and Tanzania refugee camps, and America the age considered by different authors was from 50 years and over (Pieterse, 1997; Dichter, 1992). This is not far from the Kenyan lower limit of retirement age, which is 55 years.

2.2 Overview of the ageing process

Demographically, the elderly are not a homogenous group. They have different preferences and practices given their respective lifetime experiences, food habit, physical and psychological stress, and health status that have an effect on the nutritional status.

Major determinants of life setting for the elderly are as followed: Age, motivation, education, job skills and availability, family support, presence or absence of physical illnesses, dementia, antisocial tendencies, ability to carry out activities of daily living (Roe, 1987).

2.2.1 Physiology and pathology of ageing

The ageing process is inherent and determined by genetic makeup such that within species and between species there is variability in time frame of the process. Physiological process of ageing is accompanied by immunodeficiency and loss of chemical protector mechanisms. Changes in immune function, somatic mutation, hormonal insufficiency, irreversible changes in structural proteins, acquired metabolic error, and free radical lipid per oxidation reactions all contribute to ageing. The rate of ageing process is influenced by physical and chemical environment and varies between individuals, tissues and organs. Pathological changes of ageing occur as a result of secondary diseases of the elderly.

Factors that affect the ageing process can also be categorised as a function of the genetic makeup and of the environment (Roland, 1984).

- Genetic components determine the life expectancy of a specie e.g. man at 70 years, mouse at 2 years
- Biological components of ageing process involve immune function, hormones responsiveness, and free radical lipid peroxidation, connective tissue and cellular ageing.
 - **Immune function.** With ageing, there is decrease in cellular immune function rather than humoral immunity that decrease the ability to distinguish self (normal cells) from non-self (foreign or abnormal cells) resulting from cellular self destruction “auto-immune manifestations”.
 - **Change in hormone responsiveness** by decreased receptor concentration
 - **Free radical lipid peroxidation reactions** occur and damage mainly in the membrane of the cell and in organelles.
- Ageing in connective tissue: collagen and elastin undergo quantitative and qualitative changes.

The above determinant factors of ageing process have different physiological and psychological effects on the elderly and influence food intake.

- Physiological factors are: sensory (taste, smell, sight, hearing and touch diminish), gastro-intestinal (reduced secretion, dental problems), metabolic (glucose tolerance deteriorates), cardiovascular and renal.
- Psychological factors are: sense of loss (depression), poverty, and social isolation.

2.3 Nutritional requirements of older people

Elderly people have particular nutrient needs related to their process of ageing in specific situation, just as a child has particular needs related to individual process of growth (Roland, 1984). Unfortunately, nutrient requirements for the elderly people have not yet been well explored and need more investigations. Earlier and recent studies are controversial about it (Eschleman, 1984). The reason is that, earlier guidelines have been developed by extrapolating the requirements of the young adult to the process of ageing. Given their heterogeneity, no general statement can be made about the elderly and each of them is an individual person. For the sake of nutrition adequacy, the diet must be built around baby food i.e. with high nutrient density and moisture content. Macronutrient intake does not change except energy requirement due to decline of basal metabolic rate.

2.3.1 Energy

Energy needs vary with age, sex, body size, activity, and environmental factors. It is supposed that energy requirements will be relatively lower for older people compared to younger adults as a result of decreased physical activity and decreased basal metabolism due to higher relatively less lean body mass (Debnay, 1977). However the energy-producing nutrients needs in the elderly remain poorly defined in quantitative terms (Young, 1985).

2.3.2 Proteins:

Different studies on the quantitative requirements of proteins have been made on the elderly. Some found that the elderly need more proteins than the young adult set at a

minimum of 0.7 g protein /kg (Kountz et al., 1997) while others found that the requirements were similar to those of the young adult (Roberts et al., 1948). The recommended daily allowance for proteins is estimated at 1g per kg of body weight per day (Eschleman, 1984).

2.3.3 Minerals and vitamins

The role of micronutrients in the ageing process is very important to sustain, maintain or cope with different physiological and metabolic changes that often happen. Unlike energy, micronutrient requirements are higher for the elderly person than it is for the young adult (Russell and Suter, 1993; Wood, 1995). Calcium and iron protect against osteoporosis and osteomalacia, anaemia and periodontal disease.

Calcium: Despite evidence to show that calcium has a positive effect on maintenance of bone health and prevention of osteopathic fractures, the data on effectiveness of calcium supplements for older people remains unanswered (Prentice, 1998). It has been demonstrated that calcium intervention is relatively more important during adolescence rather than during inter stages of life (Murray, 1996) and that physical activity during later years can also prevent to some extent the loss of bone mineral in older people. Moreover, it has shown that there is an age related decrease in absorption of calcium (Wood, 1995). Calcium supplements do have a positive effect in preventing mineral loss especially among those with habitually low intakes of calcium (Prentice, 1998; Murray, 1996) and that there is no great risk associate with taking supplements (Blumberg, 1994).

Iron: Research on levels of iron requirement for older people remains uncertain. Older women require lower iron in comparison to younger women. However, counter arguments to a lower requirement of iron suggest that in older people the body tends to store excess amounts of iron (Wood, 1995) and that high iron intakes may actually increase the levels of free radicals. However, reduced gastric activity (associated with older people) may result in less effective absorption of non-haeme iron (from vegetable source) and hence increased iron intakes in older people may be required in some cases. A study carried out in India showed that the prevalence of anemia which increased with age, was high (about) 71% among older women as compared with 38% among older men

Other trace minerals: Given the vital role in metabolic regulation and the action against the gamut of chronic diseases such as heart disease, osteoporosis, cancer, the trace elements cannot be ignored in the elderly diet (Dichter, 1992). Selenium, magnesium, zinc, cobalt are commonly needed (Tolonen, 1990).

Vitamins:

Studies on vitamin requirement have shown that the requirements for vitamins are higher than those for the young adult. Several focus are made on antioxidant vitamins (A, C, E), carotenoids, non-nutritive food constituents (flavonoids, indols) and other vitamins (B1, B2, B6, B9, B12). There are many factors causing an increase in requirements and in some cases, micronutrient deficiencies among older people. These are: the decreased actual energy intakes, the lower intakes of nutrient food, the reduced gastric acid activity absolute increase, the lower secretion of intrinsic factor, the chronic disease and gastro-intestinal bleeding (Russell, 1993; Wood, 1995).

Vitamin A: Requirements may be lower than the younger persons. This is due to decreased absorption through the intestinal luminal epithelial tissue as well as a decreased liver uptake characteristic in older people (Hopper, 1968; Ismail & Manandhar, 1999; Underwood, 1970; Blumberg, 1994). With all age groups, older people with poor nutritional status will be deficient in vitamin A. Anti-oxidant properties of vitamin A are important for older people suffering from chronic diseases (Richard, 1999; Herbert. V, 1998). Therefore maintaining similar intakes of vitamin A (as for younger adults) may still be important.

Vitamin D: Increased requirement RDAs for older people are due to the fact that::

1. A general lack of exposure to the sun for example, because older people are house bound reduces the kidney capacity to convert vitamin D to its active form.
2. A reduced capacity of the skin to synthesize vitamin D
3. A reduced capacity of the kidney to convert it to its active form (Ganny, 1982; Russel and Suter, 1993).

Comparative studies of older people carried out by (2q2Kane et al 1980) found that there is a wide range of physical capacity and functional ability independent of culture in industrialized society. In each of the several countries studied, it was found that 2.4% of elderly are bed ridden; the number of those who are house bound varies from 12-24%.

Vitamin B group:

The requirements of vitamin B2 are the same as for the younger adult. It is tied to the metabolism of energy expenditure. Deficiency has been associated with oesophageal cancer of the elderly people.

Vitamin B6 requirements are higher with increasing age. Its deficiency in older people results in decreased immune function and increased susceptibility to infections. Vitamin B6 is required for maintaining glucose tolerance and normal cognitive function. In older person where glucose tolerance increases (Blumberg, 1994), there is possible increase in requirement of vitamin B6 for older person. Vitamin B6 is also important in metabolism of vitamin B12 and folate, which provide protection against elevation in homocystein, an independent risk factor for cardio-vascular disease and depression (Garry, 1996; Blumberg, 1994 and Tucker, 1999). Due to a reduction of the secretion of hydrochloric acid and a reduced activity of intrinsic factor, there is a reduced capacity to absorb vitamin B12 in older people; therefore the requirement for vitamin B12 may also need to be increased (Blumberg, 1994; Allen and Casterline, 1994 and Herbert, 1998). The reduced actual form of folate tetrahydrofolate (THF) is B12 dependent, and hence a deficiency in vitamin B12 can result in a secondary folate deficiency (Quinn and Basu, 1996; Tucker, 1999; Boisvert et al., 1993 and Charlton, 1997) in older people.

2.3. 4 Fluid Intake

Water is a component of most body cell and cellular environments, essential to maintain body functions. Water intake is provided by fluid intakes, semi-solid and solids foods containing water and by metabolic processes, which produce water. At least 1.5 litres of water is needed per day.

2.3.5 Dietary fibre

Dietary fibre is not a nutrient but a substance that helps digestion process and absorption of nutrients. It prevents constipation and other diseases of the bowel. The major sources for fiber are fruits, vegetables and whole –grain.

2.4 Assessment of nutritional status of the elderly

2.4.1 Anthropometric measurements

The assessment of nutritional status through anthropometry can be made by measuring the weight, the height, the arm span or half span (if height cannot be measured or will not be accurate) and Mid-Upper arm Circumference (MUAC).

For individual assessment and monitoring or for monitoring and evaluation of interventions, weight and height (or Arm span or Half span) are preferred measures. MUAC is used for screening or in case it is not possible to measure other parameters (Ismail, 1999).

Then weight and height (Arm span or Half span) are converted into body mass index (BMI) that is the nutritional index for adults. BMI is a measure of chronic energy deficiency in adults. BMI ≥ 18.5 are usually taken as an indication of normal nutritional status. BMI between 17.0 and 18.4 is taken as a measurement of mild chronic energy deficiency. BMI between 16 and 16.9 is taken as a measurement of severe chronic energy deficiency. BMI < 16 is taken as a measurement of severe chronic energy deficiency. (Collins, 2000). In general a BMI less than 16 kg/m^2 is considered as severe malnutrition while a BMI less than

18.5kg/m² is considered as global malnutrition (i.e. both moderate and severe malnutrition) (Pieterse, 1997).

- **Weight** is measured using an electronic scale with digital display or an upright beam balance scale or mechanical scale, with a precision of 100 grams.
- **Height** is measured using stadiometer or solid board (scaled in centimetres) with sliding head piece or alternatively using a measurement tape in centimetres, fixed to a wall or door post, ruler or wood as head piece.
- **Arm span and Half span** The anthropometric measurements of “the distance from tip of the middle finger of the left arm to the tip of the middle finger of the right arm with the arms stretched out”. Arm span can be a useful proxy for height, especially for older people whose ability to stand straight is affected by spinal disease. This measurement is converted to an estimate of height using correction factors specific to the population. They are also measured when the person’s back is bent and he/she cannot stand straight; or when the person cannot straighten his/her legs. Steel or fiberglass measuring tapes (in cm) with metal tip for placing at ends of fingers are recommended or alternatively non-stretch fabric or plastic measuring tapes in centimetres can be used.
- **MUAC.** Often used for screening purposes in emergency situation where people are assessed quickly and with few resources. The recommended equipment is a steel or fiberglass measuring tape (in cm) with metal tip for placing it at ends of fingers or alternatively a non-stretch fabric or plastic measuring tape in centimeters. In this study, MUAC (Castaneda et al 1997) was used as the index for assessing a cute malnutrition in older people based on the following reasons: The study population was drawn from parts of Baringo district that was experiencing drought then. MUAC is quicker and easier than BMI measurement, it requires less sophisticated equipment, it involves no calculation and

can be used on people with kyphosis (Pieterse 1998), However, given that there continues to be considerable debate over the appropriateness of BMI versus MUAC and a continuing lack of information on cut-off points for increased risk of mortality, it is recommended that while MUAC (In conjunction with clinical criteria) be used for purposes of admission, measurements of weight and height(or arm-span) are collected for purposes of operational research.

2. 4. 2 Food intake

Information on food intake can be collected through diet history, food frequency and amount questionnaire or the 24-hour recall. The method to be used must consider that the elderly usually have memory lapse to recall events passed a long time ago (Mc Dowell, 1985). Food habits and food preferences that vary among the elderly lead to malnutrition. In a comparative study of food sources of nutrients in diets of elderly in Italy and the US, Friedman.P.(1991) found that both populations had white bread as their first source of energy but with much preponderance of vegetable and less processed food in Italy than in the US.

2. 5 Factors affecting the nutritional status of elderly

Studies have shown that older people have a set of characteristics that make them a vulnerable group in terms of nutritional status. First, organ functions and metabolic parameters decrease progressively with age, secondly a number of chronic degenerative condition e.g. arteriosclerosis increase infrequently as age advances. Factors that determine

food intake are first those found in the young adult. Secondly the appetite can be altered by physiological or psychological problems, which may be associated with acute or chronic disease, as the age increases, loss of sense of taste and smell, problem of dental status and swallowing. Another important factor in the elderly nutrition is the effect of drugs. The elderly are known to be chief users of drug and special diet. Drugs can interfere in the absorption of nutrient or simply cause anorexia or nausea, which would reduce the quantity of food eaten (Eschleman, 1984).

Risk factors to nutritional vulnerability are given in **Figure 1**. Under normal conditions, older people are at increased risk of becoming malnourished in comparison to some other population groups. Some of these risk factors are summarized in figure 1 below. At an individual level, it is essential to understand why an older people/person or group of older people person is malnourished or is at risk of becoming malnourished i.e. the causes of malnutrition (HelpAge International, 1999). Not all the risk factors will apply equally to all older people/persons, different risk factors may be linked and will have a synergistic effect and, the presence of risk factors does not necessarily lead to malnutrition. In essence, risk factors are often situation –and individual specific. For the purposes of intervention at a population level in emergency situations in this case drought, it is necessary to examine risk factors at household and community level. Some of these underlying causes (at household and community level) and basic causes (at a population level), which may influence older people’s vulnerability as discussed. In particular, it is the external changes that affect the household and community, as “caring units” that should be the focus in considering the likelihood of increased vulnerability for older persons. The figure below, illustrates some of

the potential causes of malnutrition in older people in emergencies .The extent to which each factor contributes to an increased risk will differ in different emergency situations.

Figure 1.



2. 6. Changes in the external and social environment in emergency situation

Changes that are likely to affect the elderly in emergency situations include stressful events for example displacement, loss or livelihood or death of family members and many others (Howe, 1981). Loneliness is a common phenomenon amongst the elderly in emergency situation.

During crisis situation, older people in emergency situation are always in reduced financial circumstances particularly the disabled ones (Briggs, 1984). There is also general breakdown of normal support structures within the communities. The disruption or loss of support structures as a result of conflict, severe food shortages and loss of livelihoods will have negative impact on the older people's ability to access the food. Once these structures are broken down, the community capacity to care for and prioritize its most vulnerable members such as the elderly may no longer be adequate (WHO, 1988).

Family separation that occurs when the population flee or travel for large distances may result in older people experiencing dramatic changes to their normal practice of food production. Social responsibilities of older people may also change e. g. older people care for younger children once the stronger population groups have left in search of food, employment or pasture (WHO, 1988).

2.7 Food processing and preparation

Not only are whole grain cereals and beans difficult to digest for older people but these foods are relatively more difficult to prepare. Foods that are not precooked or are in whole grain form will often require substantially longer time. A lack of access to fuel, water, cooking material and medical facilities will aggravate the situation for many of the older people, especially those living alone (Howe, 1981). In many emergency situations, resource such as fuel and water are limited and older people may consequently be unable to prepare their food.

2.8 Access to food through coping mechanisms

Food is usually accessed through mechanism such as informal trade and labour, fishing, labour activities in exchange for food and others. People often do not experience the same opportunity as those of younger adults. Therefore, while those households with active members will attain adequate food for household, older people living alone will often remain or become increasingly food insecure. For example in the recent drought 2000 in Baringo, the older members living alone may be more vulnerable since they might be less able to adopt to knew means of livelihood.

CHAPTER THREE: METHODOLOGY

3.1 STUDY SETTING

3.1.1 AREA OF STUDY

Baringo district is one of the fourteen districts in Rift Valley province. It covers an area of 10,949 km² and lies between 35°30' and 36°30' longitudes East and between 0°10' South and 1°40' north latitudes. It borders Turkana and Samburu districts in the north, Laikipia at the East, Nakuru and Kericho in the south and Uasin Gishu, Elgeyo Marakwet and West Pokot at the west. Topographically, the district can be divided into: river valleys and plains, the Tugen hills, the floor of the rift valley and the northern plateau. The Tugen Hills mainly consist of volcanic rocks and have escarpments on the east and west. Their altitudes vary from 300 to 100 metres above the sea level.

Baringo district is one of the arid and the semi-arid districts in the country (UNICEF-KCO&UNDP,1996). The rainfall, reliable at 50% varies from 1000 to 1500 mm in the high lands to 600 mm in the northeastern part of the district.

The main staples during drought period are maize, beans, millet and cassava. Livestock activities include herding (of cows, goats, sheep and camel) and poultry keeping.

3.1.2 POPULATION COMPOSITION

The district is divided into twelve divisions with a total population of 347, 990 (172,847 males and 175.143 females). The population density is 32 persons per square kilometre.

Baringo district is cosmopolitan with the Pokots, the Njemps and the Tugen ethnic groups.

Table below indicates divisions of Baringo district, approximate area size, population and rank of severity of drought.

Table 1: Divisions of Baringo district with their respective approximate areas, populations and Rank on drought.

Division	Area (km ²)	Approximate population	Rank on drought*
Sacho		16,353	3
Nginyang	3,253	25,992	1
Tenges	373	14,960	3
Marigat	1,346	48,642	3
Kipsaraman		36,262	3
Tangulbei	995	18,251	1
Kabartonjo	1,868	47,748	4
Muchongoi	315	5,737	4
Kolowa		18,389	1
Kabarnet	619	72,208	4
Barwesa		35,679	2

Source: Unicef-KCO and UNDP compiled by ANP(1996)

* Rank on drought: 1-4 = from the least to the most severely affected.

3.1.3 INFRASTRUCTURE AND SOCIAL SERVICES FACILITIES

A total of two hospitals, 11 health centres and 61 dispensaries were registered in the Baringo district. Several non-governmental organizations and churches work with the communities for different programs aimed at welfare improvement. Among them are the Kenya Freedom from Hunger Council (KFFHC), World Vision International, and the Catholic mission, Kipsaraman Integrated Development, Morop Christian Children's Fund and Christian Children's Fund.

3.2 RESEARCH METHODOLOGY

3.2.1 STUDY DESIGN

The study was cross-sectional in nature. Its major aim was to assess nutritional status of the elderly population. A pre-tested questionnaire with pre-coded and a few open-ended questions, was used to collect the data from the two populations. Trained enumerators administered the questionnaire. The elderly aged more than 55 was the targeted respondent.

3.2.2 METHOD OF SAMPLING

3.2.2.1 Sample size determination

The sample size of the study was computed using the formula for cross-sectional survey (Fisher et al., 1986) for population more than 10000. To calculate the sample size, the prevalence rate of malnutrition from the Turkana nutrition and socio-economic assessment

(Busolo. D, 2001) of the older people that indicated global malnutrition rates of 20.5% was used.

$$n = \frac{z^2 pq}{d^2}$$

Where:

n = the desired sample size in each of the groups (each group with equal sample size)

z = Standard normal deviation, set at 1.96 which corresponds to 95% confidence.

p = Prevalence of malnutrition among the elderly population estimated to be 20%

q = 1-p= that is the proportion of well nourished in the elderly population = 80%

d = Degree of desired accuracy set at 0.05 or maximum error (5%) for 95% confidence interval.

Therefore; $n = 1.96^2 \times 0.2 \times 0.8 / 0.05^2 = 246$

Sample size was estimated to be 250 elders.

3.2.2.2 Sampling Procedure

The sampling procedure used in selecting study samples is shown in **Figure 2**. The study population from the two communities (ethnic groups) was purposively selected from two divisions namely: Barwesa and Kollowa, where ten locations were selected.

Selection of household within location

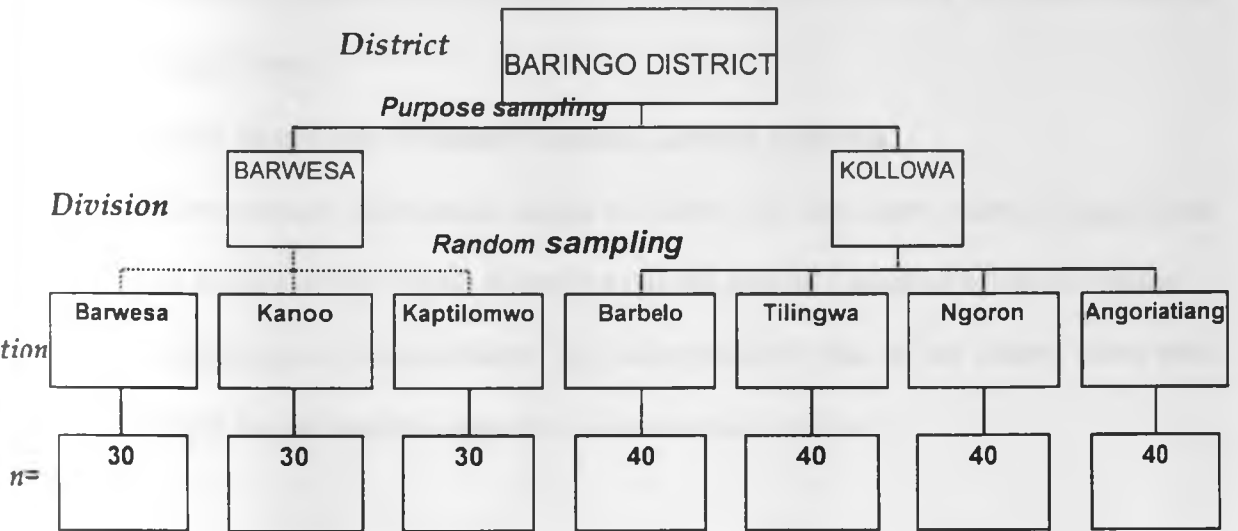
The field assistants went to the center of the selected location. Direction was chosen randomly by spinning a bottle on the ground noting the direction in which it points. The direction of the bottle indicated the direction where the field assistant was supposed to go to

select the first household. Due to the big geographical area, it was difficult to mark the center to the periphery of the location by counting all households in the selected direction. Rather a random number was chosen between one and five to select the first household among the five households counted in the selected direction. For example if "2" was selected, the study team went to the second household along the randomly chosen direction and examined all the elderly belonging to the household.

After the first household had been surveyed the team went to the next nearest house, same direction as was selected earlier. At the location boundary the team moved to the next house on the left hand side within the boundary of the location following the nearest household pattern until the required number had been interviewed.

When choosing nearest house within the location, we decided during the training to follow left hand through out. There were no elements of deliberate choice or bias by the team in selecting the sample houses. All elderly 55 years and over belonging to each selected household were included in the study.

Figure 2:



Flow chart showing the sampling procedure

3. 2. 3 RESEARCH INSTRUMENTS

The study used a semi-structured questionnaire, which had two parts. The first part dealt with quantitative data. The second part dealt with qualitative information. The quantitative data included demographic and socio-economic information, 24-hour recall of all food items consumed in the household and anthropometric measures (Appendix 1).

Different sections used in the questionnaire were.

1. Socio-demographic and socio-economic section: This consisted of identification of household members (their age, sex, education level, occupation and money

contribution to household finance), source of income, animal owned and died within the 12 last months.

2. Social support system: this section has information on type of support received, food aid (ration), quantity of food received, source of food consumed, and preparedness to drought event.
3. Dental status: Type of dental infections, chewing problems.
4. 24-hour recall: Information sought was time food was eaten, name of ingredients, and amount of ingredients in family meal and amount consumed by the old person.
5. Anthropometric measurements: the anthropometric data of the elderly taken were weight, height and mid-upper arm circumference (MUAC)

3.2.4 IMPLEMENTATION OF RESEARCH ACTIVITIES

3.2.4.1 Training of field assistants and pre-testing of questionnaires

Four enumerators were recruited and trained. All of them had secondary school education and had knowledge of the study community language.

The researcher trained the assistants for four days. The training covered the study objectives, the survey instruments and interviewing techniques. Training was done on how to address and approach subjects in a culturally acceptable manner.

Pre-testing was done in 15 households in which data was collected and analysed before the major data collection. Minor changes on the structure of the questionnaire were made, where necessary. These questionnaires were not included in the final analysis. The pre-testing was also taken as an opportunity to retrain the field assistants.

3. 2. 4. 2 Data collection

Socio-demographic and socio-economic characteristics

Socio-demographic and socio-economic data were collected from the selected households during the first visit to the households.

Dietary intake

For 24-hours recall, respondents were asked to indicate the amount of all ingredients used to prepare the meals. This was done using household measures and food models collected during the pre-testing phase. Detailed description of all meals and the ingredients were recorded using the proper section designed for that in the questionnaire (Appendix 1).

Household measures of each ingredient were converted into grams and/or milliliters. Fluid measuring cylinders graduated in milliliters of capacity 1000ML, 500ML and 100ML were used to measure cooked and raw food items. Volumes were converted into grams using the food conversion factors produced by FAO before software computation into nutrients.

Anthropometric measurements

Anthropometric measurements were taken using adult weighing scales for weight and adult tape measures for arm span or half span. MUAC tapes were also used to measure the Mid Upper Arm Circumference.

3.2.5 DATA QUALITY CONTROL

Procedure used to ensure quality data was collected included careful training of interviewers, close supervision of the field assistants during the actual survey, and daily check by the researcher for consistency, completeness and clarity of the completed questionnaire.

3.2.6 DATA PROCESSING AND ANALYSIS

Data processing and analysis involved the following packages:

- a) Nutrition survey software (Update 2000) was used for data entry, plausibility check of data, data cleaning and for conversion of raw data of 24-hours recall food intake to nutrients and to assess the fulfillment of requirements. The Kenya food database was selected as a reference for nutrient composition of foods.
- b) The statistical package for social scientists (SPSS, version 8.0) was mainly used for data analysis. Descriptive statistics, comparison between means and proportions of
- c) Different variables affecting the nutritional situation in households were done by assessing the significance levels at 0.05 of chi-square test, student t-test. Odd-ratios were applied to test for the risk of malnutrition due to different nutritional vulnerability factors.
- d) Graphs were plotted using SPSS program and Excel.

CHAPTER FOUR: RESULTS

4.1 Socio-demographic characteristics of the study population

Population composition, age and gender of the Elderly

The study sample involved 250 households of the elderly with a total population of 795 from two communities, Tugens of Barwesa division and Pokots of Kolowa division. The male population was lower (Tugen 47% and Pokot 49.5%) than female (Tugen 53% and Pokots 50.5%) but there was no significant difference between the two sexes (Table 2). Of 250 respondents with a distribution of males and females of 42.4% and 57.6 % respectively, about a third (36%) were Tugens and the rest (64%) were Pokots.

Table 2 Distribution of the elderly population by general socio-demographic characteristics

Characteristic	Area				Total		Test	
	Tugen		Pokot					
	N	%	N	%	N	%	χ^2	p
Total population								
Male	110	47.0%	277	49.4%	387	48.7%	0.28	0.586
Female	124	53.0%	284	50.6%	408	51.3%		
Total	234	29.4%	561	70.6%	795	100%		
Elderly population								
Male	35	38.9%	71	44.4%	106	42.4%	0.71	0.113
Female	55	61.1%	89	55.6%	144	57.6%		
Total	90	36%	160	64%	250	100%		
Marital status (elderly)								
Married	23	25.6%	97	60.6%	120	48.0%	28.38	0.000
Single	3	3.3%	6	3.8%	9	3.6%	0.57	0.451
Separated	18	20.0%	11	6.9%	29	11.6%	12.26	0.005
Widowed	46	51.1%	46	28.8%	92	36.8%	33.3	0.000

The ratio of male to female was not significantly different both for the whole population and between the two populations. There were more Pokot elderly married (above two thirds 60.6%) than there were among Tugen (slightly more than a quarter 25.6%). There were significantly more widowed Tugen elderly (slightly more than a half 51.1%) than there were Pokot elderly (slightly more than a quarter 28.8 %). Overall, slightly there were more than a third (36.8%) widowed.

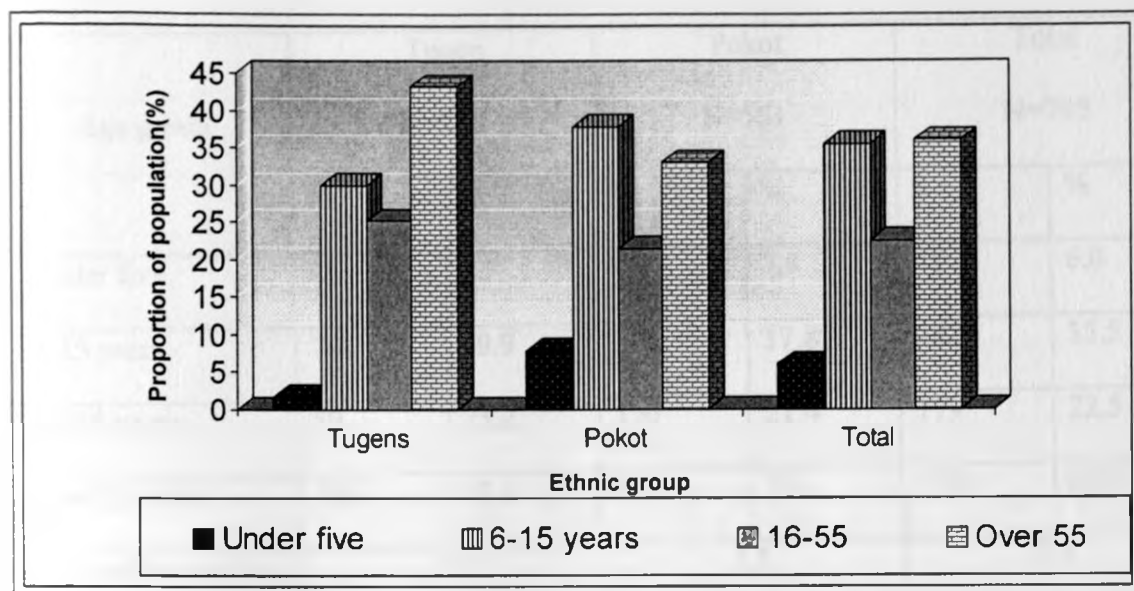
For both Tugens and Pokots, the mean age of the elderly population is the same approximately 73 years as shown in Table 3.

Table 3: Distribution of the elderly population by age and household size and by division

Age and household size	Area		Total	Test	
	Tugen	Pokot		t-test	p
	Mean ±SD	Mean ±SD	Mean ±SD		
Age of elderly population	73.1±9	73.2±9.8	73.1 ±9.5	-0.092	0.952
Age household member	42±29.1	33.6±28.9	36.1±29.2	-0.097	0.970
Household size	3.9±2.3	2.6±1.3	3.4±2.1	-4.848	0.000

The general population had a mean age of 36 ±29 years. Pokot population (34± 29 years) was significantly younger than Tugen (42 ±29 years) (p<0.01). The household size for the whole population was 3 persons; this was significantly smaller for Pokot (3 persons) than for Tugen (4 persons) (p <0.01).

Figure 3: Distribution of the population in elderly households by age categories



Dependency ratio (= population aged < 15 years + population aged >55 years / population aged 15 to 55 years), was 3.44 for the total population (Table 2). The population whose age was over 55 years represented in slightly more than a third (36%) while those whose age was 15 years and below were 41.5%

Households where lived elderly people had less than a quarter (22.5%) of reproductive age population with as low as 2.4% of active population for Pokots and 25.2% for Tugens. The proportion of the elderly living alone was 18.8%. It did not differ significantly between the two communities ($p > 0.05$).

Table 4: Age group repartition of the total population and dependency ratios in households where lived the elderly.

Age group	Tugen N=234		Pokot N=561		Total N=795	
	N	%	N	%	n	%
Under five	4	1.7	44	7.8	48	6.0
6-15 years	70	29.9	212	37.8	282	35.5
16-55 years	59	25.2	120	21.4	179	22.5
Over 55 years	101	43.2	185	33	179	36.0
Dependency ratio	3.0		3.7		3.4	

The distribution of male and female elders among different age categories was not significantly different ($p>0.05$). However female were in higher proportion for the category of age below 76 years and above 85 years than were male (Table 5).

Table 5: Distribution of the elderly households by age category and by sex.

Age and sex of the elderly		Age groups				p
		<65 years N=51	65-75 years N=95	76-85 years N=71	>85 years N=33	
Sex	Male	20 (39.2%)	36 (37.9%)	36 (50.7%)	14 (42.4%)	0.391 ^a
	Female	31 (60.8%)	59 (62.1%)	35 (49.3%)	19 (57.6%)	
Mean age		61.39 ±1.6	69.4 ±2.5	78.76 ±2.1	89.97±1.6	0.000 ^b

^a significance level based on χ^2 chi-square test ^b: significance level based on t-test

Education level of Pokot and Tugen elderly population

Table 6 indicates education levels of the elderly population. The elderly population had low level of education with about 98.6% who did not attend school (especially all Tugen elders and 97.8% of Pokots). Pokot elders were more educated than the Tugens ($p < 0.001$).

Table 6 Education levels of elderly Pokots and Tugens

Characteristic	Tugen		Pokots		Total		χ^2	p
	N	%	N	%	N	%		
Education level								
Completed primary	-	-	2	1.1	2	0.7		
Adult education	-	-	2	1.1	2	0.7		
Not attended school	101	100	181	97.8	282	98.6	8.57	0.004

4.2 Socio-economic characteristics of the study population

The main occupations in the two communities were herding, casual works and domestic activities (Table 7). The type of occupations differed significantly ($p < 0.01$) between the Pokots and the Tugens. The latter had close to three quarters (70.3%) without any occupation, 14.9% were in herding and domestic services. Among the Pokots, more than half (58.9%) were herding, slightly more than quarter (29.2%) did casual work or had no occupation.

The major source of income was the sale of animals for close to two thirds of the total population (60.8%). About one quarter (23.2%) relied on gift from relatives, 16 % had no

income source and the rest had other sources or farming. Slightly more than three quarters (76.4%) owned animals distributed as follows: about three quarters (73.2%) owned goats and sheep, about half (52%) had cows, 3.6%, 2.4% chicken, donkeys and camels respectively. The mean numbers of animals owned were respectively 3 cows, 8 goats and sheep and one or less for chicken, camels and donkeys. Animals, which had died in the past twelve months, were on average respectively 10 cows, 14 goats and sheep, and one or less for chicken, camels and donkeys.

Table 7: Occupation and source of income of the elderly Pokot and Tugen population.

Occupation and source of income	Community				Total		χ^2 test	p
	Tugen		Pokot		N	%		
Occupation	N	%	N	%				
Domestic services	15	14.9	22	11.9	37	12.9	0.39	0.530
Herding	15	14.9	109	58.9	124	43.4	61.01	0.001
None/casual labour	71	70.3	54	29.2	125	43.7	45.02	0.001
Source of income								
Sale of animals	34	37.8	118	73.8	152	60.8	22.43	0.000
No income source	20	22.2	20	12.5	40	16.0	6.00	0.015
Gifts	36	40.0	22	13.8	58	23.2	28.42	0.000

Pokot people relied significantly ($p < 0.001$) on sales of animals (73.8%) than the Tugen (37.8%) who instead depended mostly, about half of the population, on gifts from relatives (40%) while close to a quarter (22.2%) had no source of income compared with only 13.8% and 12.5% respectively for the Pokots.

Table 8: Distribution of households of elderly by ownership of animals and number of animals. which died for last 12 months.

Animals	Proportion own		Number owned	Number died
	N	%	Mean \pm SD	Mean \pm SD
Goats and sheep	183	73.2	8.2 \pm 8.8	14.4 \pm 8.9
Cows	130	52	2.7 \pm 4.0	9.6 \pm 18.3
Chicken	9	3.6	0.2 \pm 0.9	0.1 \pm 0.8
Donkeys	6	2.4	0.1 \pm 0.4	0.2 \pm 1.8
Camels	6	2.4	0.1 \pm 0.4	0.2 \pm 0.4

Table 8 shows that goats and sheep were the most commonly owned animals for about three quarters of the population (73.2%), followed by cows by more than half of the population (52%). Other animals such as chicken, donkeys and camels were owned in small proportion by less than five percent (i.e. 3.6, 2.4 and 2.4% respectively).

The average number of animals owned was 8; 3; 1; 1 and 1 for goats and sheep, cows, chicken, donkey and camels respectively. These results reveal that the number of animal which died during the previous year prior the survey was higher than the actual number of animals owned by the population.

Table 9: Distribution of households of elderly by ownership and loss of livestock ^a.

Community	Animal									
	Goats /sheep		Cows		Chicken		Donkeys		Camels	
	Owned	Died	Owned	Died	Owned	Died	Owned	Died	Owned	Died
Tugens	7.5 (10.9)	4.4 (6.4)	1.31 (3.4)	2.2 (6.9)	0.3 (1.1)	0.1 (0.36)	0	0	0	0
Pokots	8.53 (7.5)	20.1 33.3	3.4 (4.1)	13.8 (21.3)	0.1 (0.9)	0.1 (1.0)	0.1 (0.5)	0.3 (2.3)	0.09 (0.5)	0.3 (2.3)
P*	0.000	0.000	0.392	0.000	0.288	0.698	-	-	-	-

^a: values are mean and (SD)

* based on t-test

Between the two communities, ownership and loss of animals showed a significant difference based on comparison between means using t-test. The results as indicated in Table 9 reveal that the Tugens owned and lost significantly, respectively fewer goats (8 and 4) and cows (1 and 2) than the Pokot (9 and 20 goats; 3 and 14 cows). The mean number of chicken owned by the Tugens was higher but not significantly different from that owned by the elderly Pokot. Neither camels nor donkeys were found in The Tugen elderly households.

4.3 Food consumption

About a quarter of the households (24.6%) had at least one lunch in the 48 hours prior the survey (Table 10). Much significantly higher proportion of households among the Pokots (19.8%) took lunch than those among the Tugens (4.8%) ($p < 0.01$). All the population reported they took at least one supper. About 3.3% of the Tugens (none of the Pokots) had a snack.

The majority of population (89.4%) preferred maize as part of their ration for making Ugali that they consume. There were more but not significantly Tugens (98.9%) who preferred maize than for Pokots (83.4%).

Table 10: Distribution of households of elderly by meals taken and food preference

Food consumption	Tugens		Pokots		Total		Statistical test	
	N=90		N= 160		N=250			
Meal	n	%	n	%	n	%	χ^2	p
% Took lunch	12	4.8	49	19.8	61	24.6	9.34	0.000
% Took snack	3	3.3	0	0.0	3	1.2	2.97	0.045
% Took supper	90	100	160	100	250	100	-	-
Food type preference								
Maize	89	98.6	121	83.4	210	89.4	23.19	0.001
Pulses	1	1.4	106	73.6	107	36.8	97.19	0.000
Unimix	0		26	17.9	26	11.1	14.64	0.001
Oil	0		86	40.4	87	36.8	73.74	0.000
Milk	0		4	2.8	4	4.1	0.97	0.165

The average number of meals per day was one meal in general. Pokot elders had significant ($p < 0.01$) more number of meals per two days (about three meals) than the Tugens (about two meals).

The number of meals varied also with trend to decrease with the actual age as shown in Table 11. The observed proportion of population who took lunch showed a decreasing trend with age from 31.4% in the elderly category of less than 65years to 9.4% in the Elderly category above 95 years; but that difference was not significant ($p > 0.05$).

Table 11: Distribution of households by number and type of meals and by different age groups.

Meals	Age category of the elderly								p
	<65 years		65-74 years		75-84 years		>84 years		
	n	%	n	%	n	%	n	%	
Number of meals	2.27±0.9		2.24±1.0		2.21±0.8		2.06±0.9		0.72
% Took snack	1	2	1	1.1	1	1.4	0	0	-
% Took lunch	16	31.4	27	28.4	15	21.4	3	9.40	0.094
% Took supper	51	100	95	100	71	100	33	100	-

The proportion of recommended daily allowances (RDAs) was for iron 75.2%, vitamin A 65.6% while that of the others was less 50%. The average energy recommended daily allowance was about 27.8% and protein intake 22.8% using FAO/WHO recommendations.

Table 12 below shows average nutrient intakes and average percentages of fulfilment of recommended dietary intakes.

Table 12. Average nutrient intakes of the elderly Pokots and Tugens in Baringo district.

Nutrient	Intakes	% of households fulfilling RDAs
	Mean ±SD	%
Energy (Kcal)	543.7±171.6	27.8%
Protein (g)	13.2 ±7.1	22.8%
Fiber (g)	12.8±31.9	31.9%
Calcium (mg)	62.4±47.4	7.8%
Iron (mg)	7.6±4.5	75.3%
Zinc(mg)	2.1±2.2	16.4%
Vitamin A (ug)	547.0±255.7	65.6%
Vitamin B1 (mg)	0.3±0.3	28.3%
Vitamin B2 (mg)	0.3±1.1	13.8%
Vitamin B6 (mg)	0.2±0.2	23.4%

4.4 Nutritional status of elderly population in Baringo

The nutritional status was poor with 82.4% of elderly people being malnourished. Tugen elders reported higher proportion of underweight, about 2 times more likely to be malnourished (OR: 2.2; 95% CI: 1.1-4.6) compared to the Pokots. The prevalence of malnutrition as shown by those with BMI < 18.5 was 88.9% among the Tugens and 78.8% among Pokots (Table 13).

Table 13: Distribution of Underweight (BMI <18.5) among different age group of the elderly Pokots and Tugens.

Age category	Tugen- Barwesa N=90		Pokot- Kolowa N=160		Total		Statistical test	
	n	%	n	%	n	%	χ^2	p
Less than 65 years	13	14.4	29	18.1	42	20.4	1.38	0.26
65-74 years	35	38.9	40	25	75	38	3.05	0.08
75-84 years	23	25.6	35	21.9	58	28.4	0.02	0.87
More than 84 years	9	10	22	13.8	31	13.2	3.95	0.29
Total	80	88.9	126	78.8	206	82.4	4.08	0.04

The rate of malnutrition was high for elderly aged 65 to 74 years, but no significant difference was found (p=0.08) as shown in Table 14. The average BMI was slightly higher than 16.5 for the total population.

Table 14: Average body mass index (BMI) and mid-upper arm circumference (MUAC) by age category of the elderly in Baringo District.

Age group	Body Mass Index (Mean ±SD)
Less than 65 years	16.5±2.6
65-74 years	16.8 ±2.7
75-84 years	16.8 ±2.3
More than 84 years	16.7 ±1.6
F-test	1.43
P	0.234

The Mid Upper Arm Circumference was significantly decreasing with age of the elder (F=7.99, p = 0.002). Figure 4 shows a similar trend of MUAC for both males and females. Meanwhile that difference was not significantly influenced by the sex of the individual. The average MUAC was high for elderly males aged less than 65 years and those aged more than 84 years while the same was noticed for females aged between 65 years and 84 years.

Figure 4: Change in mid upper arm circumference with age and sex

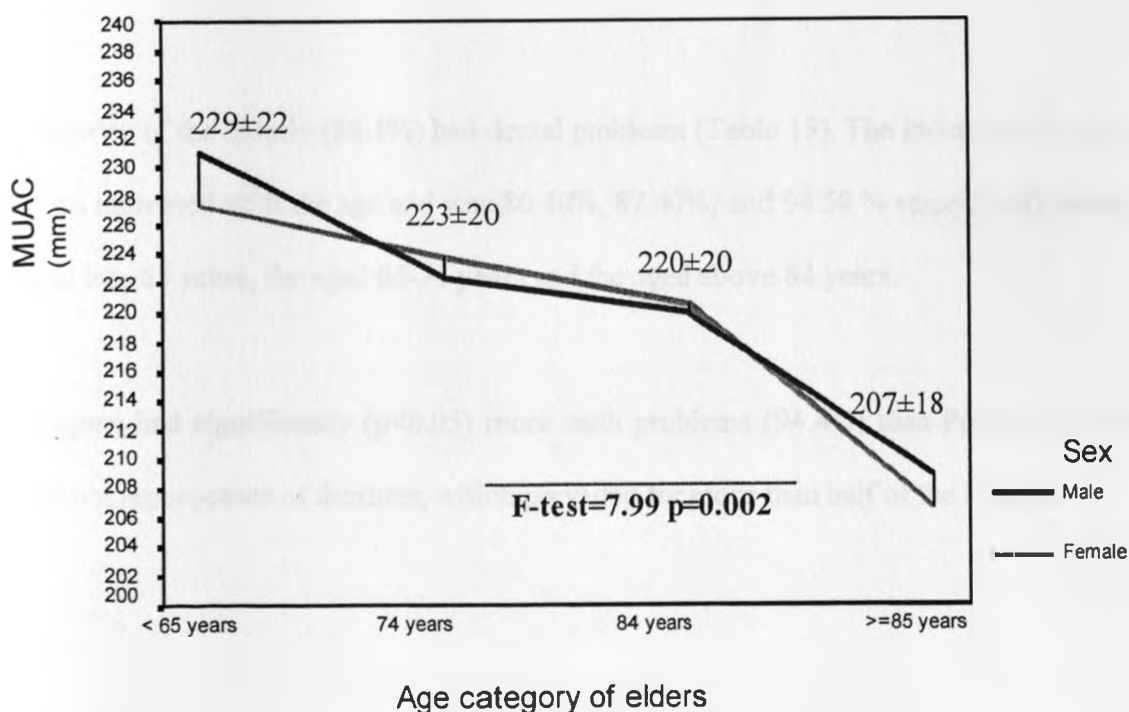
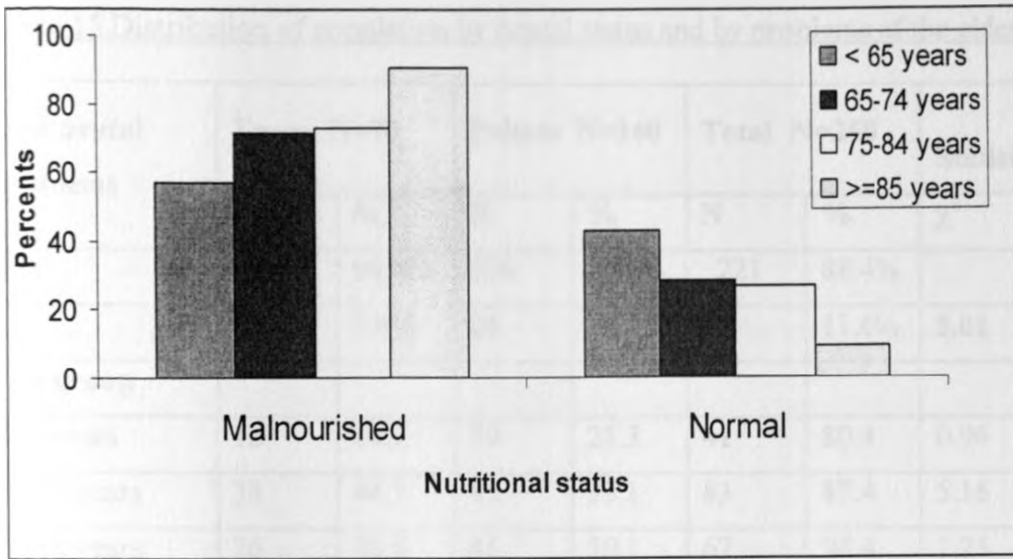


Figure 5: Classification elderly by MUAC and by age category.



The distribution of elders according to nutritional status was close to the normal curve with number of malnourished increasing with age while the number of well nourished decreased consequently.

4.5 Dental status

The majority of the elderly (88.4%) had dental problems (Table 15). The incidence of dental problems increased with the age and was 80.40%, 87.40%, and 94.50 % respectively among the aged less 65 years, the aged 65-74 years and the aged above 84 years.

The Tugens had significantly ($p < 0.05$) more teeth problems (94.4%) than Pokots (85.0%) and did not report cases of dentures, which prevailed for more than half of the Pokots.

Table 15 Distribution of population by dental status and by problems of the elderly.

Had dental problems	Tugen N=90		Pokots N=160		Total N=250		Statistical test	
	N	%	N	%	N	%	χ^2	P
Yes	85	94.4%	136	85.0%	221	88.4%		
No	5	5.6%	24	15.0%	29	11.6%	5.01	0.025
Age group								
<65 years	12	14.1	29	21.3	41	80.4	0.96	0.36
65-74 years	38	44.7	45	33.1	83	87.4	5.16	0.023
75-84 years	26	30.6	41	30.1	67	94.4	1.25	0.263
> 84 years	9	10.6	21	15.4	30	90.9	0.17	0.834

Slightly more than two thirds (38.9%) had dentures, close to a third (29.9%) had missing or decayed teeth (31.2 %). All those with teeth problems reported that the chewing capacity was affected (Table 16)

Table 16 Distribution of elders by type of dental problems they experience and by ethnic group.

Types of dental problems	Tugens N=90		Pokots N=160		Total N=250		Statistical test	
	N	%	N	%	N	%	χ^2	P
Missing teeth	38	44.7	28	20.6	66	29.9	14.3	0.0001
Decayed teeth	47	55.3	22	16.2	69	31.2	47.5	0.000
Dentures	--	-	86	63.2	86	38.9	87.9	0.000
Total	85	94.4%	136	85.0%	221	88.4%	5.01	0.025

4.6 Support systems

Within the community, the major source of support was provided by the child of the elderly as reported by close to a half (42.4%). Almost half of the population (46.8%) reported having self-support. Close to two thirds of elderly Tugen (62%) were supported by their children while almost the same proportions of child-support (42.4%) and self-support (46.8%) characterized Pokots. Priority in times of scarcity was most given to children (84.3% stated by elders). Significant difference in this prioritization was found among Pokots (90.5%) and Tugen elders (73.3%).

Significantly higher number of elderly Tugen (100%) received food ration compared to elder Pokots (80%).

Table 17 Source of support of the elderly among Pokot and Tugen

Support	Area						p
	Tugen N=90		Pokot N=160		Total		
	n	%	n	%	n	%	
Food relief	90	100	128	80.0	218	87.2	0.000
Community support							
Children	56	62.2	50	31.3	106	42.4	
Other members	12	13.3	15	9.4	27	10.8	
Self	22	24.4	95	59.4	117	46.8	0.000

Most of the elderly (84.5%) gave priority to children in times of food scarcity, 14.5% give priority to themselves and the remaining 1.2% stated that men should be given first priority (Table 18).

Table 18: Distribution of households by priority given for food during time of shortage.

Priority when food shortage	Area				Total N=250		Statistical test	
	Tugen N=90		Pokot N=160					
	n	%	n	%	N	%	χ^2	p
Children	66	73.3	143	90.5	209	84.3	13.88	0.001
Self	23	25.6	13	8.2	36	14.5		
Men	1	1.1	2	1.3	3	1.2		

4. 7 Factors affecting nutritional status of the elderly in Baringo district

4. 7. 1 Social and economic factors

The proportion of malnutrition among people who were living alone (72.3%) was not significantly different as compared to that of those living with at least one other person (84.7%). However Table 19 reveals that significantly more married elders were about three times less likely to be malnourished (44.7%) than unmarried elders (55.3%) showing an odds ratio of 2.8 (95%CI: 1.3-5.9).

Table 19 association between social, economic factors and nutritional status

Characteristic	Underweight N= 206		Normal N=44		Statistical test	
	n	%	N	%	p	Odds ratio
Live alone						
Yes	34	72.3	13	27.7	0.072	0.5(0.2-1.1)
No	172	84.7	31	15.3		
Marital status						
Married	90	44.7	30	68.2	0.005	2.8(1.3-5.9)
Not married	116	55.3	14	31.8		

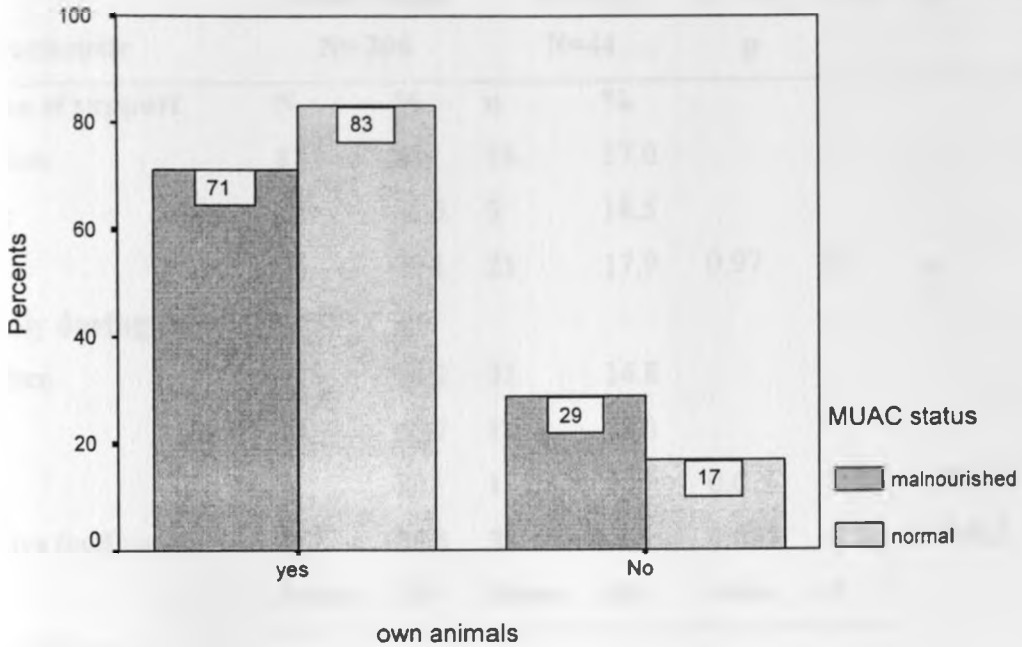
Economic factors, namely source of income and animal ownership tested for association with nutritional status of elders, showed some significance for the entire elderly population (Table 20).

Table 20: Association between source of income, animal ownership and nutritional status of Pokot and Tugen elders.

Characteristic	Underweight		Normal		P	Odds ratio
	N= 206		N=44			
	N	%	n	%		
Source of income						
Sale of animals	119	57.8	33	75		
No income	34	16.5	6	13.6		
Gift from relatives	53	25.7	5	11.4	0.075	ns
Animal ownership						
Own animals	156	75.7	35	79.5	0.373	ns
Own cows	99	48.1	31	70.35	0.007	2.6 (1.3-5.2)
Own goats	148	71.8	35	79.5	0.295	ns
Own chicken	6	2.9	3	6.8	0.207	ns
Own donkeys/camels	12	5.8	0	0	-	

No significant association was found between the source of income or the ownership of animals (all types) and nutritional status (as classified by BMI) ($p > 0.05$). However significant association was found ($p < 0.05$) when the nutritional status was classified by MUAC (see Table 19 and figure 4). Moreover those who owned cows were about three times more likely to be well nourished than those who did not own cows (OR: 2.6 95%CI: 1.9-5.2).

Figure 6: MUAC classification and animal ownership



4. 7. 2 Association between social support and nutritional status

No association ($p > 0.05$) was found between the source of social support and the nutritional status. The elderly who consider children to be the priority for food in times of scarcity were 2.5 times more likely to be underweight ($p < 0.05$) than those who consider first themselves (Figure 21).

There were more malnourished elderly among those who received general food relief (85.8%) than among those who did not receive food ration (59.4%). Meanwhile, malnourished people had also significant lower means of number of rations received (3 rations) and number of meals (2 rations) than the well nourished (3 and 3 respectively).

Table 21 Distribution of households by nutritional status and by support systems.

Characteristic	Underweight		Normal		χ^2 test p	OR	OR 95% CI
	N= 206		N=44				
Source of support	N	%	n	%			
Children	88	83	18	17.0			
Other	22	81.5	5	18.5			
Self	96	82.1	21	17.9	0.97	ns	ns
Priority during crisis							
Children	178	85.2	31	14.8			
Self	24	66.7	12	33.3			
Men	4	80	1	20	0.026	2.6	1.09-5.93
Receive food ration	187	85.8	31		0.001	4.1	1.9-9.2
	Mean	SD	Mean	SD	t-test	P	
Times of ration distributed	2.8	0.7	3.3	1.3	-2.81	0.007	
Number of meals	2.1	0.9	2.7	1.1	-3.47	0.001	

4. 7. 3 Dental status and nutritional status

The majority of the elderly had teeth problems (86.4%) which affected their chewing ability (88.8%). No association was found between dental status or type of dental infections and nutritional status of the elderly population (Table 22). This is because there was no significant difference in status of teeth between the age categories.

Table 22: Dental status and nutritional status

Dentition problem	Underweight		Normal		Statistical test	
	N= 206		N=44		X ²	p
	N	%	n	%		
% Teeth problems	183	88.8	38	86.4	0.22	0.642
Missing teeth	53	29	13	34.2	0.27	0.60
Decayed teeth	57	31.1	12	31.6	0.02	0.95
Dentures	73	39.9	13	34.2	0.56	0.45
Chewing affected	183	88.8	38	86.4	0.22	0.642

4. 7. 4 Food intake and nutritional status

People who had at least one lunch in the 48 hours prior the survey were five times more likely to have better nutritional status (54.5%) than those who just took supper with or without snack. The average household size of the underweight elderly (4 members) was significantly higher ($p < 0.05$) than that of the well nourished (2 members).

The mean intakes for most nutrients (except calcium) were lower but not significantly for malnourished people than for well-nourished people as shown in **Table 23**.

Table 23: Food intakes and nutritional status of elderly population

Characteristic	Underweight		Normal		Statistical test
	N= 206		N=44		
Meals	n	%	N	%	p
% Took lunch	37	18.0	24	54.5	0.000 OR:5.4(2.6-11.5)
	Mean	SD	Mean	SD	
Household size	3.6	2.1	2.7	2.0	0.016
Kcal	536.3	174.1	597	148.4	ns
Protein	13.1	7.3	13.8	6.0	ns
Iron	7.5	4.5	8.2	4.7	ns
Calcium	62.6	48.2	61.4	43	ns
Zinc	2.1	2.09	2.3	2.4	ns
Vitamin A	544.1	262.4	567.5	210	ns
Vitamin B1	0.3	0.26	0.4	0.3	ns
Vitamin B2	0.2	0.17	0.2	0.2	ns
Vitamin B6	0.4	0.29	0.4	0.3	ns
Vitamin C	34.5	26.3	34.8	26.7	ns

CHAPTER FIVE: DISCUSSIONS

5.1 Characteristics of elderly study population

The sample size consisted of 250 households in which at least one old person was living. Two communities, the Tugens and the Pokots presented different socio-demographic and economic characteristics. The Pokot population had small number of household members and high dependency ratio (DR). The high DR gap for the Pokots compared to the Tugens can be explained by the fact that some households lost their young children during last ethnic clashes in the region.

The Pokots were most involved in herding, they are pastorolists. Their main source of income (sale of animals) makes them to be less dependent and mostly self-supported. Their food intake was significantly different from the Tugen's in quantity and number of meals. Generally the diet for the Pokot consisted of porridge taken many times a day with fresh milk or legumes while most Tugen elders had Ugali eaten once or twice, alone or with a little amount of vegetables. Lunch, if taken was more found among the Pokots than the Tugen. That can explain the differences observed in food consumption between the two communities.

The Tugen reported also the high proportion of dental problems that were affecting chewing ability of food.

Factors reported to justify food preference were related to chewing and food habit of the community as reported in other studies (Goland et al., 1986). Most of the Tugens (98.6%) preferred maize for making Ugali (that is a bread made from maize flour) and the Pokots (83.4%) liked maize and other foods namely milk and oil. The other aspect in the preference is that such food could be provided during ration distribution and therefore could therefore tick the mind of the respondent.

5.2 Factors affecting nutritional status of elderly population in Baringo district.

The most obvious factor that affects the general situation of the population in Baringo district was the drought. Most people relied on the food ration, which is poorly distributed. Therefore apart from poverty and disaster that are mainly striking the area, some other factors had shown significant associations with poor nutritional status of the elderly population. This confirms other findings (Ismail, 1999; Young, 1989 and Bermudez, 1999), which reported that isolation, mal distribution of food and poor eating habits are the risk factors to nutritional vulnerability of the elderly population.

5.2.1. Loneliness and mal-distribution of food.

A number of studies (Russel & Suter, 1993) have shown that older people are more likely to be given rather than to receive aid in emergencies. This has been proven in Baringo district with the Pokot community where the elderly were taking care of the young children in the situation where their parents were killed during the cattle wrestling clashes or when younger adults have travelled great distance in search of food. In fact, most of the elderly lived with

children under fifteen and took them as priority for food in case of scarcity. The priority as to who to be given food first goes to the young children, which may result in the reduction of food intake in households.

That can be one of the reasons explaining why those living alone had good average BMI status. It could be the problem of mal distribution of scarce food in the household where the elderly sacrifices his needs to fulfil the young child's one. People who were staying alone in the household showed low proportion of malnutrition among those populations.

But when controlled for marital status, those married had better nutritional status than those who were not married, suggesting that loneliness must be taken as living without a partner to be considered as a risk factor of malnutrition in this population.

5. 2. 2 Economic status of the household

Socio-economy is also an important factor influencing nutritional status. Generally stated elsewhere as poverty (Young, 1989), it proved significant associations with malnutrition. But for the case of Baringo population, the ownership of cows was sole isolated key determinant in observed differences in nutritional status. The reason can also be due to its potential to provide milk, which can be added to the household diet or sold to buy other types of food. The prevailing drought condition in Baringo might have had an effect on the population, as they were required to engage in opportunities to access and prepare food through their own means. Coping activities undertaken to increase household food availability in response to food shortages were not necessarily options for older Tugen as they were more vulnerable compared to their counterpart Pokots who had more animals and that could probably explain the difference in malnutrition rates amongst the two groups.

5. 2. 3 Social support.

Two types of support could be mentioned in this population. The first consisted of non-governmental organizations providing food ration and the second of community or family support. However, the family and community support system in the study have been broken down as a result of the drought, leading in difficulties of the older people accessing food. Further, community capacity to care for and prioritise its most vulnerable members such as older people may no longer have been adequate hence contributing to high malnutrition rates. Fortunately, for those who received food relief, the majority were economically weak without source of income as it was the case of most Tugen elders. Community support depended also on the economic status of the elder person. Most people, who did not own animals, had no income and therefore relied on food aid. The two factors appeared to be confounding masking the true relationship between social support and nutritional status. One of the reasons that might be hiding the association between social support and nutritional status is the quantity of support itself. As stated in the above section, the food ration is too little and community self-sufficiency is diminished so that the impact is difficult to define.

5. 2. 4 Food intake

Studies have shown that (UNHCR/UNICEF/WFP-1998) The initial reference value or planning figure for general food rations in emergencies is based on the average per capita nutritional requirements for a population. These requirements are considered in terms of

energy, fat, protein and micronutrients. This figure is/can be increased based on specific circumstances, or is decreased based on the population's access to other food sources. In this study, there was consideration in terms of meeting criteria for providing general ratio based on population especially the Pokots as they accessed other food sources (animals). However, this figure is rather too low in this circumstance as the Tugen population who entirely dependent on food aid, were not able to meet the criteria of 2,100kcal per person per day. Therefore, Poor food intake was principally due to the fact that most households relied on food relief. Since the ration distributed was little, the quantity of food was small, the quality poor and the total number of meals low. There was positive significant association with malnutrition. Since supper was eaten in most households where it was the sole meal in some of them, taking lunch showed differences in nutritional status with more likelihood of malnutrition among those who skipped it. The role of snacking could not be defined because it was a rare event in this population.

Nutrient intakes averages were below recommended daily allowances (RDAs). Iron (source maize) and vitamin A (source vegetables) intakes reached about three quarters of the recommended allowances. Mean energy and protein intakes fulfilled respectively 27% and 22 % of RDAs. The average fibre intake covered about a quarter of the requirements. While the ratio in question was provided to many people, there are a number of important factors, however, that results in the ration being inadequate for older people in this drought situation of Baringo, such as food processing and preparation. In this case: food commodity that was provided was whole grain cereals (maize) and beans which are difficult to digest for older people these foods are relatively more difficult to chew, it was established in the study that most elderly people had difficulties in chewing because of the condition of their teeth.

These prevailing factors could have contributed greatly to the poor nutrition status amongst the Tugen and Pokot elderly in Baringo district.

5.2.5 Factors explaining differences in nutritional status between Tugen and Pokot elderly in Baringo district during drought period.

The results of the research showed that Tugen elders were more vulnerable to malnutrition as compared to the Pokots. Different factors, explained above which weigh more or less proportionately in the two communities may explain those diverse levels of vulnerability:

- **Socio-economic factors.** Tugen elders lived in large households, which had low economic status. They did not own enough cows since they were more agriculturalists as compared to the Pokots. Given the drought they could not produce enough from farming and were dependent on aid, while the Pokots still had some of their livestock, which were their main source of income through sales. Moreover most Tugen elders were unmarried, half of them widowed which is opposite of the Pokot marital status (more than half were married).
- **Food intake and food habits.** The two communities differed on their food habits in favour of the Pokots. Tugen elders had poor diet of one starchy meal often made of maize flour and rarely took lunch. That was what they could get from Food relief scheme. Given their food habits, few of them added vegetables to their meals. While Pokot elders had more than one meal per day, which comprised a variety of food including milk sourced from their cows.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

The study consisted of assessing risk factors to nutrition vulnerability of the elderly population among the Tugens and the Pokots in Baringo district. Continuous drought disaster is ravaging the area and the population relies mostly on food aid provided by different organizations. The loss of animals due to the same cause is usually high. Poor diet in quantity and quality included maize porridge or ugali as main staple eaten alone or with a little amount of vegetables.

General nutritional status is poor, especially for the Tugens. The majority of the population is underweight.

Social, biological and economical characteristics of the population are principal factors affecting nutritional status of the elderly.

1. The age of the elderly influences current dental status and food intakes. As the population grows old, it tends to skip some meals decreasing the number of meals eaten per day. Significant loss of muscle occurs with age. Studies have shown that (Reubenoff-1999) Sarcopenia, involving the loss of muscle tissue, is a normal process of ageing. It has two main important effects, decrease in strength and reduced protein stores for times of physiological stress such as an acute illness. The consequences of this physiological change for older persons during emergencies in this study drought: may be particularly grave. As a result of the characteristic

deterioration in dentition, older people prefer to eat softer, more easily digestible foods (Mirie, W-1997); Access to these foods as described previously, was not feasible in the drought situation of Baringo. The observations above, opposes the hypothesis that food intake pattern is not associated with the nutritional status of the elderly in Baringo district.

2. Social factors such as loneliness, loss of a partner and caring for young grandchild are associated with high prevalence of malnutrition among the elderly in Baringo district. A large household in which the old person lived have more risk of elderly malnutrition. Loneliness can affect the nutritional status only if the elderly has no partner.
3. Socio-economic factors namely source of income, number of animals owned or dying during drought have significant associations with the nutritional status. The numbers of cows owned and the capacity to care after oneself have a positive impact on current BMI status.

Compared to the Pokots, Tugen elders are at high risk of malnutrition. This may be due to the gap in socio-economic factors such as marital status, household size, access to food and source of income; and in their eating habits.

These observations refutes the hypothesis that, there is no association between social and economic factors and nutritional status of the elderly population

The recommendations are:

1. Nutrition education should be introduced in order to encourage the elderly people improve the selection of foods in their diets in order to meet essential nutrients, which will also help them consume nutrient dense foods, adequate fluid volumes and easily digestible foods.
2. A fortified blended food that is easy to cook should be included as part of the basic general ration, where this is not available, older people (in addition to young children) should be prioritised to receive a supplement of blended food or other nutrient dense food.
3. Existing community coping mechanism or structures should be strengthened as the most important strategy of food and nutrition assistance programme for older people.
4. Include older people in agricultural assistance programme e.g. small scale horticulture
5. Help Age International should design programmes aimed at improving the living conditions of old people. Such programme should focus on improving access and availability of food by old people affected by drought in Baringo district.
6. Food habits and eating behaviours are likely to change therefore, project emphasising on alternative and survival strategy during hungry period should target old people in a participatory manner. Most old people stick to their old food habits and starve or eat poorly while some rich foods are available. This will consider a large proportion of Tugen elders.
7. More targeted intervention programs prioritising the elderly as a vulnerable group.

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APPENDIX 1. QUESTIONNAIRE

FACTORS AFFECTING THE NUTRITION STATUS OF THE ELDERLY IN THE DROUGHT PRONE AREAS OF BARINGO DISTRICT.

IDENTIFICATION

District _____ Division _____ sub-location _____
 Location _____

1. Household Id _____ Interviewer name _____ Interview date _____

1. Respondent's name _____ 3. Sex _____ (1=male 2=female)

4. Marital status _____ (1=married 2=single 3=separated/divorced 4=widowed)

Fill in the following information about the respondent and each person in the household.

0	Name	How many months stayed here last year	Sex 1=male 2=female	Age (in years)	Education (completed in years)	Occupation	Brings money or food to the household 1=yes 2=no

Codes

Education

1. completed 1-4 of primary
2. Completed 5-8 of primary
3. Attending primary (children)
4. Attended secondary school
5. Post secondary
6. Adult informal education
7. Preschool children
8. Not attended school

Regular activities / occupation

99. Preschool children
1. House wife and farming
2. Herding
3. Farming
4. Salaried / employed
5. Artisan/ jua kali
6. Student
7. Casual labourer
8. Business / self employed

SOURCES OF INCOME

6. How long have you lived here? _____
8. What are the main sources of income _____ (1. salary 2. Pension 3. sale of animals 4. Crop farming 5. no income 6. Gifts from relatives / friends 7. Business 8. Others (specify) _____)
9. Do you own animals? 1. yes 2. No
10. {If yes} which ones and how many (Fill the table below).

No	Type of livestock	Number owned	Number died
1	Cows		
2	Goats/sheep		
3	Camels		
4	Donkeys		
5	Chicken		
6	Others		

11. When did you last have rain (month of drought) _____
12. Who supports you (1. your children 2. brothers/ sisters 3. community members 4. other relatives 5. self)
13. When there is food shortage whom do you give first priority? _____ (1. children 2. women 3. self 4. men 5. others)
14. Have you received any relief food during this drought? _____ (1. yes 2. no)
15. {If yes}, what did you receive and how much {please circle}
- 1} maize 1) yes 2) no Quantity _____
- 2} pulses 1) yes 2) no Quantity _____
- 3} oil 1) yes 2) no Quantity _____
- 4} Unimix 1) yes 2) no Quantity _____
16. How many times have you received the relief food in the last three months? _____
17. {If yes} Which one? _____ (1. Maize 2. Pulses 3. unimix 4. oil 5. milk)
18. From the foods that you received which one did you prefer? _____ (1. Maize 2. Pulses 3. Unimix 4. oil 5. milk 6. None)
19. Do you have any problem with your teeth? _____ (1. yes 2. no)
20. {If yes} which one? _____ (1. missing teeth 2. decayed teeth 3. dentures).

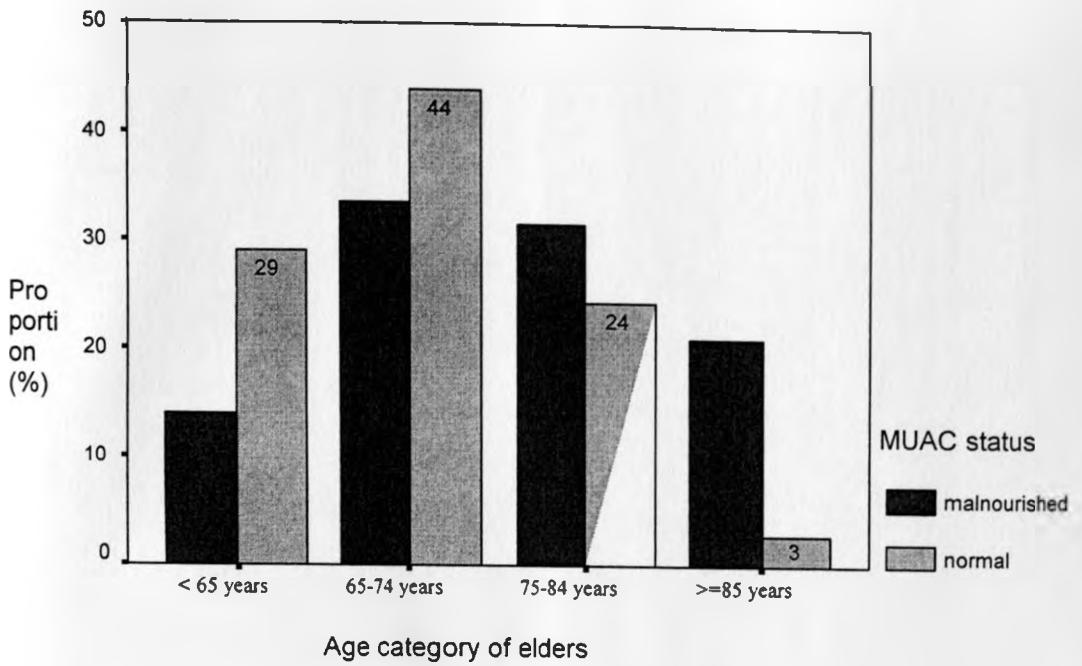
APPENDIX 2: SUMMARY OF SOCIO-ECONOMIC FACTORS

DIFFERENTIATING POKOT ELDERS FROM TUGENS ELDERS

FACTOR	THE TUGENS	THE POKOTS
Household size	4 persons	3 persons
Aged Over 55 years	43.2%	33%
Married/widowed	25.6%/51.1%	60.6%/28.8%
Dependency ratio	3	3.7
Not attended school	100%	97.8%
Herding activity	14.9%	58.9%
Casual labour	70.35	29.2%
Sales of animals	37.8%	73.8%
No income source	22.2%	3.8%
Gift from community	40%	13.8%
Own animals	55.6%	88.1%
Own cows	21.1%	69.4%
Lost cows	21.1%	61.2%
Eat lunch	4.8%	19.87%
Varied diet	No	Yes
Number of meals	1 per day	1.5 per day
Malnutrition rates	88.9%	78.8%

FACTORS AFFECTING THE NUTRITIONAL STATUS OF THE ELDERLY

FACTORS	Compared level of malnutrition	
	A*	B**
Community (The Tugens*/ the Pokots**)	More	Less
Marital status (Married*/ Unmarried**)	Less	More
Own cows (Yes*/No**)	Less	More
Receive food ration (Yes*/no**)	Less	More
Number of meals (2* versus 3**)	More	Less
Eating lunch (Yes* /No**)	Less	More
Household size (3* versus 4**)	Less	More



Although the distribution of elders can fit into the normal curve, the proportion of malnourished increased linearly with age thus the proportion of well nourished decreased with age.