NUTRITIONAL STATUS OF INSTITUTIONALIZED ELDERLY PEOPLE LIVING IN URBAN KENYA (NAIROBI).
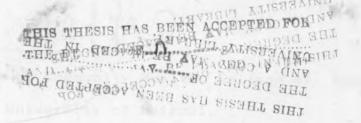
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DECLARATION.

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

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This thesis has been submitted with our approval as University supervisors.

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ABSTRACT

Nutritional assessment of 284 of Nairobi elderly male and female subjects aged between 55 and 98 years was done on the basis of anthropometry, dietary intake, parasitology, morbidity load, clinical and haemoglobin status. The subjects were primarily destitutes and were either inmates in a residential institution or attenders of a domiciliary day care centre sponsored by Help Age, Kenya.

The study objectives were to examine the type and magnitude of nutritional disorders for the subjects, determine the quality of food consumed by the inmates of the institutions and thirdly to relate the food intake with the nutritional status of the subjects.

Information was collected through personally administered questionnaires and was analysed using the statistical package for social scientists (SPSS). All measurements were taken in the field by the principal investigator and two assistants following the guidelines of Jelliffe (1966), Latham,(1979) and Jansen et al. (1983). Blood status was assessed in the field using a Spencer haemoglobinometer. Stool examination was done in a laboratory at the University of

Nairobi (Kabete campus).

The findings of this study show that a higher proportion of males was more undernourished (41% below 80% of Frisancho's median for mid upper arm circumference index) compared to the females (26%). Triceps skinfold thickness index classified 85% of males and 59% of females to be below the 80% median. The weight for height index classified 39% of the males to be below 80% of the standard while only 17% of the females were placed in this category.

The prevalence of iron deficiency anaemia was 63.6% and was not significantly related to sex or age. Parasitic infestation was common with ascaris lumbricoides presenting 34.9% prevalence and hookworm 8%. Toothache was the most common ailment based on seven days'morbidity recall (51% prevalence). Urine examination revealed that 15% of the subjects had sugar in the urine and 12% had blood.

Most subjects (96%) had no spouse and lived alone (if not in residential home) or had not been visited by children or relatives in the last six months preceding the interview.

Dedication

To   my   Parents

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CHAPTER ONE

1.1 INTRODUCTION

Nutritional assessment of people is very closely related to health assessment although the parameters under examination are rather limited. Nutritional status of the elderly has been widely studied in Europe, North America and to some extent in Latin America and Japan. The rest of the world does not have much published work related to nutritional status of the elderly.

Even in the developed world, the elderly have been presented as a vulnerable group and at nutritional risk. Malnutrition of the elderly in Britain has been equated to malnutrition in children in the developing countries (Truswell 1985). Studies on nutrition status of elderly have similarly presented findings that reveal the poor nutritional status of this group, according to Stiedemann et al., (1978), Exton-Smith (1977), Jowsey (1978), Spencer et al. (1982), Jansen and Harrill (1977), and Bailey et al., 1979. The limited work done in developing countries also show that the elderly have poor nutritional status, Waswa (1985),Godfrey (1986).

On examining the population structure on a global level, it is seen that the numbers of elderly people have greatly increased in the last

few decades. Grundy (1983), shows that the distr-
ibution of people aged 75 years and over in the
main regions of the world was as follows : Europe
28%, North America 13%, East Asia 24%, South Asia
14%, USSR 11%, Latin America 5%, Africa 4%, Ocea-
nia 1%. Life expectancy worldwide has greatly cha-
nged.

The population structures of the developing
countries and specifically Kenya shows
that 28.6% of the population is between 5-14
years and that 46.1% is between 15-64 years, World
Bank (1984). It then follows that in another
fifty years there will be many more elderly people
within the total population. These figures indica-
te that if the present mortality rates prevail,
and if the life expectancy is as predicted in
Grundy (1983) then definite health plans related
to the health of elderly should be given a fair
amount of priority.

In the United States of America, it has been
reported that the rate of acute or short term care
for older persons is twice compared to that for all
persons combined, Kohrs (1982). An elderly person
visits the physician seven times per year as oppo-
sed to five times for the population in general.
Many problems of degenerative nature have been
associated with dietary patterns. Among these are

heart disease, cancer, and diabetes to name only a few, Kelly (1978), Dickerson (1978), Harper (1982), Walker 1975, Fries (1980) and Morrison (1983).

Since the etiology of malnutrition in the elderly has many interrelated factors, it is important to assess the nutritional status of these individuals and identify their specific problems in order to help plan health related programmes for them.

The objective of this study was to assess the nutritional status of elderly people who lived in residential nursing homes, and those attending day care programmes within the city of Nairobi. The findings of the study were to be made available to organizations that cater for the needs of the aged so that they can determine how to improve these institutions. It is hoped that the findings from this study will be of benefit to Nairobi City Commission and the Ministries of Health, Culture and Social Services so that they can plan programmes to assist the needy elderly. In addition the information will be useful to Help Age, Kenya and other Non Governmental Organizations (NGOs) that are already involved in feeding the destitute elderly within the city of Nairobi.

1.2 Statement of the Problem

For many years, nutritional assessment and other primary health care components in Kenya have been directed to maternal and child health care.However, some other vulnerable groups in the population that are at risk in terms of nutritional deficiencies have received very little attention. One such group is the elderly. The improved primary health care for the entire population has greatly improved the average life expectancy in all parts of the world, Kenya included, (Grundy 1983). This has in turn increased the numbers of older citizens within the population of Kenya (appendix 1 and 2).

Social implications also challenge the position of the elderly in the African culture due to urbanization and other changes from traditional societies to industrialized ways of living. The elderly people who were once sources of wisdom and confidants for the younger family members are no longer given that respect or if given it is not to the same extent. As a result of the new lifestyles in urban areas, old people feel displaced. They can no longer be protected under the security of the extended family set and this has left them without any social or economic support.

Some institutions have taken up the task of providing material and other forms of support that may be required by the elderly people who have lost ties with their families. Such institutions which are within Nairobi are mostly run by church organizations and rely wholly on charity for funding. These institutions for the aged operate either as residential nursing homes or day care centres. Because these institutions rely wholly on charity for funds, they tend to have few bed spaces and limited finances and therefore cannot offer accommodation to all the clients who request for admission.

An older person without family ties in an urban set up finds no one to relate to both socially and economically. This type of individual may demonstrate the characteristics of a destitute and then through a consistent pattern of neediness such an old person gets the sympathy of social workers, neighbours and even the police. This is the type of record that then qualifies such an elderly to either a residential or day care programme. Those who are destitute qualify for admission in the nursing institutions because of having been recommended by social workers or police as a result of needy case history.

The demand for admission is very high but

due to economic constraints in the running of
these homes, only a few elderlies get admitted.A
bigger proportion is however supported through
the day care programmes also run on charity
basis.Many needy aged people living within the
city are however not catered for under any
programmes. Older people living independently in
their own homes in urban areas have more dis-
advantages than younger people. In most cases
for the Kenyan situation, they have less educat-
ion and limited employable skills. Physi-
cally, they are not as strong as the
younger people and hence cannot compete on equal
basis for manual or unskilled labour. As a re-
sult, these people are less successful econo-
mically and have a high probability of remaini-
ng poor unless they were rich when they were
younger.

Retirement at age 55 in Kenya may not be a
positive point even for the employed older adu-
lts because in many cases these people have
little savings or investments. This then leads to
poverty at a later stage when this same individual
is not able to earn a living in any way. Poverty
is indirectly related to the ability of people to
eat food of required quantity and quality and this
will in turn affect their nutritional status.

Data on Tables 1 and 2 (appendix 1 and 2) shows that among the Kenyan population, the elderly (aged 65 years and above) constitute a big proportion of the population. This data obtained from Kenya's Central Bureau of Statistics (CBS 1983) is based on population projections because Kenya's population census is done on a ten year period. The last census was done in 1979 and the next one will be done in 1989. Presently, there are no census figures for the current and the immediate past period.

Elderly people have specific characteristics that make them a vulnerable group in terms of nutritional status. Research has shown older people to be at nutritional risk. These problems have made it necessary to create special nutritional programmes in the industrialized world in order to minimize the possibilities of the aged developing nutrition related diseases. In Kenya, elderly people also require well planned nutrition and health related programmes which can be be implemented through various Ministries or special institutions. There are no governmental programmes targeted towards the elderly in the the country. The private institutions attempting to help the elderly require proper guidance in terms of planning and implementing of programmes.

Most urgently, there is a need for funds for these institutions.

The issue of higher proportions of elderly people in relation to total population is not unique to Kenya only. According to demographic changes in developing countries, population growth rates rose from 2% in 1950 to 2.4 % in 1965 largely because of falling death rates (World Bank,1984). The trend has continued and these demographic changes indicate that the number of people older than 65 years in developing countries will almost double between now and the year 2000. Developed countries have even higher proportions of elderly people compared to the younger ones. However, their health schemes and social security benefits are highly targeted towards the elderly.

Improved life expectancy in the United States and other developed countries from 47.2 years in 1900 towards a plateau value of 74-76 years currently has been attributed to improvements in nutrition among other health related factors. According to World Bank (1981) improved lifespan in both the industrialized and developing countries will continue. The World Bank report indicates that this increase is related to better clinical and pharmocological control of infectious diseases, better sanitation and improved nutrition. In

addition, persons of 65 years of age will contin-
ue to increase if cancer and various vascular
diseases are eventually eliminated. Consequently,
healthy aging is a challenge for the individual
and the society (WHO,1973).

The advancement of science is helping more
old people to survive longer, but many of these
people are neither at their fittest nor at their
happiest Todhunter (1980). In Kenya and other
countries in Africa where there are no formal
programmes targeted at the elderly, the problem of
hunger is immense. This is evidenced in the Kenyan
context by the number of charity organizations
looking after the destitutes and the needy elderly
in urban areas. According to a report by Ciira
(1985) the elderly in Kenya have problems related
to development and social matters. This report
quotes the elderly people in the city of Nairobi
as being those who were displaced during the
struggle for independence. As a result, these
people lost their relatives and if they never
married or never had children they have become
destitutes in their old age. This makes the elder-
ly vulnerable and at risk in terms of nutritional
status due to poverty and the physical impairment.
This same feeling was expressed by officers who
run the charitable organizations that help the

elderly. These officers felt that putting the elderly in an institution should be the last resort. The individuals who qualify for their programmes must be truly needy and must be recommended strongly by the department of Social Services.

Elderly should not be treated as a group because they differ individaully. Each person is the sum of a lifetime experiences with consequences on nutritional status, physical fitness, and psychological stress. By the time an individual reaches old age other factors will have also exerted an influence, directly or indirectly on his nutritional status and health.

This study has been chosen because conditions of the older people justify an investigation and hopefully the findings will help improve health and general welfare of the indivuals.

1.3 Aim of this Investigation

The overall aim of this study was to improve the health and nutritional status of elderly people living in Kenya. It is hoped that the findings of this study will bring an awareness of the nutritional needs of elderly people to planners, policy makers and the public so that acceptable methods of meeting these needs can be worked out.

CHAPTER 2

REVIEW OF LITERATURE

<u>Nutrition and Aging</u>

The role that nutrition may play in the phy-siological decline of the human body has not been exhaustively or adequately explored. Different studies done on nutrition and longevity present different theories on the effects of nutrition on aging. Ross (1976) says that despite the limita-tions of modern actuarial reports, early experime-ntal findings show that obesity shortens lifespan and that limitations in food or caloric intake can result in longer life. Basing his facts on studies of experimental animals Ross (1976), continues to say that when animals are maintained on a dietary regimen throughout post weaning, both the quantity and the composition of the diet significantly modify the length of life and susceptibility to diseases of aging.

In similar studies Zamenhof and Mathens (1982) found that chronically undernourished ani-mals had a mean lifespan significantly longer than those fed well. These two researchers compared chronically undernourished rats with those with mild undernutrition. The results of Zamenhof and Mathens (1982) indicated that older rats benefi-ted from undernutrition than younger rats. Simi-

larly, Liepa et al., (1980) also did a study on
food restriction as a modular of age-related cha-
nges in serum lipids using rats. They found that
the restriction of food intake markedly increased
the median length of life, they also found that
life-prolonging food restriction does not influ-
ence the serum levels of cholesterol or phospholi-
pid in young rats but delays age-related increase
in concentrations.

Kokkonen and Barrows (1986) in a review of
nutrition and the concept of aging agree with
theories presented by many researchers on increa-
sed lifespan associated with dietary manipulation
and specifically on caloric restriction.
However, these studies used laboratory animals and
are so controversial that questions were raised
as to their influence to humans (1981), Harper
(1983) and Morrison (1983). Kohrs (1982) says
that although animal studies have shown that life-
span can be altered by restricting food intake or
changing the composition of diet, adverse effects
of food restriction outweigh the benefit from
lengthening lifespan. As a result of these
adverse effects, extrapolation from animal studies
to humans in this instance is not feasible.

Even though Ross (1976) cautions that most
studies in an attempt to accomplish caloric rest-

riction have not only limited caloric intake, but also reduced consumption of protein and other dietary components. As a result the adverse effects of severe underfeeding cannot be overlooked as they may cause impaired functions of various bodily systems or organs and may be related to greater susceptibility to bacterial and parasitic diseases. Morrison (1983) also said that the relevance of animal studies in reference to human studies of nutrition and longevity is open to doubt on several grounds including the nature of populations examined, the nature of results found and the general choice of animal models.

Most research on nutrition and aging is aimed at improving the quality of life of elderly people. Dickerson (1978) states that the goal is to have healthier elderly persons rather than simply more of them. The physiology of aging has been linked to nutrition by several researchers. Munro (1983) says that many organ functions and metabolic parameters decrease progressively with aging. At the same time intakes of most nutrients also decline and that this phenomenon may be a factor contributing to functional losses associated with aging according to Munro (1983). Watkins (1982) adds that analysis of laboratory findings indica-

ted changes as age increases: the gradual diminution of carbohydrate tolerance, decrements in discrete renal function and muscle function, fall in cardiac index, and reduction in the ability to taste and smell.

In Great Britain, Dickerson (1978) stated that, of all the degenerative disorders associated with aging, arteriosclerosis merits careful attention. This ailment has been viewed as having a possible involvement in nutritional factors in ischaemic heart disease. Because death amongst the elderly can be attributed to a few chronic and degerative causes, questions have been raised as to whether or not it may be possible to increase life expectancy beyond what is currently known. Harper (1982) said that it may be even possible to lengthen life span through dietary control.

In an attempt to associate nutrition and the reduction of cardiovascular disorders, Dickerson (1978) recommended a reduction in the intakes of saturated fats an increase in the consumption of polyunsaturated fats and plant based diets and a change in lifestyle. It was on the basis of lifestyle that Walker (1974) compared the survival rate at middle aged and older individuals in developing and Western populations. He declared

that among South African blacks coronary heart
disease was non existent and that total cancer
age specific incidence was much lower compared to
the South African Caucasian population. Walker
(1974) also found that among South African Ind-
ians, there was a high incidence of coronary
heart disease, strokes and diabetes compared to
same age group of Indians living in India. Ac-
cording to his findings, he concluded that the
survival capacity of the Indians residing in South
Africa, had not been improved and he also felt
that the survival capacity has even been dimini-
shed by sophistication of diet and lifestyle.

Other research done in Uganda by Drury (1973)
on cardiac pathology of elderly Ugandan Africans,
indicated that ischaemic heart disease due to
atherosclerosis appeared in the elderly group but
not in younger group of persons used as control.
The ischaemic heart disease contributed to only 1%
of the deaths in the study but Drury did not at-
tempt to associate his findings to diet or life-
style, although other studies (Fries 1980) sug-
gests that atherosclerosis is diet related.

Kritchevsky (1978), put a direct link between
serum cholesterol levels observed in the United
States to those in the diet. He, however, noted
that the ratio of animal fat to vegetable fat has

dropped steadily. He added that dietary changes since 1909 have included more animal protein, less complex carbohydrates and more total fat. Such diets have been implicated in the high incidences of coronary heart diseases. One of the Dietary Goals for the United States is to decrease serum cholesterol through dietary means (Kummerow 1979). In less indutrialized countries, dietary patterns are changing fast in the urban areas.The implications of such changes will make the elderly populations more susceptible to degenerative diseases associated with rich and refined diets. Apart from cardio-vascular disorders other degenerative diseases associated with age and diet include various forms of cancer, diabetes mellitus and obesity (Taylor and Anthony, 1983).

Problems of diabetes mellitus in Africa have been documented by Mngola (1982), Darragh et al (1971), Steel and Mngola (1973), Abdulla (1978), Thomas (1980),and Patel and Mizigo (1985). All these studies show that contrary to the opinion that diabetes was not common among African populations (Brennam 1926),it has become a health problem in the last few decades. Complications of diabetes which are more eminent in the older subjects have also been documented (Patel and Mwai 1984, Mngola and Aswan 1976). In the African

setting,it is interesting to note that diabetic problems which had such low prevalence are presently a big health concern (Mngola 1982, Brennam 1926). Changing dietary habits and life-styles that accompany industrialization of nations no doubt have a big impact.

Dietary Requirement

Nutritional vulnerability of the elderly has many interrelated factors including pathological, socio-economic and dietary intake among others. Elderly persons tend to follow dietary practices common in the community where they live and patterns established during their youth. These may be influenced by either cultural background or religion.

The nutritional requirements of elderly people have yet to be established. Most requirements have been set by extrapolation of the adults requirements in order to meet the needs of the elderly. Studies done in the area of nutritional needs of the elderly however indicated that there are problems of nutritional requirements in the elderly and these require special examination (Kelly 1978). Shannon and Smiciklas-Wright (1979) indicate that elderly people are a nutritionally vulnerable group because they tend to eat diets that are low in quality and/or in quantity. In a study on the nutritional status of elderly men and women, Stiedmann et al. (1978) found that the calculated mean intakes of energy and other nutrients for twenty-three pairs of elderly in nursing homes were 72% for men and 74% for women of the recommended dietary allowance (RDA). The food

consumed by 22% of the men and 39% of the women
provided less than two thirds of thiamine allo-
wance. Calcium was the nutrient most often margi-
nal in women's diet. Although there was no signi-
ficant effect of age on energy or nutrient intake,
the biochemical data indicated that protein was
the serum constituent which compared least favou-
rably when compared to accepted standards. In
other studies, Kohrs et al., (1978) found that
dietary intakes of elderly male was 98% of the
standards while that for women was 90% of RDA.
The range of caloric intakes in the Kohrs
et al., (1978) study varied between 1,635 kcal and
4,274 kcal for males compared to 662 kcal to 3,210
kcal for females.

The very wide range for caloric intakes shows
the individual vulnerability and that the variabi-
lity of intakes indicated how some elderly are
found to be nutritionally at risk. The intake of
calcium in Kohrs et. al.,(1978) study also was
reported as presenting over one third of women
consuming less than 67% of the RDA and about 15%
of the women consumed less than 50% of the RDA of
this nutrient. Garry et. al., (1982) did a study
on the nutritional status in a healthy elderly
population. They similarly found that the dietary
intakes within the study population had inadequate

ranges in energy in both sexes,with Vitamin D and calcium being the least in women. On a more indepth analysis of their data Garry et al.,(1982) related age and energy intakes. They found that a significant negative correlation for men but not for women. When energy intakes were examined independently for men and women of less than 76 years of age compared to those 76 years of age and older, a significant difference was noted for both sexes. For men less than 76 years of age, the mean energy intake was 2,214 kcal per day or 88% of the RDA. For men 60-76 years of age and older, the mean intake was 1,970 kcal/day or 100% of the RDA. Women 60-76 years of age had a mean energy intake of 1,685 kcal/day or 86% of RDA, and women 76 years and older had a mean intake of 1,506 kcal/ day or 91% of the RDA.

The energy intakes have also been reported by Exton-Smith (1977). In his report, Exton-Smith says that out of the 879 elderly subjects surveyed, 88 (10%) had been found to have low energy intakes;less than 6.3 Mega Joules(MJ) for men and 5.0 MJ for women.It was considered that eight of these subjects could have had protein-calorie malnutrition on basis of clinical assessment. According to Exton-Smith (1977), the significance of subclinical protein deficiency is di-

fficult to assess but may be of greater importance in the elderly than in other ages since homeostatic mechanisms are impaired and stress due to a variety of pathological processes in old age that may upset the precarious physiological balance. These findings by Exton-Smith (1977) support the statement by Truswell (1985) that in the third world countries, the children suffer most of malnutrition while in Britain it is the elderly who are most at risk of nutritional deficiency.

Requirements for various nutrients for elderly have been conducted in different settings and many results do not agree.

Dietary protein requirements were examined by the WHO joint expert committee (1973) who later made some recommendations for elderly people based largely on extrapolation of data obtained from young adults. The committee emphasized that the recommendations were provisional, tentative and open to testing and further research.

The committee adopted a factorial approach when determining requirements. This approach is a summation of the obligatory losses of nitrogen from the body and the requirement for growth plus an additional allowance to cover the normal stresses of life and individual variability. In determining protein requirements this committee

chose to consider energy and protein requirements together so as to fully examine their interrelationship so that a diet or a food supply might be assessed simultaneously in terms of its energy and protein content.

The committee found that adult requirement for total amino acids fell more sharply than did their protein requirements. Thus the portion of total amino acids that must be supplied as essential amino acids fell with age (based on ratios essential of amino acids to total amino acids). The committee felt that the requirements of proteins need to be reviewed in relation to energy. This is because there exists an energy protein interrelationship whereby the energy intakes affect protein utilization and metabolism. It means that a reduction in energy intake below requirement results in a loss of body protein in adult and a reduction in growth of the young. Severe reduction of energy intake impairs the utilization of proteins added to the diet (WHO 1973).

The practical implications of these findings though presented through experiments have to be considered in respect to both adults and children. WHO recommended that a safe level of protein intake is 0.8g of mixed protein /kg /kg per

day. The committee stressed that individuals of the same size, living in the same environment and with the same mode of life have similar energy requirements regardless of their ethnic origin.

Below age forty, it is understood that there is little change in terms of energy requirements. As age advances, it is however known that several changes occur in peoples' activities and these may also affect the energy requirements (WHO 1973). These changes are associated with the concept that older people tend to avoid work that requires high energy expenditure.

Physical activity is found to be much reduced after the 6th decade . In view of these changes, the WHO (1973) committe recommended some guidelines in view of energy needs of adults at various stages of life cycle.

Table 4: Average energy requirement of moderately
active adults of reference body weight at
different ages.

Age (years)	65 Kg Man		55Kg Woman		
	kcal	MJ	kcal	MJ	%of Reference
20-39	3000	12.5	2200	9.2	100
40-49	2850	11.9	2090	8.7	95
50-59	2700	11.3	1980	8.3	90
60-69	2400	10.0	1760	7.4	80
70-79	2100	8.8	1540	6.4	70

Source: FAO/WHO, Joint FAO/WHO ad hoc Expert
Committee on Energy and Protein Requirements,
World Health Technical Report, Series No. 522
Geneva : WHO 1973 pp. 33.

The energy expenditure of adults may be
altered with age because of changes in body co-
mposition or body weight. According to Calloway
and Zanni (1980) total energy requirement is known
to be reduced in the aged in association with
a number of physiological and social changes.
However, there are very few studies that bear
directly on these points. In their study on
energy requirements and energy expenditure of
elderly men, Calloway and Zanni (1980) found that
the daily basal expenditure of the older men was
13% below that of the younger subjects. There
was also a loss of 2 to 3% of Lean Body Mass (LBM)
per decade of age beyond 25 years. The study
further revealed that Basal Metabolic Rate (BMR)
of the younger and older subjects was similar and
that loss of tissue function with age is propor-

tional between skeletal muscle, viscera and other lean tissues. Calloway and Zanni (1980) concluded that for men aged between 63 and 77 years, they required 2554 kcal/day to maintain their body weight with a range from 2288 to 2833 kcal. These figures differ only slightly with the FAO/WHO (1973) recommendations. Requirements by US council of Nutrition are 1800 kilocalories for ages 51-75 and 1600 for 75+.

Several studies have been conducted since the WHO (1973) recommendations were published. These follow up studies have been undertaken mainly because the requirements of elderly people continue to be questioned in view of newer findings on their physiologic changes that affect nutrient requirements. These points were raised by Zanni et al.(1979), Calloway and Zanni (1980).

Gervositz et al.,(1982) did a study to assess the adequacy of the current RDA in relation to human protein requirements. In the RDA, protein allowances for the elderly are based on extrapolation of data obtained from healthy young adults. Because of concerns of the changes that occur in the distribution of whole body protein and amino acid metabolism during the later adult years, Gervositz et. al., felt that it was important to investigate how this metabolism might

influence dietary protein utilization and needs of elderly. In their study, they fed 7 caucasian males aged 70-82 and 8 caucasian females aged 71-99 years 0.8 gm of egg protein per kg body weight per day for 30 days. Nitrogen balance of these subjects was calculated from the analyzed nitrogen intake on body weight maintenance based WHO (1973) recommendations. These findings indicated that among the elderly, 0.8 gm of egg protein was not sufficient to achieve Nitrogen balance in any subject during the initial 10 days of feeding. By the end of the 30th day of study, the elderly males approached equilibrium. The researchers believed that this occurred due to an adaptive response in these males. Three of the seven subjects had not reached an equilibrium, however. The female subjects never achieved a Nitrogen equilibrium throughout the study. They persisted with a negative N balance. All the subjects, however, maintained energy intake without change. Additional findings by Gervositz et al. (1982), also indicated that there was a decrease in haemoglobin and haematocrit parameters, mostly in the women. This presented implications of inadequate protein intakes. In view of these results, 0.8 gram of protein per kg per day of mixed protein as

recommended by WHO is insufficient to cover
protein needs of the majority of elderly popula-
tion.

In a similar study intended to assess human
protein requirements, Uauy et al., (1978) followed
the obligatory urinary and faecal nitrogen losses.
The authors used 0.52 gm to 0.8gm of graded egg
protein per kg of body weight per day for elderly
females and 0.57 gm per kg/day to 0.85gm/kg/day
for elderly males. Their results showed a negative
nitrogen balance at 0.57 gm/kg/day for females
but 0.85gm showed a positive balance. The nitrogen
equilibrium for women came at 0.83gm of protein/kg
per day. According to Uauy et al., (1978) it
appears that a daily protein intake between 0.7
and 0.85gm/kg/day would be sufficient to main-
tain body equilibrium in most elderly men
during short term balance periods. In conclusion,
Uauy et al.,(1978) indicated that dietary nitrogen
utilization by elderly females at requirement
of intake was considerably lower than that assu-
med by WHO (1973).

It is however evident from the various stu-
dies based on protein requirement in elderly that
there is no general consensus as to what the spe-
cific requirements should be. Cheng et al.,
(1978) in their study reported that protein

requirement and protein use efficiency were not affected by the aging process. This of course differed greatly with the study of Gervositz et al., (1982). Cheng et al.,(1978) qualified their results by saying that the conflicting results in the interpretation of findings on protein requirements among the aged possibly arises from the kind of test diet used, the quality of protein present in the diet, the caloric intake and the lack of simultaneous study of young adults and the aged. On the relationship between the caloric intake and protein requirement, Inoue et al.,(1973) found that administration of excess energy to Japanese patients spared loss of labile protein and reduced the time required for the adaptation to a low protein diet. In addition these researchers found that there was a nitrogen balance at a lower energy level than with a maintenance energy balance. It was also found that supply of excess energy resulted in increased availability of ingested protein and with a reduction of the protein requirement. This can possibly explain the disparity of results between studies. Inoue et al.,(1973) estimated a protein requirement of 0.65gm/kg of body weight/day for egg protein and 0.87gm/kg/day for rice protein when energy intake was

maintained.This study showed that when energy intake was in excess, the requirements were 0.4gm/kg/day egg protein and 0.58gm/kg of rice protein. The 0.87gm/kg/day for rice protein is close to the recommended 0.8gm per kilogram per day of mixed protein WHO (1973).

The determination of requirements for the elderly is also affected by their physiologic status and this was the focus of attention in a study by Bunker et al., (1987). Bunker et al., (1987) compared nitrogen balance of elderly individuals who were healthy and free from any apparent diseases and living in their own homes with a group of elderly individuals who were housebound and suffering from various patho-logical chronic disorders. The housebound subjects were receiving various drugs for their ailment. The results showed that the healthy subjects were found to be at Nitrogen balance with 0.97gm protein /kg/ day. They were eat-ing usual diets that were mixed in terms of nut-rient sources, self selected and contained adequ-ate energy. The housebound subjects were found to be consuming only 0.67gm / protein/ kg /body weight per day which was only 65% of that found in the healthy group. The housebound subjects were at negative balance

irrespective of any amount of energy intake.

Other nutrients of considerable importance in the elderly according to available literature include calcium, vitamin D, iron, folate, and zinc. Several studies have shown insufficient dietary intakes of calcium. Yet calcium has been implicated as the main nutrient in elderly patients suffering from osteoporosis. Jowsey (1978) summarised the value of calcium in the diet. He indicated that it is needed for nerve conduction, muscle contraction,and every cell activity will cease and death will follow if deficient intakes last long. Emphasizing the role of calcium in the diet Jowsey continued to say that calcium storage is the most critical and important function of bone. Without adequate supplies, the skeleton loses bone tissue to the point where it becomes fragile and fractures occur with only small stresses. Stiedemann et al., (1978) showed that calcium was the nutrient most often marginal in diets of elderly women compared to men. This state is related to differences in calcium needs between men and women. While the daily calcium requirement is over 1 gm for the average person, a postmenopausal woman requires 1.4gm. Excess phosphorous in the diet may be the most important cause of

bone loss.Increased phosphorus and decreased cal-
cium intake made mineral balance less favour-
able Jowsey, (1978).

Other studies (Mayo Clinic, Rochester 1978)
also indicated that in women, daily requirements
of calcium were inadequate. These studies con-
cluded that because calcium absorption tended to
decrease with age, calcium requirements in both
men and women could be expected to increase with
age. The mechanism of the bone loss with age
is not fully understood. Spencer et al. (1982)
indicated that there was a decrease in the inte-
stinal absorption of calcium with aging. Their
findings showed that the younger age group
excreted 56% of calcium intake while the older
age group excreted 78% of the intake. This indi-
cated that the younger age group absorbed 44% of
the calcium but older age group only absorbed 22%.
Older patients utilized only 16% of the die-
tary calcium in comparison to 40% for the
younger group. Calcium balance has been examined
in relation to other nutrients. In addition it
was also reported that the level of
protein intake significantly affected calcium
balance. Calcium was retained when young subje-
cts consumed low protein diet. The mean daily
retention was 31 mg. When these subjects were

fed medium, and high protein diets, they lost
calcium from the body with mean losses of
58 and 120 mg respectively.No subject was in
balance with either levels of protein intake.

Another nutrient, vitamin D, is of importance
in status of calcium in the body, (Lee et al
1981). The cheapest and easiest source of Vitamin
D is sunlight and for people living in sunny
weathers normally do not develop vitamin D
deficiency. However, in the elderly group there is
a tendency of covering with heavy clothing. This
in itself creates a barrier between the skin sur-
face and the ultraviolet rays that would be the
source of Vitamin D. Lawson et. al., (1979) exa-
mined the relative contributions of diet and
sunlight to Vitamin D state in the elderly and
found that in summer vitamin D state is primarily
governed by the amount of exposure to solar radia-
tion with dietary vitamin D making only a
negligible contribution. In winter at latitu-
des above 50° vitamin D is not formed in the skin
and the body (as found in the study) has to use
vitamin D from the previous summer.

Iron is important for the proper haematologi-
cal status of the elderly. Jansen and Harrill
(1977) say that studies of anaemia in the elderly
suggest that nutrient deficiencies, other than

iron, may be involved. Bailey et al.,(1979) found that in their subjects (aged between 72 and 99 years) the total dietary iron decreased at 0.097 mg/year as age increased. The food of 83% of the nursing home patients and 58% of the subjects in private homes provided on the average less than 10 mg of iron per day. Values obtained for serum protein levels and measurements related to iron nutriture in the 70 elderly women showed that protein deficiency occurred more often than iron deficiency. Neverthless, overall, 40% of the subjects studied were found to have low haemoglobin values, with more subjects from the nursing homes having lower levels compared to those from private homes. Jansen and Harrill (1977) attributed the low levels of haemoglobin of nursing home subjects to inadequate food intake, poor absorption, blood loss, and the effect of various disease.

In another study on the iron nutrition in Indian women at different ages MacPhail (1981) found that out of 320 women 52 (16%) were anaemic with haemoglobin levels below 12gm/100ml. It was noted however that only 10% of older women were anaemic while 20% of the subjects below 45 years were anaemic. Similarly Gershoff et. al.,

(1977) in a study of blood status on generally healthy institutionalized and free living people over 60 years of age, black women showed lower haemoglobins and haematocrits than white women. Males showed significantly higher haemoglobin and haematocrit values. Also haematological values obtained among the free living subjects were higher than for the institutionalized subjects.

In another study on folacin and iron status in predominantly black elderly person from urban low-income households, Bailey et al.,(1979) found that the iron status was normal and that anaemia was not due to dietary iron deficiency. The subjects had a high incidence of folacin deficiency anaemia.

Other nutrients of importance in the diets of elderly people are likely to be adequate if well balanced meals are consumed. The trouble with assuming that elderly people will eat a balanced meal is that too often old people are not bothered with the whole process of food preparation. Often they eat minimal amounts of food and select those foods that require very little time for preparation. Some other elderlies have various physical disabilities or are too poor to afford regular meals.

Parasitic Infection

Parasites are known to present negative nutritional effects on the host. Helminths utilize the nutrients that are intended to benefit the host. The presence of hookworms and the etiology of iron deficiency anaemia has been documented by many authors, (Foy and Nelson 1963), Foy and Kondi (1960), Brooks et al., (1979), Foy et al., (1958, Beaton and Bengoa (1976), Latham (1979), Roche (1969), Wolgemuth et al (1982).

Studies showing the relationship between hookworm infestation (and with special reference to load of worms) and severity of anaemia were demonstrated as early as the 18th century according to Foy and Nelson (1963). Early and recent studies continue to support the early evidence associating hookworm and iron deficiency anaemia. Studies of Foy et al., (1958) showed that when a patient had a load of over 1,000 hookworms there would be blood and iron loss that was sufficient enough to upset iron balances. Even as few as 10 adult hookworms could induce a gross iron deficiency anaemia. Similarly Roche (1969) stated that hookworm is a major cause of iron-deficiency anaemia through blood and iron losses. There was a statistically significant correlation between circulating haemoglobin levels and hook-

worm load. In addition, when the hookworms were removed through deworming, there was a slow rise in haemoglobin even when the patient remained on the usual diet. Foy and Nelson (1963), however indicated that numbers of hookworms may vary from only a few to several thousands and that loads of less than 50 or 100 worms seem to be well tolerated. When numbers increased beyond this level, a patient becomes anaemic.

The characteristic microcytic hyperchromic anaemia of hookworm infection causes blood loss in varying amounts. Isotopic studies have shown that a single hookworm (Necator Americanus) sucks about 0.03 ml of blood per day, (Markell and Voge, 1981). Roche (1969) in his studies indicated that there is significant correlation between total blood loss and the number of eggs in the stools. He reported in his study that 2000 eggs per gm of faeces cause daily faecal blood loss of about 2-4 ml. Two thousand eggs in this case are an equivalent of about 80 adult worms. Beaton and Bengoa (1976), and Roche (1969) also reported that some studies have shown that some of the iron lost into the intestines can be reabsorbed and reutilized. This only happens when the iron loss occurred in the upper gastro-

intestinal tract,(GIT). When iron losses occurred at the lower levels of GIT reabsorrption was not possible.

The frequency of anaemia in various communities has been known to have a negative effect on the progress of the given community. Yaro (1969), found an association between anaemia and reduced work capacity and additional economic losses due to the ill health. A study by Brooks et. al., (1979) of the relationships between nutrition and health to work productivity in Kenya showed that men with high levels of haemoglobin produced more work and at a faster rate than workers with low haemoglobin. The low haemoglobin was attributed to parasitic infections.They had found prevalent rates of 66% hookworm, 45% trichuris trichuira, 23% ascaris lumbricoides, and 29% of entomoeba sparalis cysts. Areas with high haemoglobin levels had no parasitic infection but dietary sources of iron for both areas were similar. In a similar study among road workers in Kenya, Wolgemuth et al. (1982) found that the presence of infections negatively correlated with work productivity. Presence of infections (16.5% prevalence of hookworm and 11.8% of Ascaris lumbricoides) was estimated to reduce productivity by 6%.

It is believed that dietary deficiency of iron, poor absorption and utilization, physiologic requirements or increased losses are the underlying causes of most anaemia, on a global level (Chopra, 1969). Several measures have been taken to prevent anaemia. These include nutritional education, food fortification, supplementation, and improvement of environmental sanitation. The issue of environmental sanitation is also closely related to parasitic infection. Problems associated with parasitic infection can be linked to the reinfestation rate even after an intervention programme. This is because in many cases, to change cultural patterns of a people is not easy and these patterns may be related to the state of enviromental sanitation.

Methods of nutritional assessment

Most studies on nutritional assessment in the elderly are of cross-sectional design. Thus, age differences are established by the comparison of results of measurements made on individuals from various age groups. The shortcomings of cross-sectional studies have included failure to account for effects of aging, pathological changes, cohort effects, social and environmental influences, (Exton-Smith 1982). These shortcomings have

not prevented progress in many similar studies. Longitudinal study designs have been used to examine varied areas related to the nutritional status of the elderly. Assessment of nutritional status has been done on basis of anthropometric measurements, dietary examination, biochemical assessment as well as some aspects of psycho-social assessment.

Anthropometric Measurements

In the elderly, different anthropometric indices have been widely used. These include mid upper arm circumference, triceps and subscapular skinfolds. Derived measurements from mid upper arm anthropometric data include arm muscle circumference, arm muscle area, arm fat area. Other parameteres cited by Frisancho and Flegel (1981) include body mass index derived from weight and height (Wt/Ht^2, Wt/Ht^3, Wt/Ht^P).

Fat stores under the skin are evaluated by the triceps skinfold measurements or arm fat area. The upper arm circumference reflects on both fat and muscle mass. Upper arm anthropometric data is therefore an indicator of the individual's energy and protein reserves according to Jansen et al., (1983).

Body weight and height are two parameters which are widely used in the assessment of nutritional status for both adults and children. These parameters are widely used because they are easy to measure and readily accessible without causing unnecessary disturbance to respondents. They do not require sophisticated tools during assessments and yet they provide valuable information that is useful in the assessment of nutritional status of individuals.

Weight is considered an important indicator of nutritional risk since it can be compared to the subject's usual weight, desirable weight, or even both. In adults, the individual is considered at nutritional risk when the subject has less than 85% of the desirable weight for his/her height, (Jansen et al., 1983). Weight should increase consistently with age for both sexes, (Bowman and Rosenberg 1982). According to these authors, maximum weight occurs around age 34 to 54 in men and around age 55 to 65 in women. It then decreases thereafter albeit more slowly for women than men. Height on the contrary decreases with age. Rossman (1977) found that average lifetime height loss is about 2.9 cm in men and 4.9 in women. Rossman (1977), however, noted that height measurements in elderly present

difficulties due to slumping resulting from aging.

The biggest problem associated with anthropo-
metric assessment in the elderly is the question
of suitable standards. To date there are no
suitable standards that researchers feel are
the most suitable for interpretting anthropometric
data on elderly. While some standards are age
specific others are just for adults,ranging from
age 25 (Jelliffe, 1966).

Differences between elderly people and the
younger adults in terms of their anthropometric
indices have been reported by Bishop et
al.,(1981). The upper arm measurements were grea-
test for men aged 35 to 44 and least for youngest
and the oldest males. The Bishop et. al. study
involved a sample size of 21,752 non institu-
tionalized people aged 25-74 years. The muscle
circumference parameter reported by age group
showed that there was an increase from a mean of
27.4 cm at age 18-24, to 28.8 cm at age 35-44.
However, after age 44 years the parameter decrea-
sed reaching 26.8cm at age 65-74. The elderly in
this age category had the lowest value.

The muscle circumference in the women accord-
ing to Bishop et. al., (1981) showed increasing
values with age from 20.9 cm at ages 18 to a
maximum of 22.8cm for ages 55-74 years. These

findings indicate that a larger mean muscle cir-
cumference was exhibited by the men than women
regardless of age. The study revealed that in men
the muscle circumference first rose and then de-
clined with age. Data for women showed that this
parameter stabilized after age 64 and in some
cases showed decline. The triceps in men however
showed no consistent trends with advancing age.
Other investigators (Bowmann and Rosenberg, 1982)
have also reported that triceps is one anthropome-
tric parameter that is relatively independent of
age in men. However, in terms of muscle size cha-
nges with advancing age, Frisancho (1981) however
cautions that the trend after age 40 tends to
compress fat.Additionally, aging in males and
increases the female fat disaproportionately and
as a result may overestimate muscle and underesti-
mate fat area. Mid upper arm circumferences have
been reported to decline with age (Bishop et al.,
1981) and (Burr and Phillips 1987). These two
groups of researchers showed that in the United
States and in Great Britain the mid upper arm
circumference shows a stronger decline in women
than in the males.

In a study of elderly in Embu District
(Kenya), Waswa (1985) found that mean mid upper
arm circumference showed a steady decline with

advancing age among the males with highest value at age 30-39. Among the females the highest value reported by Waswa (1985) was at age 40-49 and after this age there was a decline in value of the mid upper arm circumference. Waswa (1985) also reported that there was no consistent pattern over the changes in the triceps skinfold thickness except at ages above 80 years. The value of triceps skinfold was highest at advanced ages. In terms of overall values, 59% of the study group was 80% of standard (Jelliffe 1966).

Body mass index (BMI), a derived measurement from weight and height has been reported to decline with age, (Burr and Phillips 1987). In other studies it has been viewed to be independent of age, (Godfrey 1986, Waterlow 1976).Body mass index has also been reported to exhibit high correlations with skinfold thickness and known to provide adequate information about body size and fatness when interrelated to measures of subcutaneous fat, (Frisancho and Flegel 1982).

Garry et al., (1982) also reported small but significant decrease in BMI with age for men than for women. The subjects in his study were more overweight than underweight.Of the subjects aged 60 years and over, 15.8% of the men and 19.5% of the women had a weight greater than

120% of their desirable body weight and were hence obese. However the investigator also found that 2.4% of the men and 0.7% of the women were less than 80% of their desirable weight and were thus considered thin.

Frisancho and Flegel (1982) used BMI on 16,459 adult black and white individuals aged 18-74. They concluded that irrespective of sex, and race, weight and three indices of obesity have systematically higher correlations to subscapular skinfolds than triceps skinfolds. Correlations between body mass index(Wt/Ht^2)and skinfolds are almost identical to the correlation between (wt/ht)x(age)x(sex)x(population)specific regression coefficient. Godfrey (1986) in a study of elderly in the Sudan also reported that body mass index were not affected by age. Godfrey reported that decreasing values of body mass index are associated with increased mortality risks but in the study it is pointed out that BMI values may be lower in developing countries.

Godfrey (1986) reported a population prevalence rate of malnutrition to be 26-40% in men and 24-30% in women based on BMI.

Dietary Assessment

Additional means of assessing the nutritional status of elderly include dietary, social and

biochemical aspects. According to Exton-Smith
(1982) problems associated with data obtained from
such surveys ranged from pathological to mental.
Exton-Smith (1982) said that elderly people have
been found to have a high incidence of mul-
tiple pathology. This information showed that some
parameters such as those used in biochemical fi-
ndings may reflect more problems than just the
nutritional status of the elderly. Another problem
was related to the responses in nutritional
surveys whereby the exacting demands on the subje-
cts may not be conducive to isolated or mental
impairement, and hence response refusal may
come from inadequate survey methodology.

Dietary surveys present problems in terms of
methodology. Debry et al. (1977) said that dietary
surveys of the elderly are rare and the majority
have employed doubtful methodology. Some of the
problems related to age classifications whereby
some categories may range from 50 years to over 60
years. At the same time time the situation of
studying elderly subjects within their own homes
or institutions may present various differences.
As Debry et al. pointed out, food in institutions
is closely dependent on the budget available and
as for elderly living in own homes there is the
question of lifestyles and resources available.

However, Schwerin et al., (1982) studied food,
eating habits and health as a further examination
of the relationship between food, eating patterns
and nutritional status and found that ranks of
eating patterns in order of how well they fared by
biochemical and clinical measures were very consi-
stent. The Scwerin et. al., study (1982) involved
28,030 subjects aged upto 74 years and examined
food recalls for 3 days. If the elderly were not
reporting accurately, then the results would have
been skewed. In smaller sample sizes, however
misreporting of dietary intakes has also been
reported among elderly, Davies (1984). The actual
methodology employed by different researchers may
possibly reflect on the level of accuracy of data
collected in 24 hour dietary recall, and 3-7 day
diet history may be the maximum recall periods
expected of elderly subjects.

Summary of literature reviewed.

From the literature reviewed, it is apparent
that the study of nutritional status of the aged
has been done very widely and to good depth in the
industrialized world. It is also apparent that
very little investigation has been carried out in
the less industrialized countries. Only two
studies, Waswa (1985) and Godfrey (1986), were

located for elderly in these countries. In both these studies the findings indicated that the subjects were highly malnourished. This poor nutritional status of old people as featured in the available works together with the wide gap in knowledge in this field in the less industrialized countries presents a challenge to reseachers to provide more information for future planning.

CHAPTER 3

RESEARCH OBJECTIVES

The broad aim of this study is to examine the nutritional status of elderly people living in Nairobi. Three objectives and one hypothesis were formulated in order to help achieve the above aim.

3.1 Hypothesis

The hypothesis of this investigation is that destitute elderly people have poor nutritional status compared to Frisancho's (1981) median reference.

3.2 Research Objectives

The first objective was to determine type and magnitude of nutritional disorders among elderly people living in residential nursing institutions and those attending domiciliary day care programmes in Nairobi.

Sub-objectives

The following sub-objectives were set to help achieve the first objective:-

3.2.1 To determine nutritional status of elderly people on the basis of anthropometric measurements.

3.2.2 To determine nutritional status of the subjects, on basis of selected clinical indicators.

3,2.3 To examine nutritional status of elderly people based on selected biochemical indices.

3.2.4 To examine the prevalence and type of intestinal parasites and parasitic load among the subjects.

3.3   Objective
The second objective was :-
3.3 To determine the quality of food consumed by the elderly living in daycare centres and residential institutions.

Sub-objectives
The sub objectives for this objective were:-

3.3.1 To determine the quality of food eaten by elderly people in institutions on basis of checking food records, menus and shopping lists of the institutions.

3.3.2 To obtain a seven day food frequency

history from the subjects.

3.3.3 To determine frequency of days in a week when subjects went without food.

3.4   Objective

3.4 To relate the food quality to the nutritional status of the old people.

3.5   Expected Benefits

It is expected that the results of this study will provide information on the nutritional and general health status of destitute elderly people living in urban Kenya. This study will therefore offer information on the status of elderly people who are poor and are not employed in any formal sector which can provide special benefits in old age. Kenya government and different church organi- zations are targeting the elderly in their progra- mmes in this country. Their work is mainly linked to Non Governmental Organizations (NGOs). It is hoped that the Ministries of Culture and Social Services and Health can use the information from this study and together with interested NGOs start some intervention programmes targeted towards the elderly. This need will be felt even more in the future if the question of increasing numbers of elderly as indicated in the CBS census projected

reports (1983) receives special attention.

3.6 Definitions

   1. Elderly: In this study, the term elderly refers to person 55 years of age and over.

   2. Anthropometric measurements: For the purpose of this study anthropometric measurements include weight, height, mid upper arm circumference biceps and triceps skinfold thicknesses.

   3. Clinical indices: These have been limited to clinical observations of teeth, limbs, ears and eyes.Detection of nutritional deficiencies have been limited to presence or absence of clinical signs of Vitamin A, Vitamin B, dietary iron, Protein Energy Malnutrition (PEM),obesity and disorders of iodine absorption.

   4. Biochemical assessment: In this study only haemoglobin levels and urine examinations are covered.

   5. Day-care center: This refers to a facility providing social and material welfare to elderly people. The inmates visit the day care

facility one day per week.

6. <u>Residential homes or institution</u>: This refers to a residential nursing facility for elderly people. It offers full residential service to the elderly residents.

7. <u>Limitations</u> : This study is limited to individuals of age 55 and above who either attend domiciliary day care programmes or live in nursing institution.

CHAPTER 4

RESEARCH DESIGN AND METHODS

4.1   Study Design

This is a descriptive study of a cross-sectional type. It examines the nutritional status of elderly people aged 55 years and above living in an urban setting, Nairobi. The investigation is based on the following parameteres :-

    i) Dietary assessment

    ii) Clinical observations

    iii) Anthropometric measurements

    iv) Biochemical assessments

    v) Parasitology

    vi) Morbidity

    vii) Basic information

The data were collected using personally administered questionnaires, anthropometric measurements and clinical examination.

4.2 Tools of Measurement.

Each respondent was subjected to a structured questionnaire on an individual basis. Questions were directed to the elderly respondent who was either living in a residential old peoples' home or attending a domiciliary day care programme sponsored by Help Age, Kenya. In order to ascertain that no relevant information was omitted,

when assessing the dietary section the administra-
tors in charge of residential institutions or day
care centres were asked the same questions that
each elderly person was asked. These were in
terms of number of meals or snacks eaten each day.
In addition, the institutional administrators were
asked to give a weekly food frequency that the
residents consumed in terms of the type of food
eaten and how many times per week that each food
was served.

4.3 Development and Standardization of Measuring Instruments.

A structured questionnaire was designed for
the purpose of collecting all the required infor-
mation. The questions that were formulated were
based on the basic information relating to the
situation of elderly in residential and day care
institutions. This information had been collected
previously through literature search and personal
interviews with personnel charged with the respon-
sibility of looking after elderly people within
the day care or residential institutions.

4.3 Pilot Testing.

The questionnaire drafted was administered to
three elderly people living in a residential inst-
itution and two elderly people attending a day
care programme.

These individuals were potential respondents but were excluded from the final study group. The data collected were analyzed and it was found that several questions were ambiguous and tended to be misunderstood. Some other questions proved incapable of soliciting the required information. The questionnaire was then modified accordingly. In some cases questions were ommitted and additional questions were inserted.

4.3. Pre-testing.

The revised questionnaire was administered to ten respondents with similar characteristics as the study group and either living in a residential old peoples' home or attending an old peoples' day care facility. Once more, these individuals were also excluded from the study sample. Data collected at this stage was then analyzed. The findings indicated that most questions required very minor modifications. The questionnaire was reproduced in sufficient numbers for field survey. The final version of the questionnaire is to be found in appendix 4.

4.4 Population Sampling.

The sampling frame for this study comprises destitute elderly people aged 55 years and over

and living within the city of Nairobi. The samp-
ling frame also comprises elderly who are either
residents in old peoples' homes or attendants of
ambulatory institutions for the aged.

4.4 Sample Selection.

The sample was inclusive of both males and
females. Full coverage of all residential insti-
tutions and domiciliary day care centres were
planned and this was achieved.

4.4.1 Sample Size.

Through literature search, it has been noted
that 20% of elderly people are at risk of inadequ-
ate nutrition Kohrs (1978), Waswa (1985), Schorah
(1986).

Our study is however being conducted in a
developing country where income levels are much
lower than those of the developed world. Old
people may be assumed to be more disadvantaged
economically reflecting itself also in inadequa-
te food intake. Older people in developing
countries tend to have limited educational and
professional skills making them unable to secure
good jobs. Their decreased strength may at the
same time reduce their chances of getting and
maintaining employment. The groups of respondents

in this study have a history of poverty due to various social reasons. As a result, these individuals are at nutritional risk since they tend to consume minimal amounts of food. Because of all these prevailing factors, 30% of the elderly within the sampling frame have been taken to be at nutritional risk and this is the proportion that has been used to calculate the required sample size for this study. A confidence limit of 95% and a range of 10% has been used.

The following formula was then used to determine the required sample size :

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

where n = sample size

z = confidence limit

p = proportion of malnourished elderly

q = 1 - p (proportion of well nourished)

r = acceptable range of deviation from the real situation.

Therefore $n = \frac{1.96^2 \times 0.3}{(0.10)^2} = 80$

There are two strata in this study :-

i) Elderly living in residential institutions

ii) Elderly attending day care centres

Each of the strata requires a minimum of 80

subjects. Minimum sample size required is there-
fore 160.

4.5 Methods of Procedure

Data on each respondent was collected using a
structured personally administered questionnaire.
A total of 37 items including measurements were
used to solicit the required information. Areas
covered by the questionnaire and measurements
included:-

     i) Basic information

    ii) Diet history

   iii) Clinical observations

    iv) Anthropometric measurements

    v) Biochemical assessment

    vi) Parasitological examination

   vii) Morbidity information

All measurements were taken using procedures
recommended by Jelliffe (1966), Martin and Beaves
(1968), Latham (1979) , Cheesebrough (1981),and
Jansen et al.(1983).

4.6. Basic Information

Each respondent was asked for information on
his/her ethnic background, religion, marital sta-
tus and family history. Age was determined throu-

gh use of a calender of local and historical eve-
nts ranging from 1885 - 1986.

Through use of this calender it was possible
to establish the age of the respondent to within
plus or minus two years accuracy. The duration of
stay at each institution was provided by the res-
pondent but and was also verified through admini-
strator's records at each institution.Each respon-
dent gave information related to how he/she was
admitted to the particular institution. The in-
formation obtained was cross checked with availa-
ble official records or other information provided
by the officers.

In order to establish whether the responde-
nts had any social links with their immediate
families or relatives, each respondent was asked
if he or she had recei ved any visits from child-
ren or relatives within the last six months. If
the answer to this question was positive, the
subject was asked if the child or relative had
given him or her them any money or food at the
time of the visit. In the cases where the res-
pondent had been given money and/or food it was
further probed if this was a one time or regular
occurrence.

4.7. Diet History

Each respondent was asked about the number of meals he or she ate in a day. Snacks were treated separately. Any days in a week without a meal were also recorded. A seven day dietary history was then taken, based on food types found to be commonly eaten during the pilot and pre-testing phase of questionnaire development. Each food was identified by the interviewer and the respondent was asked to state if they ate that food daily, two - three times per week, once per week, rarely or never. If the response was never, the respondent was further probed on the reason why they never ate that food. The respondent was also given an opportunity to name other foods that they ate but may not have been included in the investigator's list. In order to establish the validity of the information on diet history from the respondents, the same information was collected from the administrators and cooks of each institution or day care centre.

Administrators were also requested to give information on the sources of food for the inmates and the proportion of their budget spent on food for the elderly people. In cases of food donations, the administrators were asked to state the

specific foods donated and how these foods were
stored and later utilized.

Day care attenders were asked how they spent
the weekly allowance received at the centre and
what food types they bought with the money recei-
ved. These elderly people were further asked if
they . fed other people with the food bought with
the weekly allowance. It was also investigated
whether the old people attending day care centres
had any food/money sources other than the cent-
res. The day care centres that give food rations
instead of money were asked how much, how often
and what type of foods they give the elderly
people.

4.8. Anthropometry

The following anthropometric measurements
were taken on each respondent unless there was any
physical disability that interfered with the proc-
edure of taking such required measurements as wei-
ghts, height, mid upper arm circumference and
skinfold thicknesses. The skinfold thickness was
taken taken both over the biceps and triceps mus-
cles.

4.8.1 Weight

The weight of each respondent was taken using

a "SECA" electronic balance which was calibrated bimonthly at Avery (Kenya) Ltd. The balance read accurately to within 50 grams. Each respondent was requested to remove any excess clothing such as coats, cardigans and other bulky clothing. The balance was switched on shortly before the respondent stepped on the platform. The respondents were then asked to stand upright on the balance without any support and the exact reading was read and recorded promptly.

Some respondents who had leg disabilities could not be weighed because they were unable to stand on the balance without support.

4.8.2 Height

Heights of respondents were taken using a heightmeter which had a metal plate for a base, a flexible measuring tape calibrated in centimetres and an adjustable head board. Each subject was asked to remove shoes and to stand on the metal plate with his/her back to the measuring rod. The rod was then raised until it was approximately six inches above the respondent's head. Then the respondent was told to stand upright with the chin and line of sight at horizontal level. The headboard was lowered and the height was read to the nearest centimeter.

4.8.3   Mid Upper Arm Circumference

The   respondent   was requested to sit   in   an
upright   position so as to assume a good   posture
for   mid   upper arm circumference.   He/she   was
requested to   bend the left arm at a right   angle
from   the elbow.   The acromion and the   olecranon
process   of   arm were   then   located.The   distance
between the olecranon and the acromion was   measu-
red   and the mid point was determined. This   point
was then   marked using a felt pen marker.

In order to measure the   mid   upper   arm cir-
cumference, the respondent was asked to let the
left arm   to hang freely.   The insertion tape   was
taken and the tip of the tape was put through   the
slot   that is at the near end. The upper edge   was
then aligned with the mark that   was tightened but
taking   care   not to wrinkle the   skin.   The   arm
circumference   measure was then read   through   the
window   at the origin of the tape to   the   nearest
0.1 cm.   The measurement was then   recorded.

4.8.4   Triceps and Biceps Skinfold Thickness.

Triceps and biceps skinfold thicknesses   were
measured   using   a Holtian   (R)   skinfold   caliper
calibrated   in   millimeters.   Measurements   were
recorded to the nearest 0.5 mm.

Triceps Skinfold.

The triceps skinfold thickness was measured on the left arm as it hung freely at the side. The point marked at the midpoint level of the upper arm was used as the measuring location for the triceps skinfold thickness. A vertical lengthwise double fold of the surface of the arm was picked at about 1 cm above the midpoint mark. The skinfold was picked by use of thumb and forefinger of the left hand so that the right hand could be free to hold the skinfold caliper. Care was taken to ensure that the skinfold thickness picked was in line with the point of the olecranon process. The skinfold thickness was held firmly until the measurement had been taken.

To measure the skinfold thickness, the skinfold caliper jaws were applied over the fold exactly at the midpoint mark and the left hand holding the fold remained holding it until the measuring was completed. The measurement was read as registered on the caliper after the caliper's full pressure was applied. Two measurements were taken in each case and the average was recorded.

Biceps Skinfold

The biceps skinfold thickness was measured following exactly the same procedure as that for

measuring triceps skinfold. The measurement was however taken in the front of the arm but the level of the mid point was similar.

4.9   Clinical Signs of Malnutrition

The clinical signs of malnutrition were assessed using guidelines in Jelliffe (1966) and Latham (1979).   In each observation, the signs were given a score depending on whether they were frankly present, missing or unsure.

4.9.1   Vitamin A Deficiency

The clinical sign that was investigated as suggestive   symptom of vitamin A deficiency was blindness or night blindness.Blindness does not necessarily result from vitamin A deficiency but there is an association between night blindness and vitamin A deficiency. Also in some forms of blindness (xerophthalmia and keratomalacia) vitamin A deficiency has been implicated.

4.9.2 Vitamin B Deficiency

Vitamin B deficiency was investigated through clinical assessment of the presence of angular stomatitis, magenta tongue and swollen tongue.The presence of these two clinical signs was taken as suggestive indicators of vitamin B deficiency.

Angular Stomatitis

The assessment involved examination for little cracks radiating from the corners of the mouth onto the facial skin. If such an indicator was found it was taken as a possible presence of riboflavin deficiency.

Swollen Tongue

Each subject's tongue was observed to find any indication of a swollen tongue which had notches on the sides in line with the teeth. If this condition was present it was taken to be suggestive of riboflavin and/or niacin deficiency.

Magenta Tongue

The condition of magenta tongue involved clinical visual examination of the respondent's tongue for a reddish to purplish colour. If there was a purplish colour or reddish colour and swelling on the tongue this was taken as a sign of possible deficiency of niacin.

4.10 Iron Deficiency

Signs of iron deficiency anaemia investigated included pale conjuctivae and koilonichia. In pale conjuctivae, the eye was opened wide and the

lower eyelid membrane was observed for a paler than normal colour which would be suggestive of iron deficiency. In koilonichia the nailbed was observed for a spoonshaped appearance.

4.11 State of Teeth

The state of teeth of the subjects was investigated because poor nutrition in elderly has been associated with poor state of teeth (Waswa 1985). In this study, the number of teeth missing or decayed and the presence or absence of dentures were recorded.

4.12 PROTEIN-ENERGY MALNUTRITION (PEM)

4.12.1 Muscular Wasting

Since in elderly people it is difficult to differentiate between the signs of a natural aging process and muscular wasting due to PEM, this clinical sign was interpreteted cautiously. Subjects were checked for wasted muscles and if present was crosschecked with the weight for height measurement in order to determine whether muscle wasting should be judged positive or negative. Frank muscle wasting was taken as a sign suggesting the presence of PEM.

4.12.2 Oedema

A second check, for PEM was the presence of oedema. Each subject's leg was pressed with a thumb just above the ankle. If a pit was formed which took three seconds to return to the level of the surrounding skin then oedema was present. This clinical symptom was not considered a conclusive indication of PEM because it could occur due to other pathological reasons in the elderly.

4.12.3 Obesity

A subject whose standard weight was 20% above his or her weight for height was considered obese.

4.13 Biochemical Assessment

4.13.1 Urine Examination.

A Macherey-Nagel Combi 9 field kit is normally used as a screening test for the detection of blood and glucose. The test strips are also capable of rapid determination of blood, protein, ketones, glucose and other biochemical substances in the urine. Each urine sample was placed in a clean container and a test strip for each sample was dipped into the urine. The test strip was removed from the urine and read against the colour code provided with the container. Each patholo-

gical condition observed for each urine sample
was then recorded.

4.13.2 Haemoglobin Levels.

Haemoglobin levels were determined by finger
prick method and the use of a Spencer haemoglobi-
nometer. In each case, the index finger was clean-
ed using surgical spirit and cotton wool.   A
sterile lancet and its platform were used to prick
the   finger. A drop of blood was drawn and was
fed onto a cuvette. This blood was immediately
haemolyzed using a haemolysis stick. It was cove-
red with a slide cover and placed into the haemo-
globinometer chamber. The haemoglobin level was
then determined by the use of the haemoglobino-
meter's visual assessor. Each respondent's Hb
level was recorded accordingly.

4.14 Stool examination

In order to assess the parasitological status
of each respondent stool samples were examined.
Each respondent was given a stool container on the
day he or she was interviewed. The respondent was
then instructed to take the container home and to
put a small specimen of fresh stool produced the
following morning and to return this stool speci-
men to the study site that same morning. The

stool specimen was collected and taken to the
Laboratory of the Applied Nutrition Programme
(ANP). Each sample was then prepared by the inve-
stigator together with a qualified laboratory
technician for analysis.

The method chosen to identify the intestinal
parasites was the stool concentration method of
the formol-ether centrifugation sedimentation
technique (Cheesbrough 1981). This method was
chosen because the reagents and equipment required
are readily available and the method is considered
rapid and gives good concentration of eggs. In
addition to the formol-ether centrifugation sedi-
mentation technique, a sub-sample of the specimen
collected was subjected to the modified Kato Thick
Smear Technique, (Martin and Beaves 1968). This
technique had the function of quantifying the
number of parasites eggs in a gram of stool while
the concentration technique had the function of
identifying different types and prevalence of
intestinal helminths in an individual subject.

4.15   Morbidity Information

Each respondent was asked if they had had a
per-sistent medical problem in the last one month.
The purpose of this investigation was to find out

the prevalence of chronic diseases among the eld-
erly people.Those who responded positively were
further asked to explain the nature of their
health problems. When documentary evidence was
available such as outpatient medical cards or
records in nursing homes, these were also
examined.

Respondents were also asked to recall illne-
sses they had had in the last seven days.Thirteen
illnesses found to be common among elderly people
were read out to each respondent. He/she was
asked if they had had that illness in the last
seven days. If they said they did, they were then
asked to state the measure they had taken towards
treating the illness. The information obtained
gave incidence of various types of illnesses and
thier treatment.

4.16 Data Processing and Analysis.

The data for the study was collected using
precoded questionnaire forms. At the end of each
day, the investigator examined all the forms for
missing data or ambiguous entries. If any infor-
mation appeared questionable it was verified the
following day in the field.

4.16.1 <u>Data Cleaning and Processing</u>

Each form had its information entered in special data entry boxes and the codes for each line were then indicated on a side margin column. This column provided a summary for each variable and it served as a means for cross checking that all the collected data was not lost or misplaced. All the data was then cleaned using this process.

When the data collecting phase was completed, the investigator embarked on the necessary preparations for entering the data into a micro computer for final data analysis. The first preparation involved creating a definition file for each variable and an inclusion of the necessary fields. The data was then entered into the computer using a Data Base Three Programme (dBase III). After data entry, it was converted into a text file using Wordstar Programme and edited to ascertain that there were no wrong entries or missing values.

4.16.2 <u>Data Analysis</u>

The data was converted into a system file and SPSS PC was chosen for analysis because it is specially designed for social science studies.

CHAPTER 5

DESCRIPTION OF THE STUDY SETTING.

5.1 The Geography of the Study Setting.

This study has its setting within the city of Nairobi. The residential and day care institutions that house the elderly people are located at different distances from the city centre, with the farthest being about 25 kilometers away and the nearest at about 5 kilometers to the city centre. The common umbrella for these institutions is the Ministry of Culture and Social Services. Through this ministry, the government is able to provide social workers who work in conjuction with different churches in helping the aged. The day care facilities are operated under the domiciliary day care programme which is under the Help Age Kenya, a Non Governmental Organization (NGO).

5.2 Day Care Centres

There are five well established day care centres for the elderly in Nairobi. All five centres are located within church grounds and are run by social workers employed by different church denominations. The programme for elderly forms one of the duties of the social worker, other responsibilities include many forms of social work such as programmes for orphans or single

mothers.

The elderly people visit the day care facili-
ty once per week to receive cash allowance or
food ration. In some   centres there are physical
exercises and   religious teaching incorporated
within the weekly activities. The location of the
day care centres is quite distant from   where
some of the old people live. This forces some
elderly people to send friends or a younger
person to collect their ration when they do not
feel too well to walk the long distance. In gene-
ral however, the old people manage to visit the
day care centre once per week unless the indivi-
dual has special problems.

Help Age, Kenya

Help Age, Kenya is a non-governmental Organi-
zation (NGO) that works with different organiza-
tions and individuals in order to offer care for
the elderly people.This organization works closely
with different church bodies in order to plan
programmes targeted towards elderly people. In
Kenya, this organization solicits funds from
overseas and local agents in order to help
needy elderly.

Through collaboration with different church
denominations Help Age Kenya has established day

care programmes which provide a weekly cash
allowance or food ration to each elderly person
seeking help. In a few cases, day care centres
provide a monthly cash allowance which is suppo-
sed to go towards house allowance for aged person.

Help Age, Kenya has been actively involved in
raising funds locally for the aged. Some of the
community based activities involve young school
children and other well wishers. Information
featured in the local newspapers has also raised
awareness of the needs of aged people.

Most donor agents for Help Age Kenya, are
based abroad and they assist through a system of
sponsorship whereby an elderly person is assist-
ed financially by a well wisher from a foreign
country. The money so received is then given to
the particular elderly as a weekly allowance or
a monthly house rent.

Churches actively involved in elderly domi-
cliarly day care programmes include Presbyterian
Church of East Africa (PCEA) at Eastleigh and
Pumwani, United Methodist Church at Lavington,
and Catholic Church (Mother Theresa's Sisters
of Charity) at Huruma.

5.3 Population and its Characteristics

The elderly people that are served by reside-

ntial as well as day care institutions are uni-
que individuals. Although they all originate
from some specific rural community, they have
been city dwellers for more than four decades.
This has first and foremost displaced them from
their rural communities. Some of the individua-
ls were displaced when they were recruited into
the World War II (1939-1945) such that when the
war ended they found that their land had been
occupied by other people rendering them land-
less. Many of these people lost close family
members and these factors made them migrate into
the urban area in search for employment.
During Kenya's political struggle for independence
many young people (today's elderly) vacated their
ancestral homeland in order to assist in the Mau
Mau fight for freedom. When this war ended many
people found that they had lost land, family
and many possessions. Those people who thought the
urban areas offered better prospects economi-
cally, migrated. Today, these same people find
that the socio-economic trend in the urban setting
is no longer as lucrative as it promised to be.

Most of the individuals within this study
have indicated that they were employed when they
were younger. The job type that they performed
fall within the classification of manual or semi-

skilled employment. The employers of these people
were private entrepreneurs or self employee.
These employment schemes did not place them in the
category where they could have retirement bene-
fits such as the National Social Security Fund
(NSSF). As they are today, the elderly people
in this study do not own property or any assets
that could help them have an income. It is the
combination of some or all of the above problems
that make these elderly people destitutes.

Residential Nursing Homes

Admission into residential nursing homes is
based on the report from the social workers, poli-
ce or some other source that demonstrates a
needy case history. Some elderly inmates may have
been hospitalized for many years and upon dischar-
ge from hospital it was found that they do not
have a place to return to. A social worker may
then recommend that such a destitute elderly be
put in a nursing home on a temporary basis while
at the same time attempts are made to trace the
next of kin. Such admissions may end up lasting
for years if the inmate does not have any relati-
ves. In many cases, the nursing home turns out
to be a permanent residence for such a person. An
elderly individual who is found on the streets and

demonsrates a need for assistance is also taken
by police to a nursing home.

5.4   Research Facilities/Infrastructure

This research had its requirements provided
for by the   Applied Nutrition Programme (ANP) at
the University of   Nairobi based at   Kabete
Campus.

Research Facilities

Materials and Equipment

Stationery, typing facilities and photocopy-
ing equipment required for this study were pro-
vided through the Unit of Applied Human Nutrition
(ANP). These facilities enabled the investigator
to   proceed   smoothly   from   preliminary   and
preparatory stages to the implementation stage.

Basic equipment required during the data
collecting   phase   included   balances,   skinfold
calipers, insertion   tape for measuring upper arm
circumference,   heightmeter,haemoglobinometer and
sample containers. These   equipment were ini-
tially borrowed   from the ANP Unit and some were
later purchased   when   funds were   available.

Laboratory Facilities

Stool   examination for parasites required a
well equipped laboratory with microscope, refri-

gerator, glassware and other smaller items. The
ANP Unit allowed the investigator to use its
laboratory which was suitably equipped for this
research.   In addition, a laboratory technician
was requested   to offer assistance to the inve-
stigator in the manipulation   of the special
equipment.

CHAPTER 6

RESEARCH IMPLEMENTATION

6.1 Chronology of Investigation

The investigation for this research began during the didactic year of Master of Science (M.Sc.) programme in Applied Human Nutrition. The protocol for this study was written as a requirement for the course titled "Project development and research methodology" (ANP 5).

The investigation began by general reading on problems of elderly people followed by a literature search for materials available in the country. An initial visit was made by the investigator to the Ministry of Culture and social services in order to determine the level of care available for elderly in Kenya. The investigator was then referred to the offices of Help Age, Kenya, the only organization providing care for old poeple.

Help Age, Kenya, provided the investigator with detailed information of their activities. She was also given the names and locations of all institutions that care for elderly people in Nairobi.

All institutions and day care facilities for the elderly in Nairobi were visited and information of their activities was collected. This information as well as literature search done in

this field were compiled.A proposal was prepared and presented several times to faculty members as well as fellow students for critique. The proposal was then adopted after several corrections.

The completed proposal was filed with the President's Office for approval. Permission to carry out the research was granted and the proposal was finally funded by International Development and Research Centre (IDRC).

A measuring instrument in the form of a questionnaire was developed to collect the required data in the field. This instrument was pilot tested and pre-tested before a final copy was acceptable. Information on all parameters indicated in the study design section was collected from each respondent.

6.2 Problems encountered

In order to implement this research several activities had to be carried out. Some of these activities were done without difficulties but others presented certain problems as described below.

6.2.1 Sample Characteristics

The institutions for elderly people that are available are not solely being used for old

people but also serve as nursing homes for younger people who have mental or physical disabilities. As a result, the investigator had to take measurements of individuals who did not qualify to be in the study group because they were underage. Measuring the younger inmates was done as a matter of courtesy only because the inmates requested to measured. The data was not going to be included in the study sample. Another reason why we agreed to measure the inmates aged below 55 years was because some of measurements incorporated a direct benefit to the affected individual (those who were found to have intestinal parasites were given drugs for deworming). The institutions did not have any regular medical programme and so we felt it was fair to extend the little service we could offer to those who needed it although it meant loss of valuable time. Some respondents had various forms of disabilities. Examples of disabilities that were observed included missing limbs (arms or legs)·,conginetal malformations of limbs,and wasted muscles due to paralysis.These physical characteristics made it impossible in certain cases to take accurate measurements of height, weight,arm circumferences or skinfold thicknesses. Two respondents in one residential institution

completely refused to be interviewed or to have any measurements taken. One of these two respondents appeared mentally unstable but the other did not appear to have any noticeable problem.

6.2. Measurements

Height

The height measurement presented problems due to the stooping characteristic of the very old subjects. As a result the results of height and weight for height are to interpreted with caution.The height measurement for the very old and stooped subjects were consequently not used.

Haemoglobin Assessment

The haemoglobin was measured using a spencer haemoglobinometer. There was only one haemoglobinometer available for this study as well as another study taking place at the same period. The sharing of this instrument made it very difficult for the investigator in terms of obtaining a full coverage of the haemoglobin assessment for all the subjects. Because the instrument was not available every day the investigator was in the field, subjects particularly those from day care centres failed to be covered fully. When the instrument was available some subjects failed to come back to

the day care centre although the investigator made
many re- visits in order to catch such subjects.
Another aspect of the problems associated with
the use of the haemoglobinometer was that
haemolysis sticks were not available in the cou-
ntry. These sticks are an essential component of
using the haemoglobinometer the investigator had
to await a shipment from overseas when the sticks
could not be bought locally. Once more this inter-
fered with the response for this measurement.

Urine Examination

In one day care centre, which was located
within a residential institution for sick and
disabled people, the adminstrators refused to
allow the day care elderly attenders to use the
toilet facilities. This made it impossible for
urine and its examination to be carried out.

Stool Samples

From total sample, about 40% of subjects col-
lected the stool containers and failed to bring
a sample despite the fact that they had promised
to do so the following morning. This lowered the
response rate for this assessment.

Availability of relevant literature

Very little work on the nutritional status of elderly people has been done in Africa and other developing countries. The investigator has managed to find only one reference from Kenya. The lack of relevant literature in the developing countries meant that the bulk of literature reviewed is from the Western or developed countries. It may, as a result be argued that the literature reviewed is not very specific to the less industrialized countries. However, the investigator had to concede with this limitation.

CHAPTER 7

RESULTS

A total of 284 subjects living in institutions for elderly within the city of Nairobi were studied. Five of the institutions provided full residential services while five institutions only provided day care services. There were 218 (77%) females while 66 (23%) were males.

7.1 Residential homes

Each of the five residential institutions reported that they were supported by a church or a religious Non Governmental Organization (NGO). The churches involved are Roman Catholic, Salvation Army, Church Province of Kenya and St. Johns Community.

7.2 Day Care Centres

All five day care centres studied were sponsored by Help Age, Kenya, an NGO. The Help Age, Kenya, provides a weekly allowance of Kshs. 30.00 (less than 2 US dollars) to each elderly to help him or her to buy food and in some cases to pay for house rent. Where the allowance is provided for house rent, the elderly receive the money monthly instead of weekly.

7.3 <u>Sample Characteristics</u>

7.3.1   <u>Age</u>

   The mean age of the elderly studied was   69.5
years   (S.D   9.2;   range 55-98   years).   Among   the
males, 41% were between 75 and 84 years, with only
6% being above 85 years.   Among the females   25%
were between 75 to 84 years and   6% were above   85
years.   Among the females (36%) were   between   55
and 64 years of age (Table 5).

Table 5. Distribution of elderly by age groups and
         sex.

Age group in years	:	males N	%		females N	%
55- 64		14	21		78	36
65- 74		21	32		72	33
75- 84		27	41		54	25
85+		4	6		14	6
Total		66	100		218	100

7.3.2   <u>Marital Status</u>

   The   majority   of the subjects   (58%)   were
widowed. Table 6   shows that more males than fema-
les   had never married (29%); amongst the   females
66% were widows.

Table 6: Distribution of elderly by Marital status.
N=284

Marital status	Males		Females	
	N	%	N	%
Single	19	29	19	9
Married	11	16	24	11
Divorced	8	12	24	11
Separated	9	14	4	3
Widowed	19	29	145	66
Total	66	100	218	100

7.3.3   Social   Interactions

Most of the subjects (96%) reported that they lived alone apart from those in residential institutions. Only 4% either lived with a child, spouse or relative.

From the total subjects studied 63% indicated that they had not been visited by a child or relative in the last six months preceeding the interview but 37% reported that they had been visited. Those individuals that had been receiving visitors periodically however, reported that their child or relative never offered them money or food.

7.3.4   Duration of stay at institution

The length of time that each elderly had either lived at an institution or attended a day care centre varied between one and 42 years. The majority of the subjects (62%) had been at the different institutions for a period between six and ten years. About 11% had been at these institutions for over ten years (table 7).

Table 7. Duration of stay at old people's
institution

Duration in years	N	%
Less than one	10	3
1- 5	176	62
6- 10	68	24
10-20	19	7
more than 20	11	4
Total	284	100

7.3.5 Referral

Each resident was asked how they had been admitted at the day care centre or residential institution. Those who were recommended by a social worker formed about 30% while 40% were referred to the institutions by church workers,

police, hospital and similar people. Only 7%
were taken to the institutions by relatives.

7.4 Dietary Information

7.4.1 24 hour day dietary recall

Information on food consumption of the study
was collected by 24 hour dietary recall during
interviews carried out by the investigator
herself. Food intake during three principal meal
times, namely morning (breakfast), noon (lunch),
and evening (supper) were collected. Snack or in
between meals were not considered as a meal,
unless they replaced a main meal. The majority
of the subjects (55%) ate two meals per day (Table
8).

Table 8. Distribution of subjects according to
number of meals eaten per day (n=284).

Number of Meals	Frequency	Percent
1	54	20
2	158	55
3	72	25
Total	284	100

The majority of the females reported that
they ate 2 meals per day while only 36% of the

males indicated that they ate 2 meals. Twenty seven per cent of males and 17% of females reported that they ate only one meal per day (Table 9).

Table 9 Number of meals consumed per day by sex of subjects.

Number of meals	Males		Females	
	N	%	N	%
1	18	28	36	17
2	24	36	134	62
3	24	36	48	22
Total	66	100	218	100

X^2=12.94   DF=2   Sign=.0016 p=.01.

The number of meals that the subjects ate was significantly related to their age and sex (Table 9 and 10).

Table 10. Distribution of subjects by number of
          meals consumed by age category.

Number	:	Age		groups					
	:	55-64		65-74		75-84		85+	
of meals	:	N	%	N	%	N	%	N	%
1		16	17	25	27	9	11	4	22
2		56	61	51	55	43	53	8	44
3		20	22	17	18	29	36	6	33

X^2=13.13   DF=6 Sign=.04. p=.05.

7.4.2   Snacks

The snacks in this study were taken to mean
foods or beverages that were consumed between
meals. The subjects were asked to state the actual
number of snacks they ate on most days. Data were
based on one day's snack consumption as a represe-
ntative of days in a week.

Most of the snacks that the subjects ate were
in form of tea which was with or without milk but
with sugar. The data indicates that over 40% of
the elderly ate one or two snacks per day (Table
11). Both male and females had similar snacking
habits.

Table 11.Distribution of elderly by sex and frequency of of snacks consumption per day (n=284)

Number of snacks	:	Male			Female	
	:	N	%		N	%
None		2	3		5	2
1		28	42		98	45
2		28	42		91	42
3+		8	13		24	11
Total		66	100		218	100

The snack consumption by sex and age of elderly were not significantly related.The data also shows that the older subjects (75+) had a higher frequency of snack consumption (2 or more snacks) than their younger counterparts (Table 12).

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Table 12.Frequency of snack consumption by
age of subjects. (n=284)

# of snacks /day	Age groups in years							
	55-64		65-74		75-84		85+	
	N	%	N	%	N	%	N	%
None	3	1	3	1	4	4	7	20
1	48	52	46	50	27	33	5	4
2	33	36	33	36	43	53	10	56
3+	10	11	11	12	8	10	3	16
Total	94	100	93	100	78	100	25	100

7.4.3   Missed meals

The subjects were asked if there was any day in a week when they went without food. The response was either they missed eating food on a particular day in a week or that they never went without food on any day. The number of meals were not quantified in any way. The following table shows the frequency of missing meals in any given week among the subjects.

The frequency of missed meals was found to be significantly related to sex.

Table 13.Distributionof subjects by sex and
whether or not meals were missed (N=284).

		Sex of elderly		
		Males		Females
		N	%	N	%
meals missed		53	80	146	67
meals not missed		13	20	72	33
Total		66	100	218	100

The frequency of missing meals was not.
not significantly related to age.

7.4.4   Seven Day Diet History

     Diet history for seven days was obtained from
each subject.The information was further validated
by   interviewing   the   officer   in   charge   of
inmates'food. From a list of commonly eaten foods
that   were   investigated   (see appendix 4)   foods
were   grouped   according to   the   major   nutrients
contained in them.According to the following   cri-
teria,   foods providing mainly carbohydrates   were
assigned to group 1. Foods   which mainly   provided
both   animal   and   plant   proteins   to   group
2,vegetables were assigned to group 3. Fruits were
grouped   together and were   assigned number 4   and

fats as used for cooking or table use were assigned to group 5.Beverages which included various forms of drinks were assigned to group 6.

Each inmate was asked to state the frequency of consumption of different food groups.The answers expected included daily,two to three times per week, once per week,rarely or never.For the subjects who said they never ate a particular food they were asked to give reasons why they did not eat that food.Table (14) shows the frequency of consumption the various food groups by the elderly.

The foods that were consumed daily by most subjects were those in group 1 (containing mostly carbohydrates).A total of 58% of the subjects reported that they ate foods in this group daily while 52% of the subjects also indicated that they used cooking fat daily. Foods containing mainly proteins were eaten only two to three times per week by 45% of the subjects. A large proportion of the subjects (30%), reported that they never ate fruits while over 40% said that they ate vege-tables only two to three times per week(Table 14).

Table 14. Distribution of subjects by foods consu-
med and frequency of consumption. (N=284).

Frequency of Consumption	Food Groups				
	1	2	3	4	5
	%	%	%	%	%
Daily	58	35	28	13	53
2-3 times/week	38	45	42	19	14
<once per/week	4	18	24	38	16
Never	0	2	7	30	18
Total	100	100	100	100	100

7.5 Parasitic Infection

The response rate for stool examination from the total sample was about 60%. From stool samples examined, in 59 % of the specimens was evidence of parasites. Roundworm (Ascaris lumbricoides) prevalence was 35%, hookworm (Ancylostoma duodenale) 8% and others namely: whipworm, (T. Trichuris), tapeworm (T. Saginata) and Strongyloides stercoralis had 12.4%. Other conditions observed were the presence of fat cells (2.4%), and blood cells (2.4%) in the stools.

Parasitic infection was related to age and sex of the subjects. Table 15 below shows that in both sexes, the rate of infection was not different. It is interesting to note that the older subjects had lower infection rates (Table 16). No statistical significance were however found in the relationship between parasitic infection and either age or sex of the elderly.

Table 15. Parasitic infection by sex of elderly.

	Males		Females	
	N	%	N	%
Not infected	48	73	151	69
Infected	18	27	67	31
Total	66	100	218	100

Table 16. Parasitic infection by age of elderly.
(N=284).

	Age	in		years				
	55-64		65-74		75-84		85+	
	N	%	N	%	N	%	N	%	Total
Not infected	60	30	71	36	54	27	14	7	199	70
Infected	32	37	22	26	27	32	4	5	85	30

Parasitic Load

A sub sample was examined to determine the parasitic load of the subjects with infection. Ascaris lumbricoides accounted for the heaviest load where the average was 2100 eggs in a gram of stool. Hookworm had 40eggs and taenia had an average load of 20 eggs per gram of stool.

The parasitic infestation was cross tabulated against dietary information. haemoglobin status, morbidity data and the nutritional status.

A significant relationship was found between parasitic infection and the illness prevalence in the last one month. When the other variables were tested for any association with this infection,no significant relationship was found. The results also showed that (37.8%) of the elderly had no intestinal parasites.

7.6   Anthropometry

   Different measurements were taken in order to help assess the nutritional status of the elderly. These included weight, height, mid upper arm circumference, triceps skinfold thickness and biceps skinfold thickness.

   From mid upper arm circumference, upper arm muscle and muscle area were calculated. Calculations of arm muscle circumference, arm fat area and arm muscle area were done using formulas by Jansen et al (1983) and are as follows:-

   Arm muscle circumference (mm) $= AC - pi(TSF)$
   Upper   arm muscle area $(mm)^2 = \dfrac{(AC-piTSF)^2}{4\ pi}$
   Upper arm fat area $(mm)2 = pi\ \dfrac{(AC)^2}{pi} - \dfrac{(AC-piTSF)^2}{4pi}$
Where AC=Upper arm circumference (cm);

TSF=Triceps skinfold (mm)and pi=3.14.

   These measurements were then compared to the standards for elderly subjects given by Frisancho (1981) in order to determine at what   point of centile each subject's measurements were of that standard.

7.6.1 Mid upper arm measurements.

   Mid upper arm circumference (MUAC).

   The mean mid upper arm circumference for the females was 26.7 cm (SD 4,). For the male subjects the mean was 25 cm (SD 2.8). In both cases, the mean measurements were above 80% of the standard, (Frisancho 1981) and Jelliffe (1966).The arm cir-

cumference measurement was significantly related
to age and sex as shown in tables 17 and 18.

Table 17 : Distribution of subjects by MUAC and
          age group.

MUAC	Age	of		subjects					Total
% of									
standard	55-64		65-74		75-84		85+		
	N	%	N	%	N	%	N	%	
< 70	3	3	10	11	14	17	0	0	27
70-80	8	9	9	10	13	16	6	33	36
>/ 80	81	88	74	79	54	67	12	67	221
Total	92	100	93	100	81	100	18	100	284

X^2=22.2   DF=2 Sign=.001   p=.001

Table 18: Distribution of subjects and MUAC and
          sex (N=262).

MUAC%	Males		Females		Total	
of standard	N	%	N	%	N	%
< 80	24	40.7	52	25.6	76	29
>/ 80	35	59.3	151	74.4	186	71
Total	59	100	203	100	262	100

X^2 =10.55   DF=2 Sign=.005   p=.001

A correlation matrix was done between MUAC and sex of the subjects and the results showed a significant relationship (r=.63).

A multiple regression analysis was also done to examine the effect of age on the MUAC. It was found that in both sexes, there was a decline of MUAC with advancing age as shown in table 19.

Table 19 Analysis of Variance between MUAC and age of subjects

	DF	SS	MS	F ratio
Males				
Regression	1	40.4	40.4	5.7
Residual	61	431.3	7.1	

Signif P = .0200

Regression equation:

Arm circumference =31.76 -(0.0922 Age)

Females				
Regression	1	211.6	211.6	11.6
Residual	215	3923.5	18.2	

Signif P = .0008

The regression equation :

Arm circumference =33.87 -(0.1068 Age).

DF=Degrees of freedom, SS=Sums of squares,MM=Mean

squares.

The mid arm circumference results were corre-
lated with other anthropometric measures in order
to establish whether there was any relation in the
way they were identifying the malnourished cases.
High correlation values were obtained which meant
that for each of the indexes there was a good
degree of agreement in the identification of those
subjects who were malnourished.

Table 20: Correlation between MUAC and the diffe-
rent anthropometric indicators examined (n=284).

Indicator	r
Weight	0.57**
Biceps skinfold thickness	0.39*
Triceps skinfold thickness	0.57**
Body Mass Index	0.67**
Weight-for-Height %	0.52**

   *p<0.01

   **p<.001

Triceps skinfold thickness (TSF).

The mean triceps skinfold thickness for fema-
les was 15.2mm (SD 8.6). The mean measurement
for male subjects was 8.7mm (SD 3.6). The mean
triceps measurement for the females was above 80%
of the standard but the mean value for the male
subjects was only between 70% and 80% of the sta-
ndard. The triceps measurement was significantly

related to sex and age (Table 21 and 22)

7.6.2

Table 21: Distribution of subjects by TSF and sex.

TSF % of standard	:	males		females		Total
	:	N	%	N	%	
>70		46	70	105	48	151
70-80		10	15	23	11	33
\<80		10	15	90	41	100
Total		66	100	218	100	284

X^2=15.2   DF=2   Sign=.0005 p=.001

Table 22: Distribution of subjects by TSF and age.

TSF % of standard	Age of elderly in years								Total
	55-64		65-74		75-84		85+		
	N	%	N	%	N	%	N	%	
>/70	43	47	48	52	47	58	13	72	151
70-80	6	6	12	13	13	16	2	11	33
\<80	43	47	33	35	21	26	3	17	100
Total	92	100	93	100	81	100	18	100	284

X^2 =13.1 Sign=.04   DF=6 p=.05.

Triceps skinfold measurement data was corre-
lated with most other variables that were
studied.Significant correlations were found betwe-
en this variable and sex (r=.22), BMI (r=.47)
upper arm muscle area (r=.54) and arm muscle cir-
cumference (r=.24).

7.6.3 Arm Muscle Area and Muscle circumference

The arm muscle area and muscle circumference
were calculated using the formulae given earlier
in this chapter.From the total sample population,
171 (56.7%) were below 80% of the standard while
123 (43.3%) were above 80% of both Frisancho
(1981) and Jelliffe (1966) median.Both indicators
of nutritional status were not significantly re-
lated to age of the subjects. Arm muscle circum-
ference was not significantly related to sex but
the arm muscle area was significantly related to
sex. A correlation matrix was done to examine any
relationship between this variable and the others
that had been studied. The results showed a nega-
tive correlation between the arm muscle circumfe-
rence and age for the males (r=-.34 p=.001).The
weight for height per cent of standard (males) was
correlated to the muscle circumference.(r=.52
p=.001).

7.6.4 Biceps skinfold measurement

The mean biceps skinfold measurement for females was 7.5 mm (SD 4.4). The mean biceps skin-fold measurement for males was 4.1mm (SD 1.3).

Weight and Height

Weight and height were recorded as measured in the field. Weight for height per cent of standard calculation was based on Jansen et al (1983)

where:

per cent of desirable = $\underline{\text{Present wt}}$ *100
weight   desirable wt

The mean weight for the males was 51.6 Kg with a standard deviation of 8.8 Kg. The minimum weight measured was 30.9 Kg and the maximum weight was 79.4 Kg. The mean weight for the females was 50.9 Kg with a minimum weight of 30.4 Kg and a maximum of 85.1 Kg.

The mean height for the males was 161.2 cm while that of the females was 153.8 cm.

7.6.5 Weight for Height as per cent of Standard.

The mean weight for height for the subjects was 94% but the majority of the cases were at 74% of their weight for height. From the total sample, 28% of the subjects were below 80% of their weight for height. The rest were 80% and above of the weight for height of standard. Table 23 shows the

distribution of weight for height according to the
sex of the elderly.More men (39%) were below 80%
of the standard compared to the females (17%).This
result indicates a higher rate of malnutrition
among the males compared to the females. The
interpretation was done as recommended by Jelliffe
(1966).

Table 23: Distribution of Subjects with different
Weight for height % by sex of subjects. (n=263).

Wt/ht %		Males		Females	
		N	%	N	%
>80		24	39	35	17
<80		38	61	166	83
	Total	62	100	201	100

The weight for height per cent of the stan-
dard as shown in table 24 was found to be signi-
ficantly related to the sex of the elderly.

Table 24: Distribution of subjects by weight for
height and sex.

wt/ht % :	sex of elderly				
:					
:	male		female		Total
:	N	%	N	%	N
/>80	24	39	35	17	59
\<80	38	61	166	83	204
Total	62	100	201	100	263

X^2 =11.2   D.F.=1   Sign=.0008 p=.001

7.6.6   Body Mass Index (BMI).

Body mass index (BMI) was calculated using
the formula given by Waterlow (1976).

BMI=Weight

Height^2

This index of assessing nutritional status in the
elderly was chosen because it has been found to
be independent of age Godfrey, (1986).From the
findings of this study 26% of the cases had BMI 18
which is considered a minimum level for being
under nourished, (Godfrey 1986).Table 25 shows the
breakdown of BMI by sex of the elderly.

Table 25   Distribution of subjects by BMI and sex.

BMI	Male		Female	
	N	%	N	%
< 18	21	32	53	24
18 -22	33	50	88	41
> 22	12	18	77	35
Total	66	100	218	100

A significant relationship was also found

between BMI and the sex of the subjects as shown
in the table 26.

Table 26: Distribution of subjects by Body Mass
Index and sex of elderly.

BMI	Sex of elderly				
	Males		Females		Total
	N	%	N	%	
<18	21	32	53	24	74
18-22	33	50	88	40	121
>22	12	18	77	36	89
Total	66	100	218	100	284

x^2 =6.9   D.F=2   Sign=.03 p=.05

7.6.8: Nutritional status of elderly using diffe-
rent indicators.

Using standards for determining nutritional
status of the elderly by (Frisancho 1981), the
following prevalence of malnutrition was found
(Table 27).

Table 27: Summary of subjects with anthropometric measurements below 80% of standard (N = 284).

Indicator	Males (N=66)		Females(N=218).	
	N	%	N	%
Mid upper arm circ.	24	41	52	26
Weight for Height	24	39	35	17
Body mass index	21	32	53	24
Arm muscle circ.	33	50	128	45
Arm muscle area	62	93	172	70
Triceps skinfold	56	85	128	59

Mid upper arm circumference and triceps skinfold thickness are considered the best indicators of nutritional status on the elderly, (Frisancho 1981). On that basis, the findings for this study show that elderly male subjects are highly malnourished as shown on table 27. A bigger proportion of female subjects (59%) are more malnourished using triceps skinfold measurements than when using mid upper circumference (25.6%).

7.6.9 Test for sensitivity and specificity for mid upper arm circumference as a measure of nutritional status.

The mid upper arm circumference per cent median for Frisancho(1981) was tested against other main anthropometric indicators of nutritio-

nal status in order to determine its strength in its assessment of those classified as being malnourished. Using mid upper arm circumference indicator as the reference, sensitivity, specificity, positive and negative predictive values were calculated for triceps skinfold thickness, body mass index arm muscle circumference and weight for height per cent of the standard. The results presented in the following table show that triceps skinfold thickness had the highest specificity (91%) which means that this indicator was identifying malnourished cases in a similar degree as the reference test.

Table 28: Sensitivity ,specificity and predictive values of different anthropometric indicators of nutritional status using MUAC as the reference test.

Indicator	TSF	BMI	WT/HT	AMC
	%	%	%	%
Sensitivity	57	71	58	94
Specificity	91	89	88	81
(+)Predictive	92	61	41	67
(-)Predictive	57	93	88	97

Where TSF= Triceps Skinfold Thickness

BMI=Body Mass Index

AMC=Arm Muscle Circumference.

Table 29: Relationship between Nutritional status
and sex of elderly.

MUAC % of standard	Male N	%	Female N	%	Total N	%
<80	24	41	52	26	76	29
>80	35	59	151	74	186	71
Total	59	100	203	100	262	100

x^2 = 10.5   DF = 2   P <.01

A comparison between the sensitivity of wei-
ght for height per cent and mid upper arm circum-
ference per cent as indicators of nutritional
status of male elderly showed that these indica-
tors differed in the way they indentified the
malnourished cases.

There was a significant relationship between
the nutritional status and the frequency of meals
missed in a given week.

Other dietary information relating to the
number of snacks eaten in a day and frequency of
consuming different foods did not show any signi-
ficant relationship when chi square statistics
were applied.

There was no significant relationship found when correlation statistic test was applied between the nutritional status of both sexes and the diet information.

The nutritional status of elderly was also correlated with the morbidity information and the clinical nutritional deficiency symptoms. No significant relationships were found when chi square test was applied on these variables. The only significant value that emerged was that showing an association between clinical deficiency of dietary iron (koilonichia) and mid upper arm circumference per cent of standard (Table 30).

Table 30: A comparison between MUAC and presence of koilonychia (Females) N = 218.

MUAC %	Not present	Present	Total
<80	23	29	52
80-90	11	57	68
>90	12	71	83
	15	157	203

$$X^2 = 25.0 \qquad DF = 4 \qquad P < 0.001$$

7.7   Iron Deficiency Prevalence

The haemoglobin levels of the blood for the subjects indicate a high level of iron deficiency anaemia. From the total sample examined, 48.5% of the cases had less than 10 g of iron per 100 millilitres of blood and 51.5% had values above 10 g of iron per 100 mls of blood before adjustments for altitude. After adjusting for altitude more subjects had haemoglobin values below 10g/100 milliltres of blood (68.8%). This reflects a very high proportion of subjects with iron deficiency anaemia.

Table 31: Prevalence of Anaemia (males and females) N = 217.

Hb g/100 mls of blood	Not adjusted*	Adjusted**
	%	%
<8.00 (severe anaemia)	2.6	5.2
8.00 - 10.0 (anaemia)	45.9	63.6
>10.00 (normal)	51.5	31.2
Total	100.0	100.0

* Not adjusted means the haemoglobin values are as measured.

** Adjusted means that the Hb values have been adjusted for altitude (approximately 2,000m above

sea level for Nairobi).

Table 32: Per cent distribution of elderly by haemoglobin values and sex.

Hb g/100 mls of blood*	Males(N=65) %	Females(N=152) %
<10.0	49.2	47.4
10.01 - 11.9	23.0	5.2
>12.00	27.8	47.4
Total	100.0	100.0

* Not adjusted for altitude

Haemoglobin (Hb) values of the subjects were related to age and sex. It was found that there was a significant relationship between the age of the subjects and the Hb values among the males but not among the females. The Hb values showed a decreasing trend with advancing age as shown in table 33.

Table 33 Distribution of subjects (males) according to haemoglobin values and age groups (N = 65).

Hb g/100 mls: of blood :	Age groups in years				
	55-64	65-74	75+	Total	%
\<10.0	6	10	16	32	49
10.0 - 11.9	1	4	10	15	24
>/12.0	7	6	5	18	27
Total	14	20	31	65	100

$$X^2 = 13 \quad DF = 4 \quad P = 0.05$$

Other chi square test analysis were done to measure any relationship between haemoglobin values and the nutritional status, sex of elderly, dietary scores, morbidity patterns and nutritional deficiences. The chi test values did not reach significant levels (P = .05) with any other variables. When a correlation matrix of the haemoglobin values with other variables was done, significant levels were found as indicated in table 34.

Table 34: Correlation between haemoglobin values
and selected variables.

Variables	r
Protein consumption	.34**
Presence of oedema	.34**
Swollen Tongue	.34**
Weight for height per cent	.21*
Parasitic prevalence	.31**
Body Mass Index	.22*

**p = .01   *p = .05

7.8 Prevalence of Nutritional deficiency diseases

The prevalence rate of different deficiency diseases varied as shown in Table 35. Vitamin B deficiency had the highest frequency.

Table 35: Prevalent rates of clinical signs of nutritional deficiency diseases.

Nutrient Deficiency	Prevalence
	%
Vitamin A deficiency as measured	
by night blindness	29.6
Vitamin B deficiency as measured	
by: angular stomatitis	7.4
Magenta tongue	22.5
Swollen tongue	24.3
Iron deficiency as measured by:	
Koilonichia	15.1
Pale conjuctivae	9.9
Protein Energy Malnutrition as	
measured by: Wasting*	8.8
Obesity**	23.9
Goitre (as observed)	14.1

* Wasting may be age related and not necessarily a symptom for PEM
** More than 120% of own weight-for-height.

7.10 Morbidity

Table 36 shows that a large number of the subjects reported varying degree of different illnesses. General (non specific) illness was reported by a large proportion of the elderly (53.3%)

Table 36: Morbidity prevalence by Type of illness.

Illness	Per cent Prevalence
Fever	24
Backache	29.4
Toothache	53.2
Oedema	11.3
Pain on urination	15.1

7.11 Urine examination

This examination revealed that from the total subjects studied, the presence of sugar in the urine was detected in 15% of the cases. The presence of sugar in the urine could be due to diabetes mellitus. In some cases this was confirmed by hospital documents, but in other cases there were no documents to confirm the presence of diabetes. The subjects were however asked to visit

the hospital nearest where they lived for additioal medical tests. This was because apart from the presence of sugar, 12 % of the subjects also had blood in the urine which could have been due to various pathological conditions which were beyond the objectives of this study. The presence of schistosomiasis could not be confirmed because such a test was not performed.

CHAPTER 8

DISCUSSION AND RECOMMENDATIONS.

Discussion

The results of this study show that the el-
derly subjects studied are highly malnourished.
This is indicated by the anthropometric measureme-
nts where 85% of the males and 59% of the females
were classified to be below 80% of the Frisancho's
median (1981) based on triceps skinfold
thickness.Other anthropometric indicators used in
this study have also revealed high levels of mal-
nutrition particularly in the male subjects.

The assessment of the blood status has also
shown that most of the subjects studied are anaem-
ic (48.5%). The blood status was similar for both
males and females where 49% of the males had less
than 10g per 100mls of blood compared to 47% of
the females with the same values. It was also
found that there was a significant relationship
between the age of the male subjects and the
haemoglobin values. The values of haemoglobin
showed a decreasing trend with advancing age.
Other studies Harrill (1977) and MacPill (1981)
have also found low haemoglobin values in the
blood of elderly subjects. Harrill (1977)
attributed the low levels of haemoglobin of
nursing home subjects to inadequate food intake,

poor absorption,blood loss and the effect of various diseases.The stool examination of our study also showed that about 3% of the subjects had evidence of blood loss and from urine tests 12% similarly had such evidence.

The anthropometric results of this study cannot be generalized to elderly people freely living in the community. However, these findings compare quite well to a study that was done in a rural community in Kenya by Waswa (1985), where the subjects were living in their own homes. Similar results were reported by Godfrey (1986), in the Sudan. Godfrey's study was very similar to ours whereby the subjects are refugees, and although our subjects are not refugees,they have all demonstrated a history of being destitutes. Waswa's findings of 59% of the subjects being below 80% of weight for height per cent of the standard in a rural community was rather unexpected.This is because it is assumed that old people living in their own homes and particularly in the rural areas have better access to food either from their gardens or from relatives.

These anthropometric results suggest that elderly in less industrialized countries are at nutritional risk, possibly resulting from the rapidly changing socio-economic and demographic

status of the population in general. Older people have had a special place in the traditional African setting. They never lived alone but were always part of the extended homestead and in most cases were regarded as people of great authority.

Female elderly were generally accepted as very responsible baby sitters. Under this type of setting, the older people were well cared for both socially and in the food provision. Based on this type of assumption the aged living within the extended family should not have the problem of being malnourished. This assumptiom is questionnable however based on the available data Waswa (1985).In the current rate of development, the extended family concept is gradually breaking because most young people are moving to the urban settings in search of employment and in such circumstances the older folks are left with no family members in the traditional homestead.Such people end up with nutritional as well as health problems as shown by Waswa (1985).If these old people live in the urban setting, they still have problems as indicated by the findings of our study.

Measuring old subjects accurately for anthropometry presents a problem that may have a bearing on the final results.The problem of intra observer error has been raised by Exton Smith (1982).

Accuracy of height measurements has also been brought up by Bowman and Rosenberg (1982). In our study, we found that it is rather difficult to take accurate height measurements in the very old subjects. Because of this problem, the results of weight for height per cent of standard are to be viewed with caution.

The interpretation of the upper arm circumference results on nutritional status was based on the Frisancho's median(1981). Weight for height per cent results were based on metropolitan health data as reported by Jelliffe (1966), Jansen et al. (1983) and interpreted using these authors' guidelines. The choice of these standards was based on the fact that they are special for elderly subjects and are both age and sex specific.Since the standards were based on data from healthy elderly subjects, we felt they were the best to use as no other standards were available at the time of analyzing the data and interpreting the results of our study.

The question of acceptable standards for the less industrialized countries is important. It is hoped that more reseachers will work together and consequently devise standards that are specific to the needs of populations in the less industrialized countries. The standards used to interpret

the results in this study are sex and age specif-
ic,but they are not race specific. The applica-
tion of these reference values to different ethnic
groups needs further study.

The presence of malnourished elderly in a
less industrialized country is a reflection of the
changing social systems on a world level basis.
Although malnourished subjects among the aged have
been shown in developed countries, (Truswell
1985, Schoral 1986), it has been commonly assumed
that elderly people in the less industrialized
countries are better off due to the extended fami-
ly concept (Goldtein and Beall 1982). However, the
rapid urbanization in the less industrialized
countries has changed the status of the elderly.

This study has shown that over 90% of the
subjects lived alone and their social history also
indicates that these aged people have been living
within the city for several decades. The implica-
tions of living alone, particularly for the day
care attenders, may serve to indicate the possible
reasons why the aged in this study have low nutri-
tional status. Living alone may be accompanied by
very poor eating habits related either to lack of
food or poor choice of food due to disability or
poor knowledge of nutrition.The high prevalence of
iron deficiency anaemia may be associated with

several factors. It may be a consequence from the diets very low in animal protein. Although beans and some vegetables contain appreciable amounts of iron, the bio-availability of iron is an important issue. The low intake of fruits and vegetables suggest the low intakes of vitamin C which would ordinarily enhance the absorption even of non heme iron is lacking. The haematuria reported and the blood cells in the stool samples may indicate underlying pathological conditions in the elderly.

Hookworm prevalence may in addition explain the blood loss in the infected subjects. However the hookworm infestation in this study (about 8%) cannot fully explain the high prevalence of iron deficiency anaemia. A combination of some or all of these factors may explain some of iron deficiency. Although Garn and Clark (1976) raised the question of differences in haemoglobin concentration and haematocrit levels in different populations and specifically in black individuals, not many researchers have brought up additional material to make population-specific standards.

Parasitic infestations among the subjects are of a concern as the infections interfere with good health and work productivity (Wolgemuth et al.1982).

The state of non specific illness reported in the morbidity section of our study had a signifi-

cant relationship with the parasitic infection.
These factors indicate that the infected elderly
have poor health status and even where their phy-
sical mobility is not impaired, the total morbidi-
ty load make it impossible for them to be produ-
ctive. This, of course, interferes with their
ability to look for food and then has a direct
consequence on the nutritional status.

The problem of high frequency of toothache
reported in this study is rather surprising for a
less industrious country. Even the 30% of the
reported prevalence of no teeth at all is worth
noting since the mean age of the subjects was 69.5
years. Most of the subjects have been residents
in the city for many years. They may have been
consuming highly refined foods and this may pos-
sibly explain their dental problems. It is, how-
ever, interesting to note that in a rural Kenyan
community, over 50% of dental disease prevalence
has been reported , (Waswa 1985). Poor dental
status in the aged has a bearing on the food they
choose to eat. In many instances, such victims
will only drink less nutritous beverages such as
tea, porridge or eat soft foods such as bananas
or potatoes and will skip any food that involves
proper chewing.

The clinical signs of nutritional deficiency

diseases are never conclusive of deficiency unless accompanied by biochemical tests. Although a high prevalence of Vitamin B complex deficiency was found in this study, these results can only be considered tentative until biochemical studies yield more conclusive results on the same individuals.

The obesity prevalence reported in our study, was mainly a representation of the younger females. The older females and the males, tended to be more underweight than overweight.

CONCLUSION

Findings from this study indicate that there is a high prevalence of malnutrition among the subjects who were inmates of institutions for elderly. Male subjects seem to be worse of than females in terms of nutritional status as determined by different anthropometric indicators. The results show no significant difference between the age groups and the nutritional status. However, two anthropometric indicators, namely mid upper arm circumference and triceps skinfold thickness, show a declining trend as age advances in both sexes.

There is a high prevalence of iron deficiency anaemia for both sexes. This finding could be linked to the diet quality which showed a low intake of both animal and plant proteins. The finding could also be related to the parasitic load, haematuria or the loss of blood through faecal matter as indicated by the presence of blood cells in the stool specimens. The haematuria could originate from schistosomiasis, although this was not investigated, or other pathological conditions.

The findings of the morbidity load also indicate poor health status of the elderly. The fair-

ly high prevalence of sugar in the urine indicates the underlying possibility of the presence of undetected diabetes mellitus. Dental disease and general illness seem to have a high bearing on morbidity load. It is not easy to pin point the relationship between dental disease and other factors in these subjects.

The findings also indicate a high frequency of Vitamin B deficiency as well as Goitre. These findings of nutritional deficiencies should however be viewed with caution because they are not conclusive unless confirmed by biochemical tests. Basic information has indicated that many old people live alone. Over 80% have no spouse and many have no children or relatives who can visit them. At the same time, they eat quite poorly. From all the findings of this study, it seems that institutionalized elderly are at nutritional risk.

RECOMMENDATIONS

Based on the findings of this study the following recommendations are made :-

1. Elderly who are living alone or with family members in a community should be studied using similar parameters as those used in this study in order to establish their nutritional as well as health status.

2. There is an urgent need for intervention programmes particularly for subjects who are destitute but cannot be included in the list of aid recipients in day care centres. These aged people visit the day care centres regularly in the hope of being recruited to the programme. A community based type of programme utilizing young people either in schools or colleges could be created whereby the young people could teach the old subjects how to make items for sale. Such items could be sold to generate income for food and other basic needs.

3. A provision of an easily accessible health care centre specifically for the aged seems essential. Those subjects living in residential homes or those attending day care centres require

regular medical care. This can be implemented through collaboration with staff and students from the College of Health Sciences University of Nairobi.

4. Most homes studied have an urgent need for a knowledgeable person in nutrition or basic diet- etics. Such institutions could also be provided with proper food storage facilities (refrigera- tors or proper food larders) that can help store the foods that are donated but cannot last long due to poor storage facilities.The nutritionist/dietitian can then plan proper meals for the inmates.

5. Information compiled through this investigation should be made accessible to City Planners, Non- Governmental Organization and any interested parties so that they can use it when planning for the agreed programmes.

6.There is an urgent need to examine the socio- economic settings of old people in terms of the prevailing economic difficulties faced by most people particularly in the non industrialized countries.Since the aged are vulnerable because of many physical handicaps their state of poor socio- economic status would more risky for health and

general well being.

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Appendix 1   Distribution of elderly population

(>55 years) in Kenya by age and sex.

Projections for 1986.

Age Groups	Males	Females
55-54	175943	193238
60-64	132568	147987
65-69	93917	107327
70-74	59753	70243
75+	49886	61833
Total	512057	580628

Total population =21,211,976

Total number of elderly population=1,092,895

Percentage of all elderly compared to total

population = 5%

Source: Population projections for Kenya 1980-2000

Published by Courtesy of UNICEF-Nairobi Central

Bureau of Statistics, Ministry of Economic

Planning and Development Kenya (March 1983).

Appendix 2.

TABLE 2:Distribution of elderly population

(>55 years) in Kenya by age and sex.

Projections for the year 2000

Age group	Males	Females
55-59	288091	317385
60-64	216518	243497
65-69	153700	177336
70-74	98365	116909
75	81476	101563
Total	838160	986690

Total population=38,409,072.

Total number of elderly population=1,794840

Percentage of elderly compared to total

population = 4.6%

Source: Population Projection for Kenya 1980-2000

Published by Courtesy of UNICEF - Nairobi

Central Bureau of Statistics Ministry of Econo-

mic Planning and Development Kenya (March 1983).

Appendix 3.
The following table shows a comparison of age
structures in developed and developing countries
in 1980.

Table 3:Age Distribution Percentage

Country Group	*	0-4	5-14	15-64	65	Ages	FTR**
All developed countries		7.6	15.5	65.6	11.3	100	1.9a
Japan		7.3	16.1	67.7	8.9	100	1.8
U.S.A		7.9	15.0	66.3	10.7	100	1.9
Hungary		8.0	13.7	64.9	15.9	100	2.1
All developing countries		13.6	25.5	57.0	4.0	100	4.2a
Korea		10.6	22.7	62.7	4.0	100	3.0
Colombia		14.0	25.4	57.1	3.5	100	3.8
Bangladesh		17.9	24.9	54.6	2.6	100	6.3
Kenya		22.4	28.6	46.1	2.9	100	8.0

a = Weighted Average

* Follows international age classification.

** TFR= Total Fertility Rate.

Source :World Bank Report 1984.

CONFIDENTIAL QUESTIONNAIRE

Appendix 4

(Linda Ethangatta)

NUTRITIONAL STATUS OF INSTITUTIONALIZED ELDERLY.

A: Basic Information

Form No   Date: 8 .   Intervier:_____

Name of Inst/Day Care C:_____Location_____

No of elderly residents   Total No. of staff

B: Information on Respondent.

1. Respondent's name_____ 2. Sex: M=1 F=2

3. Ethnicity__4.Age___years 5.Religion _____

6. Approx. how many years have you been at this
   inst:___yrs

7. Marital status: s=1; m =2; sep=3 w=5

   If currently married where is spouse?:_____

   If widowed how long ago did your spouse die?__yrs

8. Who brought you into this institution?:____

9. Did you receive any visit from your children or
   other relatives within the last six months?
   No=1 Yes=2

If yes did they give you any money? No=1 yes=2

 (irreg)3=yes regularly; 7=response refused; 9=DNK

If yes ,how much_____KSH.

If yes did they give any food? 1=no 2=yes irreg.

3=yes regularly; 7=response refused; 9=DNK.

C:Diet History Information.

10. How many meals do you eat per day?_ How many snacks?

11. Are there days in a week that you go without food? 1=no 2=yes 7=RR 9=DNK.

12. How often do you eat the following food items?

    Food item daily 2-3xy once rarely never RR DNK

    (circle freq) per week

    Ugali_____

    Rice_____

    Beans_____

    Potatoes_____

    Sukuma_____

    Cabbage_____

    Carrots_____

    Fruit_____

    Meat_____

    Eggs_____

    Cooking_____

    Margarine_____

    Tea/sugar/milk_____

    Tea/sugar only_____

    Bread _____

    Soda_____

    Beer_____

    Other (specify)_____

(Linda Ethangatta)

Questions 12 through 15 are applicable only to institutionalized subjects.Skip these questions if you interviewing persons in Day care centre (DCC).

13. To be asked of person responsible for residents meals:How often do you serve the following foods in a given week?

Food item   Daily 2-3xy once rarely never RR DNK
(circle freq) per week

Ugali_____

Rice_____

Beans_____

Potatoes _____

Sukuma_____

Cabbage_____

Carrots_____

Fruit_____

Meat_____

Eggs_____

Cooking fat_____

Margarine_____

Tea/sugar/milk_____

Tea/sugar only_____

Bread_____

Soda_____

(Linda Ethangatta)

Please tell me all sources from which you get funds for running this institution for elderly (explain to respondent that you mean funds for salaries, food,maintenance ,medical care ,etc).

_____

_____

15. What approximate proportion of these funds is used for buying food?_____

Do you get any food donations? yes   no

If yes what approx. proportion of your needs do these food donations cover?_____

16.How much money is spent on the following food items per month?:

Meat   _____

Beans   _____

Maizemeal_____

Potatoes _____

Milk   _____

Vegetables_____

Sugar   _____

Fruit   _____

Other (specify)_____

(Linda Ethangatta)

To be asked of elderly visiting DCC only. Skip questions 16 through 20 if dealing with institutionilized elderly.

17. Aside from getting money from the DCC do you receive money from anyone else? If yes from whom?
 1=no 2=yes from relative 3=yes from neighbour;
 4=yes from church 5=yes from friends 7=RR;
 8=yes from other sources.

18. How often do you get additional money from sources other than the DCC?
    1=daily 2=2-3 times per week 3=once/week
    4=rarely 5=hardly ever 7=RR 8=Other.

19. On what do you spend money you receive from all sources?
    1=food 2=rent 3=clothes 4=transport 5=fuel
    6=combination of all uses 7=RR 9=DNK

(Linda Ethangatta)

20. If money was used on, what items did you buy
    with the money you received last week?

    Maizemeal   _____

    Rice   _____

    Potatoes   _____

    Sukuma   _____

    Cabbage   _____

    Carrots   _____

    Fruit   _____

    Meat   _____

    Eggs   _____

    Cooking   _____

    Tea   _____

    Sugar   _____

    Bread   _____

    Soda   _____

    Beer or other al. drinks _____

    Other (specify)._____

21. Do you receive food from other sources other
    than DCC ?

    Yes:2   No:1   If yes , how often? 1=daily;
    2=2-3 times per week, 3=once per week
    4=once per month ,5=rarely; 7=RR; 8=other;9=DNK

22. How many people did you feed with the money
    received last week? _____

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(Linda Ethangatta)

D .Clinical Observation.

(For   Code   1=sign resent; 2=sign present;

3=q/nnable;7=examination refused;9=sign missing.

23. Suggestive of vitamin A deficiency: blindness __

24. Suggestive of vitamin B2; angular stomatitis __

        magenta tongue __ swollen tongue __

25. Suggestive of iron def:pale conjuctivae __

        koilonichia __

26. State of teeth:missing teeth__ decayed teeth __

        dentures __

27. PEM: muscular wasting __ oedema__ obesity__

28. Suggestive of iodine deficiency: goitre__

Linda Ethangatta.

E.   Anthropometric Measurements.

29. Height (cm): _____ 30. Weight(Kg.1): _____

31. Arm circum. (cm.1):_____   32.Triceps (mm)____

33. Biceps (mm):_____

F.Biochemical and Parasitological information.

34. Urine: _____ 35 Hgb (mg/100ml):_____

36. Stool Parasites: ____

1=hookworm, 2=Ascari Lumbricoides 3=Tapeworm

4=Blood cells, 5=Fat cells, 8=other.

G Morbidity Information

37. In the one month, have you had a persistent
medical problem?

yes____   no____ RR ____   DNK_____

If yes, specify:_____

_____

Pertinent extracts from records available from
institution:_____

_____

38. In the last week (7 days) have you had any of the following health problems? If so what steps did you take?

Health problem	measure	Health problem	measure
Diarrheoa: ___	___	Sore throat: ___	___
Stom. Pains: ___	___	Pain/urination: ___	___
Fever: ___	___	Swollen joints: ___	___
Backache: ___	___	Oedema: ___	___
Chest pain: ___	___	Fracture: ___	___
Painful ear: ___	___	Toothace: ___	___
Pus in eye: ___	___	Other: ___	___

H. Clinical observations

39. Eyes _____   40. Ears _____   41. Limbs _____

42. Teeth ___

Codes 1=seem okay; 2=questionable; 3=defective ; 4=unusable/missing; 7=RR 8=other 9=DNK.

Codes page 1 and 2.

Ethnic Background 1=Embu 2=Kamba 3=Kalenjin 4=Kikuyu 5=Luo 6=Masai 7=Meru 8=other.

Reasons for not eating a given food.

51=Cannot afford 52=do not get 53=get sick from it 54=cannot chew it 55=do not like it.

General codes:77=response refused 88=other 9=DNK.

Elderly subjects talking to a visitor

An elderly subject sitting outside
a residential home