NUTRITIONAL PROFILE OF THE ELDERLY

By

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THESIS

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Department of Home Science

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DECLARATION

I hereby declare that the thesis entitled **"Nutritional profile of the elderly"** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

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20·10·01

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CERTIFICATE

Certified that the thesis, entitled **"Nutritional profile of the elderly"** is a record of research work done independently by **Miss.Rosemol Jose,** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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Dedicated to
my beloved parents

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Introduction

INTRODUCTION

Ageing is a natural phenomenon and is invariable and elderly are the people above the age of sixty years (Vijalakshmi *et al.*, 2000).

During the last few decades our country has witnessed a significant decline in infant and child mortality rates and an increase in life expectancy due to progress in medical science, better medicare facilities, hygiene, eradication of infectious diseases and discovery of life saving drugs.

According to 2001 census the percentage of elderly above 60 years of age in India is 6.1 per cent (Manorama year book, 2001). India today is having the demographic transition in a marked manner and within a matter of 25 years the percentage of elderly will increase to 12-15 per cent. We have about 75 million elderly today which after 25 years would be round about 160 million which will be the largest in the world (Bagchi, 2001).

The population in Kerala is also ageing more rapidly when compared to other states. As per the 1991 census 9 per cent of the total population in Kerala is above 60 years (The Hindu, 2000). With the better and improved health care facilities, living standards and other socio-economic factors, Kerala's aged persons will increase to about 20 per cent of the total population

The elderly population in the world over is showing a gradual increase at the rate of 2.5 per cent annually resulting in a geriatric boom.

In recent years the science of gerontology has gained much importance so as to provide utmost care to the elderly to lead their life peacefully. But in the

years ahead, the problems facing the aged in India are likely to get more complex on account of the interaction of a variety of social, cultural, economic and technological factors.

Though, there is an improvement in life expectancy, the physiological and pathological changes that inevitably accompany ageing results in degenerative process and decreases the functional capacity. This inturn affect the dietary pattern and nutritional status of the elderly.

As the life expectancy continues to increase, there is a felt need for the provision of better health care facilities for our elderly who are exposed to the risk of malnutrition and ill health. The most formidable challenge of the present century is how to keep this vastly increasing number of elderly individuals healthy and as much productive as possible. This would need considerable thought and action in different areas.

The information on the nutritional status of the elderly forms one of the important pre-requisites for developing appropriate strategies and programmes for the elderly. Hence, the present study entitled 'Nutritional profile of the elderly' has been taken up with the following objectives.

1. To study the food consumption pattern and nutritional status of the institutionalized and non institutionalized elderly.
2. To find out the factors influencing the nutritional status.
3. To suggest strategies to improve their nutritional status.

Review of Literature

2. REVIEW OF LITERATURE

The literature pertaining to the study entitled 'Nutritional profile of the elderly' is presented under the following headings:

2.1 Elderly – definition and challenges

2.2 Socio-economic status of elderly

2.3 Nutritional profile of elderly

2.4 Health and other nutritional problems of elderly

2.5 Factors affecting the nutritional status of elderly

2.1 Elderly – definition and challenges

Elderly are the people above the age of 60 (ICMR, 1991; WHO, 1994). Though, there is no precise definition of elderly, generally all those above the age of 65 years are considered to be elderly (Sreeramulu and Raghuramulu, 1999).

Pasricha and Thimmayamma (1992) reported that elderly belong to post mature adult group of population. Who is elderly and who is not is socially defined and therefore, who is thought of as old varies from society to society (Rao and Parthasarathy, 2000).

Old age is that phase in life when medical and nutritional care are most needed (Solanki, 1986), Dodd and Nerurkar (1987) considered old age as an accepted fact of life. According to Gwinn *et al.* (1992) definitions of old age are not consistent with reference to biology, demography, employment and retirement, and sociology. However, for statistical and public administrative purposes old age is defined as 60 or 65 years of age and older.

The elderly are the most vulnerable sections of the society to be affected by the sweeping changes taking place and upheavals in social, demographic, technical spheres around them and find it difficult to adopt to the changing milieu (Devi, 1999).

Ageing refers to normal progressive and irreversible biological changes that occurs over the individual life span (Posner *et al.*, 1987). Ageing is a biological process which will affect everyone and is not a disease (World Health Organisation, 1994). Vimala (1999) defined ageing as regression of physiological function compared with advancement of age. According to the author ageing cannot be described to any single process but is rather a complex mixture of programmed changes influenced by environmental and dietary factors.

Kamalamma and Selsa (2000) suggested ageing as a natural phenomenon that makes people move from independent adulthood to a stage of dependency. According to the authors it is a general and steady process that take place over the entire lifespan of an organism and leads finally to death.

Aged should be considered as a valuable cultural resource and role models for young generation (Pattanaik, 1999). According to Devi (1999) elderly all over the world are recognized as a distinct group and every help and encouragement should be extended to make them pleasant in the evening of their life.

Pasricha and Thimmayamma (1992) had of the opinion that elderly people with all their wisdom and experience contribute their mite to total family income and welfare of the community and as such should be considered as an asset

to the community. According to Jit (2000) old age is an important time of life because at this stage people are dependant on their own resources for their happiness.

According to Evans (1992), advancing age is associated with profound changes in body composition including increased fat mass, decreased fat free mass, decreased total body water, decreased bone density, reduced strength and functional capacity. The changes in skin texture, hair colour and body posture and shape are most obvious during ageing (Rosenberg, 1996).

Vimala (1999) reported that significant functional and structural changes like changes in appearance, muscular, skeletal, digestive, excretory and reproductive organs take place in the human body during the process of ageing. According to Hemalatha (1999) ageing is a complex phenomenon that is accompanied by physiological, psychological and social changes which contributes to a decline in health status. The author also reported that many of the protective immune responses are impaired in old age resulting in increased risk of infection, autoimmune disorders and cancer. According to Dube (1999) ageing process and health are intimately related and the laws of nature tend to make old age more complicated and uneasy. The author also opined that the incidence of dying as well as the incidence of many chronic diseases and disabilities increases with age.

Tessari (2000) had reported that the ageing process is characterized by a modification of body composition with an increase in fat mass and a decrease in lean body mass. According to Devi (2001) ageing is associated with a decline in many body functions and loss of lean body mass.

The single factor that has put gerontology in the forefront is the number of the aged in the society (Solanki, 1986). Increase in the elderly population is one of the most important developments of the 20th century all over the world and will be one of the major challenges for the next millennium (Rajagopalan and Swaminathan, 1999).

The feeling of being unwanted, beyond the prime, past one's usefulness, all these weigh heavily upon ageing (Singh, 1999a). Throughout the world, in both developed and developing countries there has been a shift in the age structure of elderly population because of a combination of increased longevity and decreased mortality (Patil, 2000).

In 1950, there were about 200 million persons aged 60 and above in the world, this figure now stands at 550 million and is expected to reach a billion by the year 2020 (Singh, 1999b). Every month the world's older population increases by 1.2 million persons (Pattanaik, 1999). According to Kamalamma and Selsa (2000) the elderly population in the world over is showing a gradual increase at the rate of 2.5 per cent annually resulting in a geriatric boom. Devi (2001) reported that about 540 million elderly people aged above 60 are present in the world and out of this 330 million live in developing countries.

India currently ranks 4th among the countries of the world in terms of the population of the aged (Sundaram, 1999). According to Singh (1999b) there are nearly 70 million elderly in the country and this number is rapidly increasing. It has been estimated that the total number of elderly will rise to 17.7 crores in 2025 AD in India and thus exceed 12 per cent of the total population. According to

Devi (2001) the number of elderly in India has risen from 5.2 million in 1960 to 6.3 million in 1980 and 7.2 million in 2000 and it may reach to 9.5 million by 2050. The percentage of population above 60 years of age in India is 6.1 per cent (Manorama year book, 2001).

It is estimated that about 82 per cent of the India's aged are living in rural areas (Pattanaik, 1999). With the number of elderly on the increase, at a rate faster than the general population, the graying of India has become more visible than ever (Patil, 2000).

Considering these factors there is an urgent need to adopt proactive approach to geriatric care both at household and at community levels. According to Rao (1999) in India, geriatrics is still not given due importance. It is high time that individual families and society at large has to take note of growing problems facing the elderly population and devise ways and means to make their evening of life meaningful and delightful.

2.2 Socio-economic status of elderly

The aged in traditional societies occupied a pre-eminent place and were venerated because they were repositors of wisdom, experience, custom and property rights (Pattanaik, 1999).

Family is the most important institution which can provide succour to the elderly (Dube, 1999).

The joint family system had certain features that ensured status and security for the elderly (Khan and Kaushik, 1999). According to Katyal and Bector

(1999) the old people living with their families have a cordial relation with their children and spouse and had good social interactions and a positive frame of mind.

As family structures in industrialized countries have changed to self-contained nuclear families of only parents and young children, older people have become isolated from younger people and each other (Gwinn *et al.*, 1992).

Singh (1999a) reported that due to the prevailing nuclear family system the senior citizens neither have the earlier position of importance in their families nor they are looked after like earlier times.

Social isolation has been associated with depression and loneliness which inturn can be linked to significant changes in eating pattern (Rolls and Drewnowski, 1996).

During old age the scope and sphere of their social interaction is reduced mainly to the family circle and hence a cordial family atmosphere is essential to develop a sense of satisfaction and to reduce the level of depression among the elderly (Patil, 2000).

Financial problems add to the misery of the aged. Having spent all their hard earned money on childrens education and marriage, they are gradually demoralized when their offspring refuse to give them shelter (Sundaram, 1999).

Old age has been associated with lower economic status, failing health, living on fixed income or death of spouse (Rolls and Drewnowski, 1996). A study conducted by Maaravi *et al.* (1996) among elderly showed that twelve percent had severe financial problems. Economic inadequacy makes adjustment difficult for elderly as it signifies loss of role status, power and occupational identity. It also

makes a shift in the role from financial independence to economic dependance on the kin (Sharada, 1999).

According to Puri and Khanna (1999) the lack of financial resources, breaking up of traditional joint family system and erosion of social values make the elderly socially vulnerable.

A micro level study undertaken by Lalitha (1999) among elderly of Athur Block of Dindigul district in Tamilnadu indicated that health problems and economic insecurity are the major problems faced by majority of the aged.

According to Pattanaik (1999) with the growth of pensions and early retirement schemes it has been argued that the elderly constitute an economic burden on the community and family as a whole.

According to Kamalamma and Selsa (2000) there are nearly 20-25% of destitute elderly in India with none to provide economic support to them.

2.3 Nutritional profile of elderly

Nutritional status is the condition of health of an individual as influenced by the utilization of nutrients (Robinson, 1967). According to Devadas (1986) nutrition is the most important single factor which affects the health and well being of a man. Arulmani and Sarojini (2000) indicated that nutrition is imperative for good health at all stages of human life, more so in advanced age. Nutrition plays an important role in ageing process; it influences the development and cause of many diseases that often accompany old age (Sharada, 1999).

Nutrition in the aged is an outcome of the earlier food habits, food choices, food likes and dislikes and also the consumption pattern (Vijayalakshmi *et al.*, 2000).

Food contributes to the quality of life through psychological, social and physical mechanism (Chandrasekhar and Bhooma, 1998). The older generation used and ate fewer food items resulting in poorer nutrition (Nakatsuka *et al.*, 1999).

A study conducted by Chandrasekhar and Bhooma (1998) among the elderly in Tamil Nadu indicated a decreased intake of cereals than the suggested quantities. Brahman (1999) indicated a decreased consumption of cereals, millets, pulses as well as protective foods like green leafy vegetables, fruits and milk among elderly. Wylie *et al.* (1999) and Devi (1999) also found an inadequate intake of fluid, fruits, vegetables and non-starch polysaccharides among the elderly.

A study conducted in Chittoor district of Andra Pradesh among elderly indicated a lower intake of flesh foods (Vijayalakshmi *et al.*, 2000). The author also found that their meal pattern consisted of light breakfast, moderate lunch and light supper.

Although the nutrient requirements of the elderly alter because of restricted physical activity, changes in Basal Metabolic Rate (BMR) and altered nutrient needs they require all the nutrients to keep them healthy and active (Vijayalakshmi, 1988). The nutrient intake appears to be an important factor

contributing to ageing (Vellas *et al.*, 1992). Chandrasekhar and Bhooma (1998) reported that the nutrient intake decreases as age advances.

A study conducted in an urban area of Meerut city by Garg and Singh (1983) among elderly showed that their daily diet is deficient in calories and iron. Sharada (1999) observed a decline in calorie intake in old age and found that 20 per cent of the elderly population consumed less than 1000 Kcal/day. Brahman (1999) observed an energy intake of 2545 Kcal/day in men in the age group of 20-44 years. However, the energy intake declined to 2073 Kcal/day for men aged 70 years and above.

Kullah and Ramnath (1985) observed a lower intake of protein and iron in the aged as compared to adults.

A study conducted by Ahrari and Kimiagar (1997) showed that the intake of nutrients like protein, calcium, zinc, vitamin A, riboflavin, folic acid and cobalamine were significantly lower than the Recommended Dietary Allowances (RDA) among the elderly.

Varela *et al.* (1998) observed a lowered intake of energy, zinc and vitamin E among elderly men and women than the recommended values. A three day weighment survey was conducted by Devi and Khader (1998) to investigate the nutritional adequacy of the elderly and reported that the elderly were not meeting the requirements even 50 per cent of the RDA for thiamin, riboflavin, niacin and iron. However, Brahman (1999) observed an intake of 54 g protein among elderly.

In a study conducted by Liang and Liu (1999) to assess the riboflavin status in elderly men, it was found that the intake was less than 60 per cent of the RDA.

Elderly require a significant amount of minerals and trace elements to maintain their health and nutritional profile and also for their productive ageing (Sabitha *et al.*, 1999).

A cross sectional study was conducted among elderly with a mean age of 84.5 years and observed that daily dietary calcium and vitamin D intakes were below the recommended levels (Melin *et al.*, 1999).

A study conducted by Kadiyala and Chheda (2000) among elderly showed an insufficient intake of ß carotene and vitamin E, while the vitamin C intake was found to be adequate.

Arulmani and Sarojini (2000) also indicated a lower intake of energy, protein, iron, carotene, thiamine, niacin, riboflavin, vitamin C and fibre among the elderly.

A study was conducted by Garg and Singh (1983) among elderly of Meerut city and reported that there is a linear reduction in height with age. According to Kullah and Ramnath (1985) the height and weight measurements were significantly lower in the aged females as compared to their adult counterparts. However, Sarojini *et al.* (1990) reported that mean height of elderly male subjects were significantly higher than females.

Chandrasekhar and Bhooma (1998) reported that the heights and weights of the elderly men and women declined with age.

Anthropometric data particularly the Body Mass Index (BMI) showed that the elderly population is suffering from chronic energy deficiency (Brahman, 1999). A study by Bulliya *et al.* (2000) among elderly also showed an overall prevalence of chronic energy deficiency with BMI less than 18.5 among 77.6 per cent of the subjects.

Brahman (1999) reported a reduction in the mid-upper arm circumference by 2 mm among the elderly than the younger generation.

2.4 Health and other nutritional problems of elderly

The principal reason for continued focus on nutritional problems among older adults is due to the widespread occurrence of under nutrition (Keller, 1993). The elderly are emerging as one of the important segment of the population exposed to the risk of malnutrition and ill health (Brahman, 1999).

Undernutrition is found to be a serious problem among older people in developing countries, which have a positive association between nutritional status and functional ability (Chilima, 2000).

Elderly people frequently experience 'unexplained' or 'unintentional' weight loss (Wallace *et al.*, 1995).

Eventhough the energy intake among elderly was lower than RDA, Saini *et al.* (1998) observed an increased prevalence of over weight and obesity among them.

According to Coleman and Krondal (1993) protein energy malnutrition in elderly may develop from chronic diseases, isolation, poverty, diminished physical and mental status or poor dentition. Morley *et al.* (1997) reported that

protein energy under nutrition is a common problem among elderly. The development of protein-energy malnutrition is directly responsible for a number of disease processes and functional impairment of old age (Morely, 1998).

A study conducted in an urban area of Meerut city among elderly revealed that about 41.6 per cent of subjects are suffering from anaemia (Garg and Singh, 1983). Kullah and Ramnath (1985) also observed high prevalence of anaemia among the aged as compared to adults.

A study conducted by Devi and Premakumari (1998) among the aged above 60 years from urban and rural areas of Dindigul district of Tamil Nadu indicated anaemia as the major nutritional problem among elderly and was found to be widespread among the rural subjects than the urban subjects. The authors also reported higher incidence of anaemia among females than in males. Liang and Liu (1999) reported 23 per cent of anemia among elderly people.

The study by Devi and Premakumari (1998) showed that the prevalence of angular stomatitis, bleeding gums, phyrnoderma, glossitis and dry and rough skin was more among the elderly people living in rural areas than in urban areas. The riboflavin status of elderly men was assessed by Liang and Liu (1999) and indicated that 28 per cent of the subjects are suffering from riboflavin deficiency.

Research data indicated that there is a high incidence of both physical and mental health problems among the aged (Sharma, 1989).

Elderly suffer from multiple health problems apart from socio-economic and other behavioural problems (Sreeramulu and Raghuramulu, 1999). The elderly

are more prone to diseases due to lowered food intake, physical activity and resistance to infection (Devadas, 2001).

Both incidence and prevalence of diabetes are increased in the aged individuals (Davidson, 1979).

In a survey on aged females of 62-64 years it was found that the most commonly found disease among elderly is hypertension (Ostberg and Samuelson, 1994).

Due to prolongation of lifespan our elderly people suffer from several degenerative diseases like cardio-vascular diseases, cancer, diabetes and osteoporosis (Polasa, 1998).

Certain aspects of sensory and perceptual skills, muscular strength and certain kinds of memory tend to diminish with age rendering older people unsuitable for some activities (Gwinn *et al.*, 1992).

Devi and Premakumari (1998) indicated that the common prevailing diseases among the aged subjects are peptic ulcer, diabetes mellitus, asthma, rheumatism, pyorrhea and hypertension.

According to Dube (1999) there is a greater susceptibility to infections among elderly and they are prone to degenerative diseases like arthritis, atherosclerosis, malignancies, blindness due to cataract, hearing loss, dementia and slowing down of intellect. A microlevel study on aged population of Athur Block of Dindigul district revealed that the most prevalent illness among them are muscular pain followed by loss of eye sight, arthritis, tuberculosis, asthma, skin diseases and urinary problems (Lalitha, 1999).

According to Kumar (1999) ageing is a time of multiple illness such as arthritis, rheumatism and vascular lesions of central nervous system including stroke, heart condition and high blood pressure. However, Prakash (1999) observed forgetfulness, weakness and fatigue, loss of vision and hearing, loss of appetite, shortness of breath, constipation and hypertension as common problems among elderly.

Dental problems are as frequent among elderly as among children and adults and dental problems in old age could be due to change in diet, decrease in oral hygiene, self care and diminished salivary flow (Prakash, 1999).

Sharada (1999) reported depression and other mental health problems like sleep difficulties, worry and anxiety, loss of interest, tiredness and forgetfulness among elderly.

A study by Arulmani and Sarojini (2000) showed that 78 per cent of elderly males and 29.5 per cent of elderly females had poor mastication.

Nandini and Parvathi (1996) observed that institutionalized senior citizens had a lower level of sense of well being and a higher level of depression than those residing at home.

A comparative study among institutionalized and non-institutionalized elderly by Bilehal and Naik (1999) revealed that institutionalized elderly had more health problems.

2.5 Factors affecting the nutritional status of elderly

Malnutrition among the aged is caused by a number of factors such as condition of the family, poverty, ignorance, superstition, lack of food, poor

environmental sanitation, undesirable social customs, traditional prejudices and frequent infection (Chopra, 1986). According to Sundaram (1999) the ageing process itself is seldom the major cause of problems in old age. Devi (1999) stated that the ageing process can influence diet and nutrition. According to the author age related deficits in smell and possibly taste as well as the physiological changes during ageing may lead to a lowered intake of food among elderly.

Coleman and Krondal (1993) reported that the elderly persons fail to regulate food intake and develop a physiologic anorexia during ageing. According to Robert (2000) the anorexia of ageing may either reduce the food intake directly or reduce the food intake in response to such adverse factors like reduction in taste and smell, poor dentition, use of multiple medicines and depression.

Due to changing values, modernization and urbanization the elderly are left alone and have to provide themselves their own diet, which may not provide variety in the menu and thus becomes nutritionally unbalanced.

Living alone can be a nutritional risk factor as it increases irregular eating (Coleman and Krondal, 1993).

Poverty due to joblessness will be a hinderance to afford protective foods among elderly (Solanki, 1986; Goyal and Goyal, 1999). Social factors like widowhood may intervene to change the diet of elderly and thus lead to potential health problems (Goyal and Goyal, 1999).

Devi and Premakumari (1998) observed that in rural areas elderly population with illiteracy and low income suffered from more nutritional and physiological problems.

Hollingsworth and Hart (1991) observed differences between male and female nutrient intake in rural and urban ethnic groups.

According to Rolls and Drewnowski (1996) marital status has a major impact on the diets of elderly men and it is generally accepted that socialization at meals can increase energy intake.

Coleman and Krondal (1993)observed malnutrition among elderly people living in their own homes, if they are impoverished or have an isolated household, because of their own disability or because of serious illness of their partner.

The most commonly reported risk factors for poor nutrition among elderly were found to be polypharmacy, eating alone most of the time and having an illness or condition leading to changed eating habits (Burge and Gazibarich, 1999).

Variety in the diet and number of eating occasions are two important concepts in nutrition of older adults (Sabha *et al.*, 1997).

Health and social factors which affect the food choices and nutritional intake of older people were identified by Wylie *et al.* (1999). The factors included inadequate money, inadequate food storage facilities, loneliness and bereavement.

Physiological factors like changes in body composition, gastrointestinal tract and kidney function, oral changes, sensory and motor functions during old age interfere with the process necessary to nourish the body (Sharada, 1999).

Barclay *et al.* (1996) and Hemalatha (1999) reported that low physical activity during ageing is associated with low energy intake and low serum albumin levels.

According to Sharada (1999) smoking and alcohol consumption also deprive food intake due to decreased appetite. Walmsley *et al.* (1999) observed that older people who smoke cigarettes are at increased risk of sub optimal antioxidant and other micronutrient intakes and status.

Lack of individual attention, absence of choice, lack of care and concern to the inmates by managerial staff affected the nutritional adequacy of institutionalized elderly (Sharada, 1999). Prakash (1999) reported that alteration of diet during ageing is generally due to retirement, economic factors, loneliness, change in taste and the inability to masticate or a combination of these factors.

Materials and Methods

3. MATERIALS AND METHODS

This chapter presents the details with respect to the locale of the study, sample and sampling procedures, methods adopted for data collection and statistical procedures used in the analysis of the data. The details are presented under the following headings.

3.1 Selection of the area

3.2 Selection of the sample

3.3 Plan of the study

3.4 Methods adopted for the study

3.5 Development of tools and conduct of the study

3.6 Analysis of the data

3.1 Selection of the area

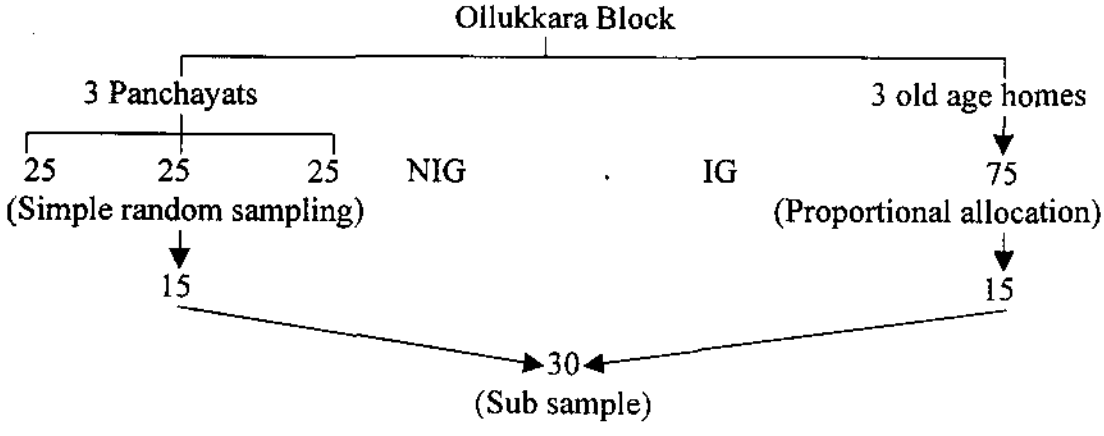
The study was conducted in Ollukkara Block of Thrissur District of Kerala State. From the seven panchayats in Ollukkara Block, three panchayats namely, Ollukkara, Puthur and Madakkathara were selected randomly for the study. Three old age homes were also selected from Ollukkara Block to conduct the study in institutionalized group.

3.2 Selection of the sample

The sampling frame consisted of the elderly persons between 60 to 75 years of age. A list of elderly persons from the selected panchayats were prepared after collecting the details from the voter's list available at panchayat office. From this list 25 elderly persons from both sexes were selected through simple random sampling from each of the three panchayats. This group was categorized as the non-institutionalized group. Thus, 75 elderly persons between 60 to 75 years of age constituted the sample from non-institutionalized group.

From the three old age homes (one government aided and two run by christian missionaries) of Ollukkara Block, 75 elderly persons between 60 to 75 years of age from both sexes were selected under proportional allocation of sample size. This group was categorized as the institutionalized group. Thus, a total of 150 elderly persons between the age group of 60 to 75 years comprised the sample of the study.

For the detailed study, 15 individuals each from institutionalized and non-institutionalized groups were selected randomly as sub sample. Thus, 30 elderly persons were selected for the detailed study. The details of the sample selected for the study are given below.



3.3 Plan of the study

The plan of action of the present study included:

3.3.1 A baseline survey to collect the socio-economic background, personal informations and personal habits of the selected subjects.

3.3.2 A dietary survey to assess the food consumption pattern of the selected subjects

3.3.3 A survey to monitor the health and other personal problems of the selected subjects.

3.3.4 Assessment of nutritional status of the subjects by conducting

3.3.4.1 Anthropometric survey to monitor the crown-heel length, weight, mid upper arm circumference, hip and waist circumference of the selected subjects

3.3.4.2 Clinical examination of the sub sample to identify the manifestations of symptoms related to malnutrition

3.3.4.3 A food weighment survey among non-institutionalized group (sub sample) and food list survey among institutionalized group (sub sample) to determine the actual food and nutrient intake.

3.3.5 Measurement of the physical strength and lung capacity of the sub sample.

3.4 Methods adopted for the study

Appropriate interview schedules were formulated to collect relevant details on socio-economic background, personal informations, personal habits, food consumption pattern and health and other personal problems of the selected subjects. Interview method is reported to be the most suitable way to collect data since it proceeds systematically and enables quick recording of data (Devadas and Kulandaivel, 1975 and Bass *et al.,* 1979). According to Gupta (1987) the information received from an interview schedule was more reliable as the accuracy of the statements could be checked by supplementary questions.

Anthropometric measurements, presence of clinical symptoms, actual food intake and biochemical estimations are widely used as direct parameters of nutritional status of individuals (Swaminathan, 1986).

To assess the nutritional status of elderly persons, the following methods were employed.

(a) Recording of anthropometric measurements

(b) Conducting clinical examination

(c) Monitoring actual food and nutrient intake

Anthropometry has been accepted as an important tool for assessment of nutritional status and it is a simple and useful practical index. (Jelliffee, 1966; Weisell and Francois, 1982; Cooper and William, 1982; McLaren *et al.*, 1984; Vijayaraghavan, 1987; Sharma and Kalia, 1990; Reddy *et al.*, 1993; and Rao and Vijayaraghavan, 1996).

According to Rao and Vijayaraghavan (1996), anthropometry can help in the assessment of subclinical stages of malnutrition and it has been recognized as a reliable tool in identification of nutritionally vulnerable groups.

Body weight is the most widely used and the simplest anthropometric measurement for the evaluation of nutritional status (Swaminathan, 1987; Rao and Vijayaraghavan, 1996).

Crown-heel length or height deficit is an indicator of long term malnutrition. The extent of height deficit in relation to age as compared to regional standards could be regarded as a measure of malnutrition (Gopaldas and Seshadri, 1987).

Among the environmental factors which influence the height of an individual, nutrition and morbidity are very important because, inadequate dietary intake and or infections reduce nutrient availability at cellular level leading to growth retardation and stunting (Rao and Vijayaraghavan, 1996).

Presently the BMI is used as an indicator of nutritional status of adults (Brahman, 1999). In order to assess the Chronic Energy Deficiency (CED) of elderly persons BMI is calculated by the formula BMI = weight (kg)/height^2 (m).

Measurement of the mid upper arm circumference is the most useful, practical method for assessing muscle mass, as this region is easily accessible and measurement requires only a flexible fibre glass tape (Gopaldas and Seshadri, 1987). Mid upper arm circumference is an indicator of muscle development and reflects protein – calorie malnutrition (Kamath, 1986).

Fat mass is distributed differently in men and women. The android is the fat distributed predominantly in the upper body above the waist, where as gynoid shows fat predominantly in the lower body that is lower abdomen, buttocks, hips and thighs. The waist to hip ratio is important in determining obesity (Srilakshmi, 2000).

In this study anthropometric measurements like weight, crown heel length, MUAC and waist and hip circumference were taken to assess the nutritional status of elderly.

Clinical examination is an important and sound method of assessing the nutritional status of a community (Jelliffee, 1966 and Kamath, 1986). According to Swaminathan (1986), it provides direct information of signs and symptoms of dietary deficiencies prevalent among people. Rao and Vijayaraghavan (1996) opined that the clinical examination reveals the anatomical changes due to malnutrition that can be diagonised by naked eye.

In the present study, the sub sample was clinically examined for deficiency manifestations and their blood pressure and heart rate were also recorded.

Diet surveys constitute an essential part of any complete study of nutritional status of individuals or groups and provide essential information on nutrient intake levels, source of nutrients, food habits and attitudes (Gopaldas and Seshadri, 1987). According to Schofield (1985) food consumption surveys provide data on the type and amount of food consumed by a representative sample of the survey population.

Tilve (1978) had indicated that individual's intake could be measured accurately only by actual weighing of food items consumed. Devadas and Eswaran (1986) observed food weighment method as the most reliable method to assess the actual food intake of an individual.

Rao (1975) stated that any single day or two day weighment method would be as efficient a tool as that of seven days. According to Mari (1985) actual food consumption within the family by one day weighment could be better mentioned in micro samples. Hence, in this study one day weighment survey was conducted among the non-institutionalized group to determine actual food and nutrient intake.

Food list method is often employed in institutions like hostels, orphanages, old age homes where homogenous groups of people take their meals from a common kitchen. This method provides estimates of food available and are as good as the food records (Thimmayamma and Rau, 1996). Hence, in this study a

food list survey was carried out for on week among the institutionalized group to know their food and nutrient intake.

Sathyanarayana (1988) reported that nutritional deprivation appeared to impair the work capacity, physical fitness and the capacity to handle moderate work loads. According to Phillips (1986) grip strength is an indicator of nutritional state.

Lung capacity varies with age, sex, body surface area, posture, habits and exercise. It is reduced in lung diseases, pleural effusion and cardiovascular disorders (Ratan, 1993).

Hence, in this study physical strength (grip strength) and lung capacity of the sub sample were also measured.

3.5 Development of tools and conduct of the study

To collect informations on socio-economic background, personal informations and personal habits and health problems of the selected subjects, a questionnaire was developed. The schedule comprised of informations pertaining to the type of family, family size, family income, occupation of subjects and family members, expenditure pattern, savings, debts, assets, social and religious practices followed and utilization of social services. This also included details regarding personal habits like smoking, alcohol consumption, tobacco chewing, physical exercise and activities involved. The pretested schedule used to collect these details is presented in Appendix I.

Another schedule was prepared to elicit information on dietary pattern, of the selected subjects. It included details regarding food habits, frequency of use

of various foods, meal pattern, dietary restrictions, use of nutrient supplements and foods included and avoided by the elderly. It also included details of health problems like indigestion, anorexia, diabetes, cardio-vascular diseases and arthritis, their duration, medication and measures taken as well as personal problems including care from the family members, reasons for coming to the old age home and frequency of visit of relatives. The pretested schedule used is presented in Appendix II.

Anthropometric measurements like weight, crown-heel length, mid-upper arm circumference, waist and hip circumference of the selected 150 elderly persons were recorded as suggested by Rao and Vijayaraghavan (1996).

Clinical examination of the sub sample was conducted with the help of a qualified physician, using a questionnaire formulated for this purpose. Heart rate and blood pressure were also measured with the help of a physician. The schedule used for clinical examination is presented in Appendix III.

One day food weighment survey and a food list survey of one week, as suggested by Thimmayamma and Rau (1996) were conducted among the sub sample of non-institutionalized and institutionalized groups respectively to monitor the actual food and nutrient intake. The nutrients available from the food consumed were computed using food composition tables (Gopalan *et al.*, 1989).

Physical strength of the sub sample was measured using hand grip dynamometer specifically designed to measure the grip strength. Lung capacity was also measured (sub sample) using incentive spirometer. Both these measurements were taken using standard procedures as detailed below.

Assessment of physical status of an individual usually starts with the measurement of his/her strength capacity. Considering the age of the subjects selected for the study the test of hand grip strength was selected. The hand grip dynamometer was used to secure the strength scores of the grip of hand.

Grip dynamometer has an adjustable handle to hold and according to the force exerted a needle indicator moves over a dial marked in kilograms from 0 to 100, with a stopper, thus making the scoring easy. Reliability co-efficients have been reported in the 0.90s, which indicates that there is a satisfactory degree of reliability.

The subjects were given two trials and the best score was selected as their grip strength of right hand.

The lung capacity of the elderly was measured using an incentive spirometer manufactured by Hudson Respiratory Care Inc., California, USA which is extensively used for clinical and research purposes.

Considering the results of the pilot study conducted among adults aged 20-35 years and the age of the subjects selected for the present study, the flow of the inspired air was adjusted to the minimum value of 200 CC/second in the instrument.

The elderly were asked to place the mouthpiece in his/her mouth and from a normal resting expiration the person was asked to inspire at a sufficient rate to raise the ball from the bottom of the spirometer. The inspiration was continued to keep the ball up and the time of floating of the ball in the air was noted using a stop watch. Two trials were given and the best score was selected.

The lung capacity was calculated using the formula

Lung capacity (cc/sec) = inspiratory time x flow setting.

3.6 Analysis of the data

The various statistical techniques used to analyse the observations are percentage analysis, chi-square test and regression analysis.

Results

4. RESULTS

The results of the study on nutritional profile of elderly are presented in this chapter under the following headings.

4.1 Socio-economic profile and personal informations of the elderly

4.2 Dietary pattern of elderly

4.3 Nutritional status of elderly

4.4 Physical parameters of elderly

4.5 Factors influencing nutritional status of the elderly

4.1 Socio-economic profile and personal informations of the elderly

Socio-economic and personal informations of elderly were assessed in terms of age, sex, religion, caste, type of family, marital status, educational and occupational status, monthly income, monthly expenditure pattern, pension, indebtedness, possession of land, housing conditions, recreational facilities and other personal informations.

4.1.1 Distribution of the elderly on the basis of age and sex

Information on age and sex of the institutionalized and non-institutionalized elderly are furnished in Table 1.

From the table it is seen that out of the total samples selected for the study, in institutionalized group 33.33 per cent were males and 66.67 per cent were females while in non-institutionalized group male and female members were found to be 37.33 per cent and 62.67 per cent of the total.

About 53 per cent and 40 per cent of elderly in institutionalized and non-institutionalized groups respectively were in the age group of 70 to 75 years and comprised of 20 per cent and 16 per cent male and 33.33 per cent and 24 per

Table 1. Distribution of elderly on the basis age and sex

Age (years)	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
60-65	3 (4.0)	9 (12.0)	12 (16.0)	7 (9.33)	15 (20.0)	22 (29.33)
65-70	7 (9.33)	16 (21.33)	23 (30.67)	9 (12.0)	14 (18.67)	23 (30.67)
70-75	15 (20.0)	25 (33.33)	40 (53.33)	12 (16.0)	18 (24.0)	30 (40.0)
Total ($\chi^2 = 4.31^{NS}$)	25 (33.33)	50 (66.67)	75 (100)	28 (37.33)	47 (62.67)	75 (100)

Number in parenthesis are percentage
NS – Not significant

cent females in institutionalized and non institutionalized groups respectively. Among the 30.67 per cent elderly in each of the two groups 9.33 per cent and 12 per cent were males and 21.33 per cent and 18.67 per cent were females.

Elderly persons in between 60-65 years constituted 16 per cent in institutionalized group and 29.33 per cent in non-institutionalized group, which comprised of 4 per cent male and 12 per cent female in institutionalized group and 9.33 per cent and 20 per cent in non-institutionalized group.

The difference in the distribution of elderly based on age and sex in institutionalized and non-institutionalized groups were found to be statistically insignificant ($\chi^2 = 4.31$).

4.1.2 Religion, caste, type of family and family size

Details of religion, caste, type of family and family size are presented in Table 2.

The table reveals that 78.67 per cent of the respondents in institutionalized group were Christians and the remaining (21.33%) belonged to the Hindu community.

In contrast to this in non-institutionalized group 70.67 per cent belonged to the Hindu community and 25.33 per cent and 4 per cent of the respondents belonged to Christian and Muslim communities respectively.

The chi-square test revealed that the distribution of elderly between the institutionalized and non-institutionalized groups were depended upon the religion ($\chi^2 = 41.34^{**}$).

Table 2. Details of religion, type of family and family size of the elderly

	Institutionalized	Non-institutionalized
Religion		
Hindu	16 (21.33)	53 (70.67)
Christian	59 (78.67)	19 (25.33)
Muslim	-	3 (4.00)
Total ($\chi^2 = 41.34$**)	75 (100)	75 (100)
Caste		
Ezhava	11 (68.75)	34 (64.15)
Nair	5 (31.25)	19 35.85)
Total	16 (100)	53 (100)
Roman Catholic	52 (88.14)	13 (68.42)
Jacobite	4 (6.78)	1 (5.26)
Marthoma	3 (5.08)	5 (26.32)
Total	59 (100)	19 (100)
Type of family		
Joint	39 (52.00)	58 (77.33)
Nuclear	36 (48.00)	17 (22.67)
Total ($\chi^2 = 9.45$**)	75 (100)	75 (100)
Family size		
Upto 4	24 (32.00)	20 (26.67)
5 to 8	48 (64.00)	44 (58.67)
>8	3 (4.00)	11 (14.66)
Total	75 (100)	75 (100)

Number in parenthesis are percentage
** - Significant at 1% level

Among Hindus majority of the respondents in both institutionalized (68.75%) and non-institutionalized groups (64.15%) were Ezhavas. Among Christians, majority of the respondents in institutionalized (88.14%) and non-institutionalized (68.42%) groups belonged to Roman Catholics. Rest of the Hindus in both groups were Nairs while among Christians the rest were either Jacobites or Marthomites.

The table also showed that 52 per cent of the respondents in institutionalized group and 77.33 per cent in non-institutionalized group were from joint families while the rest of the respondents in institutionalized group (48%) and non-institutionalized group (22.67%) were from nuclear families.

The difference in type of families between institutionalized and non-institutionalized groups was found to be statistically significant at one per cent level ($\chi^2 = 9.45^{**}$).

Regarding the family size, 64 per cent and 58.67 per cent of the families in institutionalized and non-institutionalized groups respectively were in the size group of 5-8 members while 32 per cent and 26.67 per cent in the two categories had up to 4 members. Rest of the respondents in institutionalized (4%) and non-institutionalized group (14.67%) had above 8 members in their families.

4.1.3 Details of marital status

The details furnished in Table 3 reveals that 56 per cent of the respondents in institutionalized group and 94.67 per cent of the respondents in

non-institutionalized group were married and the rest of the respondents in the two groups were unmarried.

Table 3. Details of marital status

Marital status	Institutionalized			Non-institutionalized		
	Male	Female	Total	Male	Female	Total
Married and spouse still alive	7 (28.00)	4 (8.00)	11 (14.67)	26 (92.86)	22 (46.81)	48 (64.00)
Divorced/Separated	-	1 (2.00)	1 (1.33)	-	-	-
Widowed	9 (36.00)	21 (42.00)	30 (40.00)	2 (7.14)	21 (44.68)	23 (30.67)
Unmarried	9 (36.00)	24 (48.00)	33 (44.00)	-	4 (8.51)	4 (5.33)
Total (χ^2 = 46.85**)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage
** - Significant at 1% level

In the institutionalized group 64 per cent and 52 per cent of the male and female members respectively were married while in the non-institutionalized group this was found to be 100 per cent and 91.49 per cent among the male and female members.

Among the married respondents in institutionalized group majority (71.43%) lost their spouse while in the non-institutionalized group it was found that majority (67.61%) of the spouse were still alive.

The difference in marital status between the two groups was found to be significant at 1 per cent level (χ^2 = 46.85**).

4.1.4 Educational status of respondents

As revealed in Table 4 majority of the respondents in institutionalized (54.67%) and non-institutionalized (60%) groups were literate. The percentage of illiterate people was found to be slightly higher in institutionalized group (45.33%) than in the non-institutionalized group (40%).

Among the literate respondents in institutionalized group about 29.41 per cent of male and 4.17 per cent females had studied up to high school level while in non-institutionalized group this was found to be 23.81 per cent and 16.67 per cent among male and female respondents respectively. Only 11.76 per cent and 9.52 per cent male and 12.50 per cent and 4.17 per cent female members had obtained college level education in institutionalized and non-institutionalized groups respectively. Rest of the male and female members in both groups had obtained only lower primary or upper primary level of education.

The difference in educational status of institutionalized and non-institutionalized elderly was statistically insignificant ($\chi^2 = 0.245$).

4.1.5 Past occupational status of elderly

The details regarding the occupational status of the respondents are given in Table 5.

The table showed that 48 per cent and 57.34 per cent of respondents in institutionalized and non-institutionalized groups were unemployed. It was also found that nearly 72 per cent and 89.36 per cent of the females in institutionalized and non-institutionalized groups respectively were unemployed.

Table 4. Details of educational status of elderly

Educational status	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Literate	17 (68.00)	24 (48.00)	41 (54.67)	21 (75.00)	24 (51.06)	45 (60.00)
Illiterate	8 (32.00)	26 (52.00)	34 (45.33)	7 (25.00)	23 (48.94)	30 (40.00)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Lower Primary	6 (35.30)	17 (70.83)	23 (56.10)	8 (38.10)	11 (45.83)	19 (42.22)
Upper Primary	4 (23.53)	3 (12.50)	7 (17.07)	6 (28.57)	8 (33.33)	14 (31.11)
High School	5 (29.41)	1 (4.17)	6 (14.63)	5 (23.81)	4 (16.67)	9 (20.00)
College	2 (11.76)	3 (12.50)	5 (12.20)	2 (9.52)	1 (4.17)	3 (6.67)
Total ($\chi^2 = 0.245^{NS}$)	17 (100)	24 (100)	41 (100)	21 (100)	24 (100)	45 (100.00

Number in parenthesis are percentage
NS – Not significant

Table 5. Details of past occupational status of elderly

Occupation	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Um employed	-	36 (72.00)	36 (48.00)	1 (3.57)	42 (89.36)	43 (57.34)
Cooli	13 (52.00)	9 (18.00)	22 (29.33)	7 (25.00)	2 (4.26)	9 (12.00)
Government	2 (8.00)	2 (4.00)	4 (5.33)	5 (17.86)	2 (4.26)	7 (9.33)
Private	5 (20.00)	3 (6.00)	8 (10.67)	9 (32.14)	0 (0.00)	9 (12.00)
Business	5 (20.00)	-	5 (6.67)	6 (21.43)	1 (2.12)	7 (9.33)
Total ($\chi^2 = 7.282^{NS}$)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage
NS – Not significant

It was found that 29.33 per cent worked as coolies in institutionalized group in contrast to 12 per cent in non-institutionalized group. Rest of the respondents in both groups were engaged either in government or in private jobs. It was observed that more number of male respondents rather than female respondents in both groups were employed in different sectors.

The difference in past occupational status of elderly in both groups was found to be statistically insignificant ($\chi^2 = 7.282$).

4.1.6 Details of source of income

Table 6 depicts the details of the source of income of the respondents.

From the table it can be seen that 92 per cent and 70.67 per cent elderly in institutionalized and non-institutionalized groups respectively had no income of their own and dependent on others.

The percentage of pensioners in non-institutionalized group (22.67%) was higher than the percentage of pensioners in institutionalized group (8%).

In non-institutionalized group 6.66 per cent elderly were doing business as a source of income while in the institutionalized group business was not a source of income for the respondents.

The source of income of the institutionalized and non-institutionalized elderly has statistically significant difference at 5 per cent level ($\chi^2 = 10.019^*$).

4.1.7 Details of pension

Table 7 depicts the details of pension received by the elderly.

Table 6. Details of source of income

Source	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Pensioner	2 (8.00)	4 (8.00)	6 (8.00)	8 (28.57)	9 (19.15)	17 (22.67)
Dependent	23 (92.00)	46 (92.00)	69 (92.00)	16 (57.14)	37 (78.72)	53 (70.67)
Business	-	-	-	4 (14.29)	1 (2.13)	5 (6.66)
Total (χ^2 = 10.019*)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage
* - Significant at 5% level

Table 7. Details of pension

Source	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Government	2 (100)	1 (25.00)	3 (50.00)	5 (62.50)	2 (22.22)	7 (41.18)
Private	-	-	-	3 (37.50)	-	3 (17.64)
Widow pension	-	3 (75.00)	3 (50.00)	-	7 (77.78)	7 (41.18)
Total	2 (100)	4 (100)	6 (100)	8 (100)	9 (100)	17 (100)
Amount (Rs.)						
<100	-	-	-	-	-	-
100-500.	2 (100)	4 (100)	6 (100)	1 (12.50)	2 (22.22)	3 (17.65)
500-1000	-	-	-	3 (37.50)	2 (22.22)	5 (29.41)
1000-1500	-	-	-	2 (25.00)	4 (44.45)	6 (35.29)
>1500	-	-	-	2 (25.00)	1 (11.11)	3 (17.65)
Total	2 (100)	4 (100)	6 (100)	8 (100)	9 (100)	17 (100)

Number in parenthesis are percentage

Among the pensioners in institutionalized group equal per cent (50%) elderly received government and widow pension while in non-institutionalized group 41.18 per cent elderly received government pension, 17.64 per cent received private pension and 41.18 per cent received widow pension.

All male and female pensioners in institutionalized group were receiving Rs.100 to 500 per month as pension.

In non-institutionalized group 35.29 per cent elderly received between Rs.1000-1500, 17.65 per cent received between Rs.100-500, 29.41 per cent received Rs.500-1000 and 17.65 per cent received above Rs.1500 per month as their pension.

4.1.8 Monthly family income of non-institutionalized group

Monthly income of families in non-institutionalized group is showed in Table 8.

From the table, it can be ascertained that 52 per cent of the families in the non-institutionalized group had an income ranging between Rs.4000 to Rs.8000 per month while 18.7 per cent of the families earned only up to Rs.4000/- per month. Rest of the families (29.3%) had an income above Rs.8000 per month.

4.1.9 Monthly expenditure pattern of the families (non-institutionalized group)

Table 9 depicts the expenditure pattern for various items like food, clothing, shelter, education, transport, recreation, health, savings, loan, personal expenses and fuel among the families of the non-institutionalized group.

Table 8. Monthly family income of non-institutionalized elderly

Monthly income (Rs.)	Non-institutionalized group
Upto 2000	5 (6.70)
2000-4000	9 (12.00)
4000-6000	17 (22.70)
6000-8000	22 (29.30)
8000-10000	18 (24.00)
>10000	4 (5.30)
Total	75 (100)

Number in parenthesis are percentage

Table 9. Monthly expenditure pattern of the families (Non-institutionalized group)

Item	Nil	<10 (%)	10-19.9 (%)	20-29.9 (%)	30-39.9 (%)	40-49.9 (%)	50-69.9 (%)	≥60 (%)	Total
Food	-	-	-	4 (5.33)	21 (28.00)	25 (33.33)	20 (26.67)	5 (6.67)	75 (100)
Clothing	-	73 (97.33)	2 (2.67)	-	-	-	-	-	75 (100)
Shelter	-	72 (96.00)	3 (4.00)	-	-	-	-	-	75 (100)
Education	21 (28.0)	11 (14.67)	36 (48.00)	7 (9.33)	-	-	-	-	75 (100)
Transport	-	73 (97.33)	2 (2.67)	-	-	-	-	-	75 (100)
Recreation	-	70 (93.33)	5 (6.67)	-	-	-	-	-	75 (100)
Health	-	71 (94.67)	4 (5.33)	-	-	-	-	-	75 (100)
Savings	3 (4.0)	18 (24.00)	23 (30.67)	15 (20.00)	11 (14.67)	4 (5.33)	1 (1.33)	-	75 (100)
Loan	68 (90.66)	2 (2.67)	3 (4.00)	2 (2.67)	-	-	-	-	75 (100)
Personal expenses	-	75 (100)	-	-	-	-	-	-	75 (100)
Fuel	-	70 (93.33)	5 (6.67)	-	-	-	-	-	75 (100)

Number in parenthesis are percentage

From the table it is clear that 88 per cent of the families spent between 30 per cent and 59.9 per cent of their monthly income on food.

All the families spent less than 20 per cent of their income on clothing, shelter, transport, recreation, health and fuel.

Except 28 per cent of the families all others spent up to 29.9 per cent of their income on education of their children.

Out of the 75 families in the non-institutionalized group except 4 per cent all others had the habit of saving money. Up to 10 per cent of the income as savings was reported by 24 per cent of the families while 30.7 per cent of the families saved 10 to 19.9 per cent and 20 per cent saved 20 to 29.9 per cent of their income. Rest of the families (21.3%) saved in between 30 to 59.9 per cent of their monthly income.

With regard to the expenditure incurred for the remittance of loan, it was found that 9.4 per cent of the families spent upto 29.9 per cent of their income for remittance of loan. Majority (90.66%) of the families did not spent money for this purpose.

The percentage of monthly income spent for personal expenses was found to be less than 10 per cent for all the families.

4.1.10 Details of indebtedness (non-institutionalized group)

Details of indebtedness of the elderly in non-institutionalized group are depicted in Table 10.

Table 10. Details of indebtedness (Non-institutionalized group)

Details	Male	Female	Total
Have debts	2 (7.14)	5 (10.64)	7 (9.33)
No debts	26 (92.86)	42 (89.36)	68 (90.67)
Total	28 (100)	47 (100)	75 (100)
Source of debt			
Bank	1 (50.00)	4 (80.00)	5 (71.42)
Private	-	1 (20.00)	1 (14.29)
Neighbours	1 (50.00)	-	1 (14.29)
Total	2 (100)	5 (100)	7 (100)

Number in parenthesis are percentage

From the study it was observed that majority of the elderly (90.67%) in non-institutionalized group have no debts while 9.33 per cent had taken loan mainly from bank or private agencies.

4.1.11 Details on availability of land

Details on availability of land are given in Table 11. All the elderly men and women in institutionalized group were landless.

Majority of the elderly in non-institutionalized group (77.33%) owned land ranging from 1 to 100 cents (82.76%) and a very few (17.24%) had above 100 cents of land.

Table 11. Details on availability of land (Non-institutionalized group)

Details	Male	Female	Total
Own land	25	33	58
	(89.29)	(70.21)	(77.33)
No own land	3	14	17
	(10.71)	(29.79)	(22.67)
Total	28	47	75
	(100)	(100)	(100)
Area (cents)			
1 to 50	14	20	34
	(56.00)	(60.61)	(58.62)
50 to 100	7	7	14
	(28.00)	(21.21)	(24.14)
≥ 100	4	6	10
	(16.00)	(18.18)	(17.24)
Total	25	33	58
	(100)	(100)	(100)
Inherited	18	31	49
	(72.00)	(93.94)	(84.48)
Purchased	7	2	9
	(28.00)	(6.06)	(15.52)
Total	25	33	58
	(100)	(100)	(100)
Partition			
Yes	5	11	16
	(20.00)	(33.33)	(27.59)
No	20	22	42
	(80.00)	(66.67)	(72.41)
Total	25	33	58
	(100)	(100)	(100)

Number in parenthesis are percentage

About 85 per cent of the elderly inherited the land from their parents, while 15.52 per cent purchased their land. Most of the respondents (72.41%) had not partitioned their property while the rest (27.59%) had partitioned the property and given to their siblings.

4.1.12 Housing conditions

Details of the housing conditions of the non-institutionalized elderly are presented in Table 12.

As revealed in the table, 44 per cent of the respondents had their own houses. Rest of the respondents (56%) lived with their family members.

Out of the 75 respondents surveyed 84 per cent had 3 to 6 rooms while 5.33 per cent had two rooms and 10.67 per cent had more than 6 rooms.

Most of the houses (81.33%) were tiled and with cement flooring (85.33%). All the houses were made with brick as the wall material.

Most of the houses (64%) had separate room for different members in the family and 76 per cent of the elderly had a separate room for them.

All the houses had separate kitchen, good drainage facilities, lavatory and electricity facilities.

Most of the families (84%) had their own well for drinking water while 5.33 per cent families depended on public tap, 2.7 per cent families on public well and 8 per cent on tank as the source of drinking water.

4.1.13 Recreational activities of the elderly

Table 13 indicates the details of recreational activities of the elderly.

Table 12. Details of housing conditions of non-institutionalized group

	Male	Female	Total
Ownership of the house			
Own house	17 (60.71)	16 (34.04)	33 (44.00)
Residing with family members	11 (39.29)	31 (65.96)	42 (56.00)
Total	28 (100)	47 (100)	75 (100)
Number of rooms			
2	3 (10.71)	1 (2.13)	4 (5.33)
3 to 4	11 (39.30)	13 (27.66)	24 (32.00)
5 to 6	12 (42.85)	27 (57.44)	39 (52.00)
> 6	2 (7.14)	6 (12.77)	8 (10.67)
Total	28 (100)	47 (100)	75 (100)
Type of roof			
Tiled	23 (82.14)	38 (80.85)	61 (81.33)
Concrete	5 (17.86)	9 (19.15)	14 (18.67)
Total	28 (100)	47 (100)	75 (100)
Type of floor			
Cement	25 (89.29)	39 (82.98)	64 (85.33)
Mosaic	1 (3.57)	3 (6.38)	4 (5.33)
Marble	2 (7.14)	5 (10.64)	7 (9.34)
Total	28 (100)	47 (100)	75 (100)
Type of wall			
Brick	28 (100)	47 (100)	75 (100)

Contd.

Table 12. Continued

	Male	Female	Total
Separate room for individual members			
Present	19	29	48
	(67.86)	(61.70)	(64.00)
Absent	9	18	27
	(32.14)	(38.30)	(36.00)
Total	28	47	75
	(100)	(100)	(100)
Separate room for the respondent			
Present	22	35	57
	(78.57)	(74.47)	(76.00)
Absent	6	12	18
	(21.43)	(25.53)	(24.00)
Total	28	47	75
	(100)	(100)	(100)
Separate kitchen	28	47	75
	(100)	(100)	(100)
Source of drinking water			
Own well	25	38	63
	(89.29)	(80.85)	(84.00)
Public tap	1	3	4
	(3.57)	(6.38)	(5.33)
Public well	-	2	2
		(4.26)	(2.67)
Tank	2	4	6
	(7.14)	(8.51)	(8.00)
Total	28	47	75
	(100)	(100)	(100)

Number in parenthesis are percentage

Table 13. Details of recreational activities

Recreational activities	Institutionalized		Total	Non- institutionalized		Total
	Male	Female		Male	Female	
TV / movies	-	10 (20.00)	10 (13.33)	5 (17.86)	11 (23.40)	16 (21.33)
Newspaper	-	15 (30.00)	15 (20.00)	3 (10.71)	1 (2.13)	4 (5.33)
Playing with grand children	-	-	-	-	2 (4.26)	2 (2.68)
Gardening	-	-	-	3 (10.71)	-	3 (4.00)
TV & newspaper	12 (48.00)	25 (50.00)	37 (49.33)	9 (32.14)	16 (34.04)	25 (33.33)
TV, newspaper & playing with grand children	-	-	-	3 (10.71)	6 (12.77)	9 (12.00)
TV, newspaper & gardening	5 (20.00)	-	5 (6.67)	4 (14.30)	3 (6.38)	7 (9.33)
TV, newspaper & playing cards	8 (32.00)	-	8 (10.67)	-	-	-
No such facilities	-	-	-	1 (3.57)	8 (17.02)	9 (12.00)
Total ($\chi^2 = 21.049$**)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage

** - Significant at 1% level

Except 12 per cent of the elderly in the non-institutionalized group all the other respondents in the two groups were involved in one or other recreational activities.

About 49 per cent of the elderly in the institutionalized group were involved in seeing TV and reading newspaper, while only 33.33 per cent of the non-institutionalized elderly were having such recreational facilities.

Only 13.33 per cent and 21.33 per cent elderly in institutionalized and non-institutionalized groups respectively were in the habit of watching television and seeing movies.

In general, elderly women were found to be having more recreational activities than men. Only very few elderly in both groups were interested in playing cards, playing with grand children and in gardening.

The difference in having recreational activities like watching television, reading newspaper, gardening and playing cards among institutionalized and non-institutionalized elderly was found to be statistically significant at 1 per cent level ($\chi^2 = 21.049^{**}$).

4.1.14 Details of attending social functions

Table 14 furnishes the details regarding the participation of elderly in different functions.

About 68 per cent of the institutionalized elderly did not attend various social functions like marriage, birthdays, festivals etc. while this was found to be 32 per cent among the non-institutionalized group. Nearly 9.33 per cent of the

Table 14. Details of attending social functions

Details	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Marriage	6 (24.00)	11 (22.00)	17 (22.67)	12 (42.86)	16 (34.04)	28 (37.34)
Birthdays and marriages	-	-	-	4 (14.29)	8 (17.03)	12 (16.00)
Birthdays, marriages and festivals	-	-	-	3 (10.71)	4 (8.51)	7 (9.33)
Marriage and festivals	4 (16.00)	3 (6.00)	7 (9.33)	1 (3.57)	3 (6.38)	4 (5.33)
Not attending functions	15 (60.00)	36 (72.00)	51 (68.00)	8 (28.57)	16 (34.04)	24 (32.00)
Total (χ^2 = 10.696**)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage
** - Significant at 1% level

institutionalized elderly attended both marriages and festivals while 22.67 per cent attended only marriage ceremonies. In contrast to this majority (68%) of non-institutionalized elderly used to attend various social functions like marriage, birthdays and festivals.

There is statistically significant difference (at 1% level) between institutionalized and non-institutionalized elderly in attending different social functions ($\chi^2 = 10.696^{**}$).

4.1.15 Details of visiting religious places

Table 15 shows that 82.67 per cent elderly from institutionalized group and 73.33 per cent elderly from non-institutionalized group used to visit various religious places.

It was observed that all the respondents who visited religious places in institutionalized group used to visit churches while in the non-institutionalized group 40 per cent used to visit churches, 58.18 per cent temples and 1.82 per cent mosques.

The statistical analysis revealed that visiting religious places by the elderly was independent on the fact that whether they are institutionalized or not ($\chi^2 = 1.398$).

In the institutionalized group majority of elderly (77.42%) used to visit the religious places daily, while in non-institutionalized group majority (60.0%) used to visit once in a week. In institutionalized elderly 17.74 per cent used to visit religious places once in a week and 4.84 per cent once in a month.

Table 15. Details of visiting religious places

Details	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Visiting religious places						
Yes	22 (88.00)	40 (80.00)	62 (82.67)	17 (60.71)	38 (80.85)	55 (73.33)
No	3 (12.00)	10 (20.00)	13 (17.33)	11 (39.29)	9 (19.15)	20 (26.67)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Type						
Church	22 (100)	40 (100)	62 (100)	6 (35.29)	16 (42.11)	22 (40.00)
Temple	-	-	-	10 (58.82)	22 (57.89)	32 (58.18)
Mosque	-	-	-	1 (5.89)	-	1 (1.82)
Total	22 (100)	40 (100)	62 (100)	17 (100)	38 (100)	55 (100)
Frequency						
Daily	14 (63.64)	34 (85.00)	48 (77.42)	3 (17.65)	8 (21.05)	11 (20.00)
Weekly	6 (27.27)	5 (12.50)	11 (17.74)	9 (52.94)	24 (63.16)	33 (60.00)
Monthly	2 (9.09)	1 (2.50)	3 (4.84)	5 (29.41)	6 (15.79)	11 (20.00)
Total	22 (100)	40 (100)	62 (100)	17 (100)	38 (100)	55 (100)
Mode of travel						
Walking	22 (100)	40 (100)	62 (100)	12 (70.59)	28 (73.68)	40 (72.72)
Bus	-	-	-	5 (29.41)	8 (21.06)	13 (23.62)
Own car	-	-	-	-	2 (5.26)	2 (3.64)
Total	22 (100)	40 (100)	62 (100)	17 (100)	38 (100)	55 (100)

Number in parenthesis are percentage

In non-institutionalized elderly 20 per cent visited religious places daily while this was found to be once in a month among 20 per cent of non-institutionalized elderly.

Regarding the transport facilities used for going to religious places all the respondents in institutionalized group and 72.72 per cent in non-institutionalized group did not use any transport facilities to go to religious places. Only a minority (3.64%) used their own car and the rest (23.62%) used bus to go to religious places.

4.1.16 Details of membership in social organizations

From Table 16 it can be seen that all the elderly from institutionalized group and 80 per cent from non-institutionalized group were not members of any of the social organizations.

Among the 15 non-institutionalized elderly who were members of the social organizations 66.66 per cent were members for more than 5 years while 26.67 per cent were members for the past one to five years.

The difference in membership in different social organizations between the two groups was found to be statistically significant at 1 per cent level ($\chi^2 = 12.008^{**}$).

4.1.17 Details of health problems

Table 17 depicts the different health problems among the elderly respondents such as arthritis, asthma, cataract, diabetes and cardiovascular diseases.

Table 16. Details of membership in social organisations

Details	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Membership in social orgnisation						
Members	-	-	-	6 (21.43)	9 (19.15)	15 (20.00)
No membership	25 (100)	50 (100)	75 (100)	22 (78.57)	38 (80.85)	60 (80.00)
Total (χ^2 = 12.008**)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Duration (years)						
<1	-	-	-	1 (16.67)	0 (0.00)	1 (6.67)
1-5	-	-	-	2 (33.33)	2 (22.22)	4 (26.67)
>5	-	-	-	3 (50.00)	7 (77.78)	10 (66.66)
Total	-	-	-	6 (100)	9 (100)	15 (100)

Number in parenthesis are percentage
** - Significant at 1% level

Table 17. Details of health problems

Health problems	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
With health problems	24 (96.00)	43 (86.00)	67 (89.33)	25 (89.29)	37 (78.72)	62 (82.67)
Without health problems	1 (4.00)	7 (14.00)	8 (10.67)	3 (10.71)	10 (21.28)	13 (17.33)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Arthritis	1 (4.17)	4 (9.30)	5 (7.46)	1 (4.00)	3 (8.10)	4 (6.45)
Asthma	4 (16.67)	3 (6.98)	7 (10.45)	5 (20.00)	2 (5.41)	7 (11.29)
Cataract	2 (8.33)	3 (6.98)	5 (7.46)	1 (4.00)	6 (16.22)	7 (11.29)
Diabetes	1 (4.17)	2 (4.65)	3 (4.48)	1 (4.00)	3 (8.10)	4 (6.45)
Cardiovascular diseases	4 (16.67)	3 (6.98)	7 (10.45)	4 (16.00)	4 (10.81)	8 (12.90)
Gastro intestinal diseases	-	2 (4.65)	2 (2.98)	1 (4.00)	1 (2.71)	2 (3.23)
More than one disease	12 (50.00)	26 (60.46)	38 (56.72)	12 (48.00)	18 (48.65)	30 (48.39)
Total	24 (100)	43 (100.00	67 (100)	25 (100)	37 (100)	62 (100)

Number in parenthesis are percentage

Majority of the elderly in both groups were having one or more health problems. Only 10.67 per cent elderly from institutionalized group and 17.33 per cent from non-institutionalized group were not having any sort of health problems.

About 34 per cent and 40 per cent of the elderly in institutionalized and non-institutionalized groups respectively were having cardio-vascular complications, most of them along with asthma, arthritis, diabetes or cataract.

All the other respondents in both categories were having one or more health problems like arthritis, asthma, cataract, diabetes, cardiovascular diseases or a combination of different diseases.

Among male and female elderly in the two categories percentage prevalence of cardiovascular diseases or cardiovascular diseases along with other diseases was found to be high among females than males.

The chi square test revealed that the health problems are not related with the fact that whether the elderly are institutionalized or not ($\chi^2 = 0.886$).

4.1.18 Details of taking medicines

The details on the medicines taken by the elderly in the two categories are presented in Table 18.

Compared to non-institutionalized group (37.33%), a higher percentage of institutionalized elderly (46.67%) used to have a routine medical check up.

Forty eight per cent elderly from institutionalized group and 49.33 per cent from non-institutionalized group used to take medicines regularly while the rest did not take medicines regularly.

Table 18. Details of taking medicines

Details	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Have a routine medical check up						
Yes	13 (52.00)	22 (44.00)	35 (46.67)	7 (25.00)	21 (44.68)	28 (37.33)
No	12 (48.00)	28 (56.00)	40 (53.33)	21 (75.00)	26 (55.32)	47 (62.67)
Total ($\chi^2 = 0.985^{NS}$)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Regular intake of medicines						
Yes	12 (48.00)	24 (48.00)	36 (48.00)	13 (46.43)	24 (51.06)	37 (49.33)
No	13 (52.00)	26 (52.00)	39 (52.00)	15 (53.57)	23 (48.94)	38 (50.67)
Total ($\chi^2 = 0.04^{NS}$)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Type of medicine						
Allopathy	12 (100)	17 (70.83)	29 (80.56)	11 (84.62)	17 (70.83)	28 (75.68)
Ayurveda	-	7 (29.17)	7 (19.44)	2 (15.38)	6 (25.00)	8 (21.62)
Homeo	-	-		-	1 (4.17)	1 (2.70)
Total ($\chi^2 = 0.084^{NS}$)	12 (100)	24 (100)	36 (100)	13 (100)	24 (100)	37 (100)
Frequency						
Daily	12 (100)	24 (100)	36 (100)	13 (100)	24 (100)	37 (100)

Number in parenthesis are percentage
NS – Not significant

Among the respondents who used to take medicines regularly majority in institutionalized group (80.56%) and in non-institutionalized group (75.68%) used to take allopathy medicines while 19.44 per cent and 21.62 per cent used ayurveda medicines. Only one respondent was found to take homoeo medicine.

All the elderly who took medicines in the two groups used to take it daily.

The statistical analysis revealed that the factors like having a routine medical checkup ($\chi^2 = 0.985$), regular intake of medicines ($\chi^2 = 0.04$) and the type of medicines ($\chi^2 = 0.084$) used by the elderly are independent of the fact that whether they are institutionalized or not.

4.1.19 Unhealthy habits prevalent among elderly

Table 19 depicts the unhealthy habits like smoking, alcohol consumption, tobacco chewing and using betel leaves among the elderly.

Out of the total elderly in institutionalized and non-institutionalized categories 89.33 per cent and 57.33 per cent respectively did not have any of the unhealthy practices mentioned above.

The difference in having unhealthy practices by the elderly in institutionalized and non-institutionalized groups was statistically significant at 1 per cent level ($\chi^2 = 26.066^{**}$).

When compared to female elderly male respondents had more unhealthy practices.

Table 19. Unhealthy habits prevalent among the elderly

Habits	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
With habits	6 (24.00)	2 (4.00)	8 (10.67)	18 (64.29)	14 (29.79)	32 (42.57)
Without habits	19 (76.00)	48 (96.00)	67 (89.33)	10 (35.71)	33 (70.21)	43 (57.33)
Total ($\chi^2 = 26.066$**)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Smoking	5 (83.33)	-	5 (62.50)	2 (11.11)	-	2 (6.25)
Alcohol consumption	-	-	-	4 (22.22)	-	4 (12.50)
Tobacco chewing	1 (16.67)	2 (100)	3 (37.50)	3 (16.67)	7 (50.00)	10 (31.24)
Use of betal leaves	-	-	-	-	3 (21.43)	3 (9.38)
Smoking and alcohol consumption	-	-	-	4 (22.22)	-	4 (12.50)
Smoking, alcohol consumption and tobacco chewing	-	-	-	1 (5.56)	-	1 (3.13)
Smoking and tobacco chewing	-	-	-	2 (11.11)	-	2 (6.35)
Tobacco chewing and use of betal leaves	-	-	-	2 (11.11)	4 (28.57)	6 (18.75)
Total	6 (100)	2 (100)	8 (100)	18 (100)	14 (100)	32 (100)

Number in parenthesis are percentage
** - Significant at 1% level

Among those who had the unhealthy practices most of them had the habit of smoking, consuming alcohol, chewing tobacco or betel leaves.

4.1.20 Details of physical activity

Regarding the details of physical activity among elderly it was found that about 91 per cent of the respondents in institutionalized group and 80 per cent in non-institutionalized group did one or more physical exercises (Table 20) and the chi square test revealed that the difference in doing physical exercises are not dependent on whether the elderly are institutionalized or non-institutionalized ($\chi^2 = 2.61$).

The details of the various physical exercises done by the male and female respondents of the groups are presented in Table 20.

It was found that among the respondents who were doing some physical exercise in the two groups majority were involved in evening walk with or without other activities like gardening, household work etc.

When compared to men higher percentage of female elderly were involved in various physical exercises in both groups.

4.1.21 Activities which need help

Table 21 shows that all elderly men and women from non-institutionalized group did all the activities like bathing, dressing, transfer out to bed and feeding by themselves without any help.

In institutionalized group a minority of the respondents required help from others for bathing, dressing and transfer out to bed.

Table 20. Details of physical activity

Details	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
Used to take physical activity	23 (92.00)	45 (90.00)	68 (90.70)	24 (85.71)	36 (76.60)	60 (80.00)
No physical activity	2 (8.00)	5 (10.00)	7 (9.30)	4 (14.29)	11 (23.40)	15 (20.00)
Total ($\chi^2 = 2.61^{NS}$)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Evening walk	3 (13.04)	-	3 (4.40)	5 (20.83)	2 (5.56)	7 (11.67)
Purchasing	-	-	-	1 (4.17)	2 (5.56)	3 (5.00)
Evening walk and gardening	-	-	-	2 (8.33)	1 (2.78)	3 (5.00)
Evening walk, gardening and purchasing	-	-	-	2 (8.33)	-	2 (3.33)
Evening walk and purchasing	-	-	-	7 (29.17)	-	7 (11.67)
Cooking and cleaning	-	1 (2.22)	1 (1.48)	-	11 (30.55)	11 (18.33)
Cleaning and washing clothes	3 (13.04)	3 (6.67)	6 (8.82)	2 (8.33)	7 (19.44)	9 (15.00)
Cooking, cleaning and washing clothes	-	23 (51.11)	23 (33.82)	-	8 (22.22)	8 (13.33)
Care of domestic animals	-	-	-	4 (16.67)	2 (5.56)	6 (10.00)
Washing clothes	2 (8.70)	14 (31.11)	16 (23.53)	-	3 (8.33)	3 (5.00)
Evening walk and washing clothes	15 (65.22)	3 (6.67)	18 (26.47)	1 (4.17)	-	1 (1.67)
Evening walk, cleaning and cooking	-	1 (2.22)	1 (1.48)	-	-	-
Total	23 (100)	45 (100)	68 (100)	24 (100)	36 (100)	60 (100)

Number in parenthesis are percentage
NS – Not significant

Table 21. Details of activities which need help

Activity	Institutionalized		Total	Non-institutionalized		Total
	Male	Female		Male	Female	
1. Bathing						
a. Need help	2 (8.00)	4 (8.00)	6 (8.00)	-	-	-
b. Doing alone	23 (92.00)	46 (92.00)	69 (92.00)	28 (100)	47 (100)	75 (100)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
2. Dressing						
Need help	2 (8.00)	3 (6.00)	5 (6.67)	-	-	-
Doing alone	23 (92.00)	47 (94.00)	70 (93.33)	28 (100)	47 (100)	75 (100)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
3. Transfer out to bed						
Need help	2 (8.00)	3 (6.00)	5 (6.67)	-	-	-
Doing alone	23 (92.00)	47 (94.00)	70 (93.33)	28 (100)	47 (100)	75 (100)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
4. Feeding						
Need help	-	-	-	-	-	-
Doing alone	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)
Total	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage

None of the elderly in institutionalized and non-institutionalized groups required any help for taking food.

4.1.22 Details of visiting relatives

From Table 22 it is clear that majority of the elderly in institutionalized group neither visited their relatives nor their relatives come to old age homes.

Table 22. Details of visiting relatives (Institutionalized group)

	Elderly visiting relatives	Relatives visiting elderly
Frequency		
Once in a month	1 (1.30)	2 (2.70)
Occasionally	18 (24.00)	39 (52.00)
Never	56 (74.70)	34 (45.30)
Total	75 (100)	75 (100)
Visitors		
Own children	-	12 (29.20)
Relatives	-	27 (65.90)
Neighbours	-	2 (4.90)
Total		41 (100)

Number in parenthesis are percentage

About 24 per cent of elderly visited their relatives occasionally while 52 per cent of the elderly's relatives, children or neighbors visited them in the old age homes occasionally.

4.1.23 Reasons for opting old age home

From Table 23 it can be seen that majority of the elderly male (76%) and female (72%) came to old age home since nobody was there in the house to take care of them.

Table 23. Reasons for opting old age home (Institutionalized group)

Reasons	Male	Female	Total
Compulsion from children	3 (12.00)	5 (10.00)	8 (10.67)
Own wish	3 (12.00)	9 (18.00)	12 (16.00)
Nobody to look after	19 (76.00)	36 (72.00)	55 (73.33)
Total ($\chi^2 = 0.473^{NS}$)	25 (100)	50 (100)	75 (100)

Number in parenthesis are percentage
NS – Not significant

About 12 per cent of elderly men and 18 per cent elderly women came to old age home on their own wish while 12 per cent men and 10 per cent women opted the old age home due to the compulsion from their children.

The chi square test revealed that there is no significant difference in the reasons for opting the old age home among male and female elderly ($\chi^2 = 0.473$).

4.2 Dietary pattern of elderly

The dietary pattern of the elderly was assessed with respect to the food habits, meal pattern, frequency of use of various foods, cooking pattern, details of food intake, details of purchase and preparation of processed foods,

foods prepared during special conditions and details of intake of nutrient supplements by the elderly.

4.2.1 Food habits of the elderly

The details of food habits of the elderly are presented in Table 24.

Table 24. Details of food habits of elderly

Details	Institutionalized group			Non institutionalized group		
	Male	Female	Total	Male	Female	Total
Vegetarian	-	6 (12.00)	6 (8.00)	2 (7.14)	6 (12.77)	8 (10.67)
Non-vegetarian	25 (100)	44 (88.00)	69 (92.00)	26 (92.86)	41 (87.23)	67 (89.33)
Total ($\chi^2 = 4.31^{NS}$)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage

From the table it can be seen that eight per cent of elderly in institutionalized and 10.67 per cent elderly in non-institutionalized groups were vegetarians while 92 per cent and 89.33 per cent of institutionalized and non-institutionalized elderly respectively were non-vegetarians. All the elderly male and 88 per cent of the females in the institutionalized group and majority of male (92.86%) and female (87.23%) elderly in the non institutionalized group were also found to be non-vegetarians.

All the subjects consumed rice as the staple food. The difference in food habits between institutionalized and non-institutionalized elderly was found to be statistically in- significant ($\chi^2 = 4.31$).

4.2.2 Dietary habits of the elderly

The dietary habits of elderly for three consecutive days was assessed and the results are depicted in Table 25.

About 87 per cent elderly in institutionalized group and about 48 per cent elderly in non-institutionalized group used to consume tea in the early morning, while 13 per cent and 41 per cent of institutionalized and non-institutionalized groups respectively consumed black tea in the early morning. The rest of the elderly neither consumed tea nor black tea.

During breakfast 60 per cent and 31 per cent of institutionalized and non-institutionalized groups included cereals and pulses as well as vegetables in their diet while 40 per cent and 16 per cent respectively included only cereals and pulses for breakfast. About 15 per cent of non-institutionalized elderly consumed cereals and vegetables and 39 per cent included cereals, pulses, vegetables, milk or egg for breakfast.

Among institutionalized elderly 86.67 per cent had cereals, pulses, vegetables and meat/fish/curd for lunch while in the non-institutionalized group only 52 per cent included these items for lunch. Rest (13.33%) of the elderly in the institutionalized group had only cereals, pulses and vegetables for lunch.

In non-institutionalized group 32 per cent elderly consumed cereals, pulses, vegetables and fruits during lunch while 16 per cent had only cereals, pulses and vegetables.

For evening tea majority of the non-institutionalized elderly (73.33%) used to consume either tea or coffee while 27 per cent had snacks along with tea. Majority of the elderly in institutionalized category had snack and tea during evening while 13.33 per cent had only tea.

Table 25. Details of dietary habits of the elderly

Meal pattern	Institutionalized group	Non-institutionalized group
Early morning		
Tea	65 (86.67)	36 (48.00)
Black tea	10 (13.33)	31 (41.33)
Nil	-	8 (10.67)
Total	75 (100)	75 (100)
Breakfast		
Cereals & pulses	30 (40.00)	12 (16.00)
Cereals, pulses & vegetables	45 (60.00)	23 (30.67)
Cereals & vegetables	-	11 (14.66)
Cereal, pulse, vegetables & milk/egg	-	29 (38.67)
Total	75 (100)	75 (100)
Lunch		
Cereals, pulse & vegetables	10 (13.33)	12 (16.00)
Cereals, pulses, vegetables & meat/fish/curd	65 (86.67)	39 (52.00)
Cereals, pulses, vegetables & fruits	-	24 (32.00)
Total	75 (100)	75 (100)
Evening tea		
Only tea	10 (13.33)	51 (68.00)
Black tea	-	4 (5.33)
Tea with snacks	65 (86.67)	20 (26.67)
Total	75 (100)	75 (100)
Dinner		
Cereals and pulses	-	8 (10.67)
Cereal, pulse and vegetables	65 (73.33)	22 (29.33)
Cereals and vegetables	20 (26.67)	15 (20.00)
Cereals, pulses, vegetables and meat/fish/egg	-	24 (32.00)
Cereals, pulses, vegetables and fruits	-	6 (8.00)
Total ($\chi^2 = 44.99$**)	75 (100)	75 (100)

Number in parenthesis are percentage

** - Significant at 1% level

For dinner 73.33 per cent and 29.33 per cent of institutionalized and non-institutionalized elderly respectively had cereals, pulses and vegetables. About 27 per cent elderly in institutionalized and 20 per cent in non-institutionalized groups included only cereals and vegetables during dinner.

Among non-institutionalized group 32 per cent elderly included meat/fish/egg along with other food items and 8 per cent included fruits along with cereals, pulses and vegetables for dinner. None of the institutionalized group included neither non-vegetarian items or fruits during dinner.

Statistical analysis revealed that the difference in dietary pattern between the institutionalized and non-institutionalized groups was significant at 1 per cent level ($\chi^2 = 44.99^{**}$).

4.2.3 Frequency of use of different food items in three institutions

The frequency of use of different food items by the three institutions is presented in Table 26.

Table 26. Frequency of use of different food items in three institutions

Sl. No.	Details	Institution I	Institution II	Institution III
1	Cereals	Daily	Daily	Daily
2	Pulses	Weekly 4 times	Daily	Daily
3	Green leafy vegetables	Occasionally	Occasionally	Occasionally
4	Roots and tubers	Weekly twice	Occasionally	Weekly twice
5	Other vegetables	Daily	Daily	Daily
6	Fruits	Weekly twice	Weekly once	Weekly once
7	Milk and milk products	Daily	Daily	Daily
8	Egg	Weekly once	Once in 2 weeks	Weekly once
9	Meat	Weekly twice	Once in 2 weeks	Weekly once
10	Fish	Weekly twice	Weekly once	Weekly 3 times
11	Nuts and oil seeds	Daily	Daily	Daily
12	Fats and oils	Daily	Daily	Daily
13	Spices and condiments	Daily	Daily	Daily
14	Sugar	Daily	Daily	Daily

All the three institutions used cereals, other vegetables, milk, nuts and oil seeds, fat and oils, spices and condiments and sugar daily.

Green leafy vegetables were used occasionally in all the three institutions while they used fruits once or twice in a week. The frequency of use of flesh food items like meat, fish and egg was also found to be once or twice in a week.

4.2.4 Frequency of use of various foods in non-institutionalized group

The details of frequency of use of various food items by the non-institutionalized groups are presented in Table 27.

The table reveals that all families used cereals, other vegetables, nuts and oil seeds, fats and oils, spices and condiments and sugar in their daily diet.

About 40 per cent families used pulses four times in a week whereas 37.33 per cent families used pulses daily and the rest (22.67%) of the families included pulses less than 4 times in a week.

Green leafy vegetables was used occasionally by 56 per cent families and 10.67 per cent families never used green leafy vegetables in their daily diet.

Roots and tubers were used once in a week by 37.33 per cent families whereas 24 per cent families used these items occasionally. About 38.67 per cent of families used roots and tubers either twice or thrice in a week.

Only 10.67 per cent used fruits in their daily diet while rest of the families included fruits in their diet in a weekly basis and 12 per cent used them occasionally.

Majority of the families (94.67%) used milk and milk products daily.

Table 27. Frequency of use of various foods (Non-institutionalized group)

Food items	Daily	Weekly four times	Weekly thrice	Weekly twice	Weekly once	Occasionally	Never	Total
Cereals	75 (100)	-	-	-	-	-	-	75 (100)
Pulses	28 (37.33)	30 (40.00)	9 (12.00)	6 (8.00)	2 (2.67)	-	-	75 (100)
Green leafy vegetables	-	-	-	4 (5.33)	21 (28.00)	42 (56.00)	8 (10.67)	75 (100)
Roots and tubers	-	-	15 (20.00)	14 (18.67)	28 (37.33)	18 (24.00)	-	75 (100)
Other vegetables	75 (100)	-	-	-	-	-	-	75 (100)
Fruits	8 (10.67)	14 (18.67)	22 (29.33)	13 (17.33)	9 (12.00)	9 (12.00)	-	75 (100)
Milk & milk products	71 (94.67)	3 (4.00)	-	1 (1.33)	-	-	-	75 (100)
Egg	6 (8.00)	-	2 (2.67)	14 (18.67)	23 (30.66)	21 (28.00)	9 (12.00)	75 (100)
Meat	-	-	1 (1.33)	2 (2.67)	24 (32.00)	33 (44.00)	15 (20.00)	75 (100)
Fish	8 (10.67)	18 (24.00)	17 (22.67)	9 (12.00)	4 (5.33)	5 (6.66)	14 (18.67)	75 (100)
Nuts and oil seeds	75 (100)	-	-	-	-	-	-	75 (100)
Fats and oils	75 (100)	-	-	-	-	-	-	75 (100)
Spices and condiments	75 (100)	-	-	-	-	-	-	75 (100)
Sugar	75 (100)	-	-	-	-	-	-	75 (100)

Number in parenthesis are percentage

Eggs were used by 28 per cent of families occasionally while 31 per cent used eggs once in a week and 8 per cent used them daily.

About 44 per cent included meat in their diet occasionally while 32 per cent used once in a week. Nearly 20 per cent of the families never included meat in their diet.

About 24 per cent used fish four times in a week and 18.67 per cent families never used fish in their diet.

The frequency of use of different food items among the selected families was assessed by the formula suggested by Reaburn *et al.* (1979) and percentage score is presented in Table 28.

Table 28. Frequency score (%) on different food items (Non-institutionalized group)

Food items	Scores (%)
Cereals	100.00
Pulses	83.55
Green leafy vegetables	21.33
Roots and tubers	39.11
Other vegetables	100.00
Fruits	67.56
Milk and Milk products	98.67
Egg	30.01
Meat	20.22
Fish	54.67
Nuts and oil seeds	100.00
Fats and oils	100.00
Spices and condiments	100.00
Sugar	100.00

The results indicated that a maximum score of 100 per cent was obtained for food items like cereals, other vegetables, nuts and oil seeds, fats and oils, sugar and spices and condiments.

Based on the percentage frequency scores obtained for different food items the foods were classified into 3 groups viz., most frequently used (score above 75%), medium frequently used (score 50-75%) and less frequently used (score below 50%) food stuffs and the results are given in Table 29.

Table 29. Frequency of use of food items (non-institutionalized group)

Frequency of use	Food items
Most frequently used	Cereals, pulses, other vegetables, milk and milk products, nuts and oil seeds, fats and oils, sugar and spices and condiments
Medium frequently used	Fruits, fish
Less frequently used	Green leafy vegetables, roots and tubers, egg and meat

The results showed that the most frequently used foods were cereals, pulses, other vegetables, milk and milk products, nuts and oil seeds, fats and oils, sugar and spices, and condiments and medium frequently used foods were fruits and fish and less frequently used were green leafy vegetables, roots and tubers, egg and meat.

4.2.5 Details of maintaining accounts for food expenditure (Non-institutionalized group)

Details of maintaining accounts of food expenditure of non-institutionalized group are given in Table 30.

Table 30. Details of maintaining accounts for food expenditure
(Non-institutionalized group)

Details	Number
Maintaining accounts	
Yes	13 (17.33)
No	62 (82.67)
Total	75 (100)
Form	
Written	13 (100)
Frequency	
Weekly	2 (15.38)
Monthly	11 (84.62)
Total	13 (100)

Number in parenthesis are percentage

Majority of the families (82.67%) did not maintain accounts for food expenditure. Rest of the families (17.33%) who maintained accounts kept written accounts on a monthly (84.62%) or weekly (15.38%) basis.

4.2.6 Meal pattern adopted by the families

Table 31 furnishes the details on meal planning, basis for planning, number of meals per day, time schedule for food intake, decision taken on the restriction of menu, meals taken with other members and details of food included and avoided.

It can be seen that advance meal planning was done only by 25.33 per cent of the families in the non-institutionalized group and was based on the availability of food (47.37%), availability of money (42.10%) and likes and dislikes of family members (10.53%).

Table 31. Details of meal pattern adopted by families (Non-institutionalized group)

Details	Number
Advance meal planning	
Yes	19 (25.33)
No	56 (74.67)
Total	75 (100)
Basis for planning	
Food availability	9 (47.37)
Money availability	8 (42.10)
Likes and dislikes of family members	2 (10.53)
Total	19 (100)
Number of meal/day	
2	28 (37.33)
3	47 (62.67)
Total	75 (100)
Time schedule for food intake	
Kept proper time	22 (29.33)
No proper time	53 (70.67)
Total	75 (100)
Menu decided by	
Spouse	17 (22.67)
Daughter	7 (9.33)
Self	18(24.00)
Daughter-in-law	33 (44.00)
Total	75 (100)
Meals taken along with other members	35 (46.67)
Meals taken alone	40 (53.33)
Total	75 (100)
Restriction in intake of food items	16 (21.33)
No restriction	59 (78.67
Total	75 (100)
Completely avoiding any food items	
Avoided some foods	22 (29.33)
Not avoided	53 (70.67)
Total	75 (100)

Number in parenthesis are percentage

About 37.33 per cent in non-institutionalized group took two meals per day whereas 62.67 per cent took three meals in a day.

About 29.33 per cent followed a specific time schedule for the intake of food whereas 70.67 per cent did not follow a specific time schedule.

It is seen that the daily family menu was decided either by spouse (22.67%), daughter (9.33%) or by daughter-in-law (44%). In 24 per cent of the families the decision was taken by the elderly itself.

About 47 per cent took their meals along with other members whereas 53.33 per cent took their meals alone.

Majority (78.67%) of the elderly in non-institutionalized group had no restriction in food intake. About 29.33 per cent elderly completely avoided some foods like meat, egg or fish from their diet due to dislike or allergy.

4.2.7 Meal pattern adopted in institutions

It was found that all the three institutions planned their meals in advance mainly on the basis of food availability. All members in institutions took three major meals per day and they had their meals along with other members.

Majority of institutionalized group elderly did not have any restriction in intake of food and majority did not avoid any food stuffs completely from their diet.

4.2.8 Cooking pattern adopted

Details of cooking pattern adopted by the families of non-institutionalized group are presented in Table 32.

Table 32. Details of cooking pattern adopted (Non-institutionalized group)

Details	Number
Number of times cooking is done	
Once	6 (8.00)
Twice	50 (66.67)
Thrice	19 (25.33)
Total	75 (100)
Cooking device used	
LPG alone	24 (32.00)
LPG and kerosene	10 (13.33)
LPG and wood	16 (21.33)
Wood alone	25 (33.34)
Total	75 (100)
Intake of raw food	
Raw food consumed	14 (18.67)
Do not consume	61 (82.33)
Total	75 (100)
Use of boiled water	
Used boiled water	63 (84.00)
Used water without boiling	12 (16.00)
Total	75 (100)

Number in parenthesis are percentage

About 67 per cent of the families cooked their meals twice a day while 25 per cent families cooked three times and the rest (8%) cooked only once in a day.

About 33 per cent and 32 per cent families used wood and LPG respectively as the source of fuel for cooking while 21 per cent of the families used both LPG and wood and the rest used LPG and kerosene for this purpose.

Raw foods like carrot, tomato and onion were used by 18.67 per cent of the elderly in non-institutionalized group. About 84 per cent elderly used boiled water for drinking.

In the case of institutionalized group their meals were cooked thrice in a day. The cooking device used in different institutions were LPG and wood. In all the three institutions they used boiled water for drinking while none of the institutions included raw foods in their daily diet.

4.2.9 Purchase of processed and prepared foods (Non-institutionalized group)

Table 33 contains the details of purchase of processed and prepared foods.

About 72 per cent families purchased processed foods from the market and 28 per cent prepared them at home. Among those who purchased the processed foods, the purchase was done on a monthly basis (59.26%), or weekly basis (16.67%) while 24.07 per cent purchased them occasionally.

In the case of purchase of prepared foods 85.33 per cent purchased prepared foods and among them 59.38 per cent purchased them from bakery and

Table 33. Details on purchase of processed and prepared foods
(Non-institutionalized group)

Details	Number
Purchased of processed foods	
Purchased processed foods	54 (72.00)
Do not purchase	21 (28.00)
Total	75 (100)
Frequency of purchase	
Weekly	9 (16.67)
Monthly	32 (59.26)
Occasionally	13 (24.07)
Total	54 (100)
Purchase of prepared foods	
Purchased prepared foods	64 (85.33)
Do not purchase	11 (14.67)
Total	75 (100)
Frequency of purchase	
Weekly	5 (7.81)
Monthly	22 (34.38)
Occasionally	37 (57.81)
Total	64 (100)
Type of food	
Vegetarian	53 (82.81)
Vegetarian and non vegetarian	11 (17.19)
Total	64 (100)
Purchased from	
Hotel	12 (18.75)
Bakery	38 (59.38)
Super market	14 (21.87)
Total	64 (100)

Number in parenthesis are percentage

the rest from hotels or super markets. Most of the families purchased the prepared foods occasionally.

About 82 per cent of the families purchased vegetarian food items and the rest purchased both vegetarian and non-vegetarian foods.

In the institutions where the elderly are residing, the purchase of processed and prepared food items was made occasionally only by two institutions while the third institution never purchased these items.

4.2.10 Foods prepared during special conditions

The details of foods prepared during special conditions are given in Table 34.

Table 34. Details of foods prepared during special conditions

Details	Institutionalized group	Non-institutionalized group
Birthday		
Special foods	-	24 (32.00)
No special foods	75 (100)	51 (68.00)
Other festive occasions		
Special foods	75 (100)	75 (100)
Diseased conditions		
Modified diet	75 (100)	75 (100)

Number in parenthesis are percentage

Majority of the families (68%) did not prepare any special food items for birthdays while 32 per cent families prepared special foods like payasam for birthdays.

All the families in the non-institutionalized group and the institutionalized group prepared special foods during festive occasions and during illness their diet was modified to suit the diseased conditions.

4.2.11 Details of intake of nutrient supplements

Table 35 shows the details of intake of nutrient supplements by the elderly.

Table 35. Details of intake of nutrients supplements

Details	Institutionalized group	Non-institutionalized group
Used to take nutrient supplements	6 (8.00)	7 (9.33)
Do not take	69 (92.00)	68 (90.67)
Total	75 (100)	75 (100)
Type		
Allopathy	2 (33.33)	3 (42.86)
Ayurveda	4 (66.67)	4 (57.14)
Total ($\chi^2 = 0.09^{NS}$)	6 (100)	7 (100)

Number in parenthesis are percentage
NS – Not significant

About 8 per cent institutionalized and nine per cent non-institutionalized elderly were taking nutrient supplements in the form of tablets or tonics. Majority of the elderly in both groups were not taking any nutrient supplements.

Among those who took nutrient supplements 33 per cent institutionalized and 43 per cent non-institutionalized elderly were taking allopathic supplements while the rest were taking some ayurvedic supplements.

The chi square test revealed that the type and intake of nutrient supplements by the elderly are not related to the fact that whether they are institutionalized or non-institutionalized ($\chi^2 = 0.09$).

4.3 Nutritional status of elderly

4.3.1 Anthropometric measurements of elderly

Anthropometric measurements namely weight, crown heel length(height), mid upper arm circumference (MUAC), hip circumference and waist circumference of institutionalized and non-institutionalized elderly were assessed and compared with the NNMB standards suggested by Brahman (1999). The results are furnished in Tables 36 to 40.

4.3.1.1 Weight

The mean weight of the male and female elderly were compared with the Indian standards and is given in Table 36.

The weight of the elderly male aged 60-69 years residing in the institutions varied from 36 kg to 70 kg with a mean weight of 51.64 kg. In the case of females the weight varied from 32 to 63 kg with a mean weight of 48.52 kg.

The weight of elderly aged above 70 years varied from 33 to 64 kg in males and 30 to 68 kg in females. The mean weight was found to be 47.71 kg and 43.98 kg respectively.

In non-institutionalized group (60-69 yrs) the weight of the respondents varied from 40 to 75 kg in males and 32 to 80 kg in females with a mean weight of 58.53 kg and 48.83 kg respectively. Among elderly above 70 years the weight

Table 36. Comparison of the mean weight of elderly with NNMB standards

Group	Sample size		Mean weight (kg)		NNMB standard (kg)		Deviation from Standard (kg)		t value	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Institutionalized group										
60-69 years	11	23	51.64±10.22	48.52±10.98	49.3	41.9	+2.34	+6.62	0.7592^{NS}	1.0227^{NS}
≥ 70 years	14	27	47.71±8.95	43.98±8.91	47.3	39.9	+0.41	+4.08	0.1715^{NS}	2.3638*
Non-institutionalized group										
60-69 years	15	29	58.53±9.67	48.83±10.39	49.3	41.9	+9.23	+6.93	3.7188**	3.5925**
≥ 70 years	13	18	54.85±12.86	50.06±10.47	47.3	39.9	+7.55	+10.16	2.1172*	4.1184**

* Significant at 5 per cent level
** Significant at 1 per cent level
NS - Not significant

varied from 39 to 77 kg with a mean weight of 54.85 kg in males and 37 to 75 kg with a mean weight of 50.06 kg in females.

When the weight of elderly was compared with the standard weight it was found that among the institutionalized and non-institutionalized elderly male the weight was higher than the standard weight in both age groups and this increase was found to be statistically significant only in the non-institutionalized group.

Among females also the weight was found to be higher than the standards in both institutionalized and non-institutionalized elderly. The increase was statistically significant in both age groups among non-institutionalized elderly and above 70 years among institutionalized elderly.

The difference in weight between the institutionalized and non-institutionalized male was not statistically significant in both age groups. For females the difference in weight between the institutionalized and non-institutionalized groups was statistically significant (at 5% level) only in the age group of above 70 years. The mean weights of elderly male and female are illustrated in Fig. 1 and 2.

4.3.1.2 Crown-heel length (height)

The mean height of institutionalized and non-institutionalized elderly were compared with NNMB standards reported by Brahman (1999) and the results are given in Table 37.

Among institutionalized group the height of elderly between 60-69 years of age varied from 150 to 170 cm in males and 128 to 160 cm in females with a mean height of 160.82 cm and 147.52 cm respectively. In the case of elderly

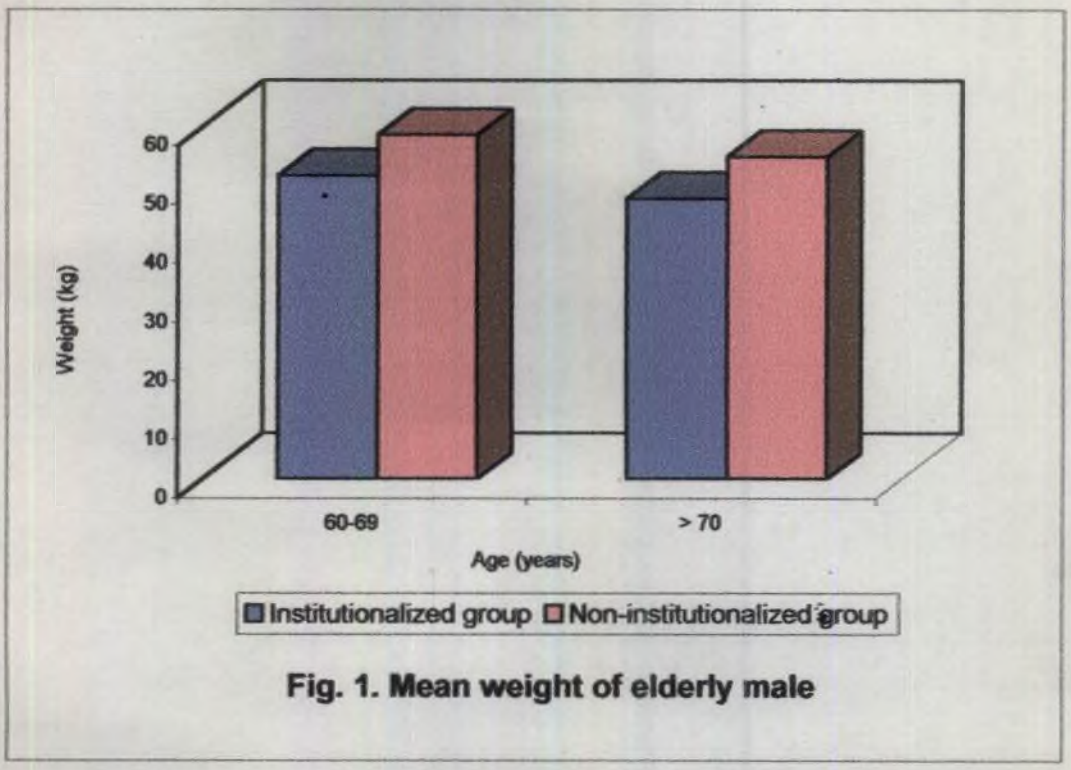


Fig. 1. Mean weight of elderly male

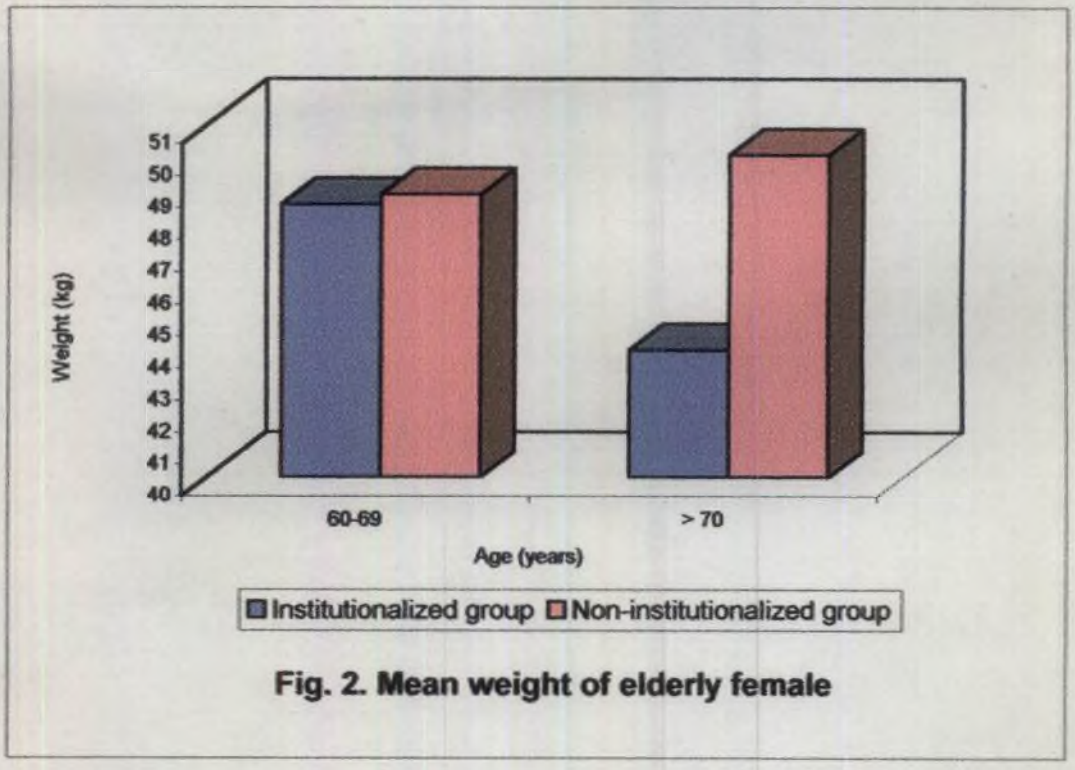


Fig. 2. Mean weight of elderly female

Table 37. Comparison of the mean height of elderly with NNMB standards

Group	Sample size		Mean height (cm)		NNMB standard (cm)		Deviation from Standard (cm)		t value	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Institutionalized group										
60-69 years	11	23	160.82±7.40	147.52±6.20	161.3	147.9	-0.48	-0.38	0.2152 ^{NS}	0.2939 ^{NS}
≥ 70 years	14	27	159.14±4.13	146.07±7.25	159.8	146.0	-0.66	+0.07	0.5973 ^{NS}	0.05018 ^{NS}
Non-institutionalized group										
60-69 years	15	29	162.97±5.96	151.15±8.46	161.3	147.9	+1.67	+3.25	1.0851 ^{NS}	2.0687*
≥ 70 years	13	18	162.00±12.97	152.25±7.39	159.8	146.0	+2.20	+6.25	0.6115 ^{NS}	3.5858**

* Significant at 5 per cent level
** Significant at 1 per cent level
NS - Not significant

above 70 years of age the height varied from 153 to 166 cm in males and 130.5 to 166 cm in females with a mean height of 159.14 cm and 146.07 cm respectively.

The height of the elderly male and female in non-institutionalized group varied from 152 to 172 cm and 141 to 181 cm respectively in 60-69 years of age with a mean height of 162.97 cm and 151.15 cm respectively. In the elderly above 70 years of age the height varied from 150.5 to 185 cm in male and 141 to 167 cm in female with a mean height of 162.00 and 152.25 cm respectively.

The mean height of elderly was compared with the NNMB standards and the mean height of institutionalized elderly was found to be lower than the standards among males and females of both age groups except in the case of females aged above 70 years. But the deviations from the standards were not significant statistically.

In the case of non-institutionalized elderly the mean height was found to be higher than the standards in both sexes and age groups but the difference in height was found to be statistically significant only in the case of females.

The difference in height between the institutionalized and non-institutionalized elderly was not significant among males of both age groups while in the case of females above 70 years the difference was found to be statistically significant.

The mean heights of elderly male and female are illustrated in Fig.3 and 4.

4.3.1.3 Body mass Index

To assess the chronic energy deficiency among elderly, body mass index was calculated as suggested by James *et al.* (1988).

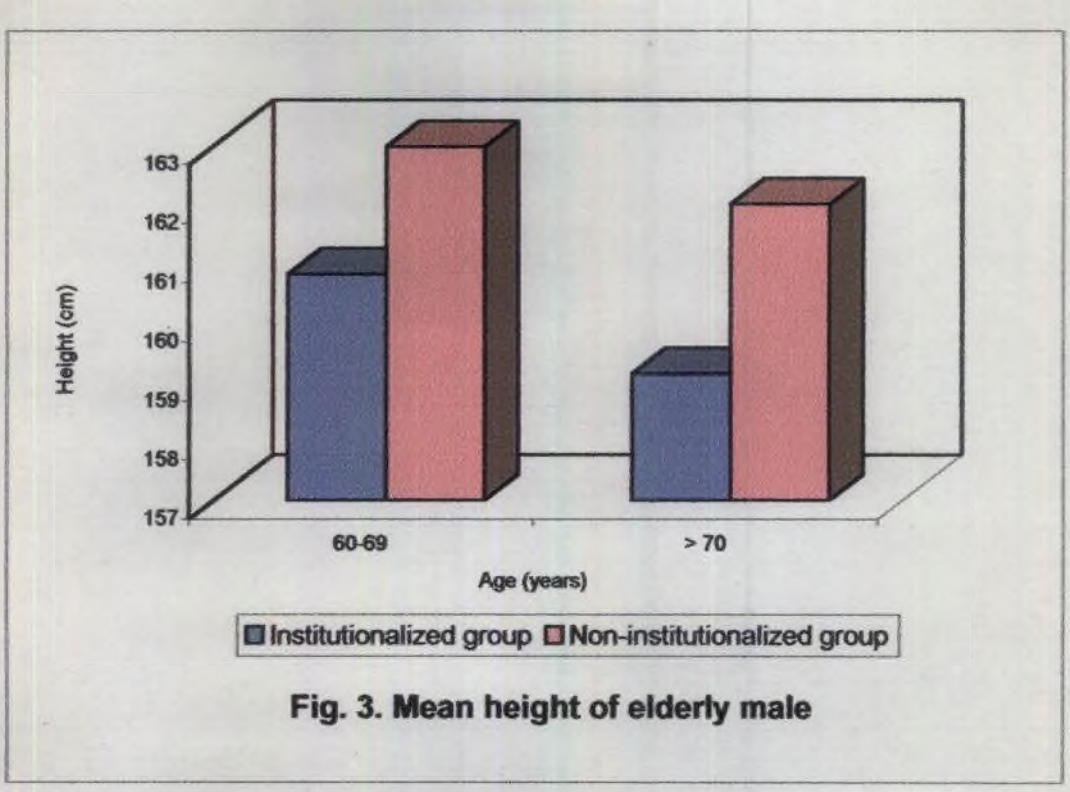


Fig. 3. Mean height of elderly male

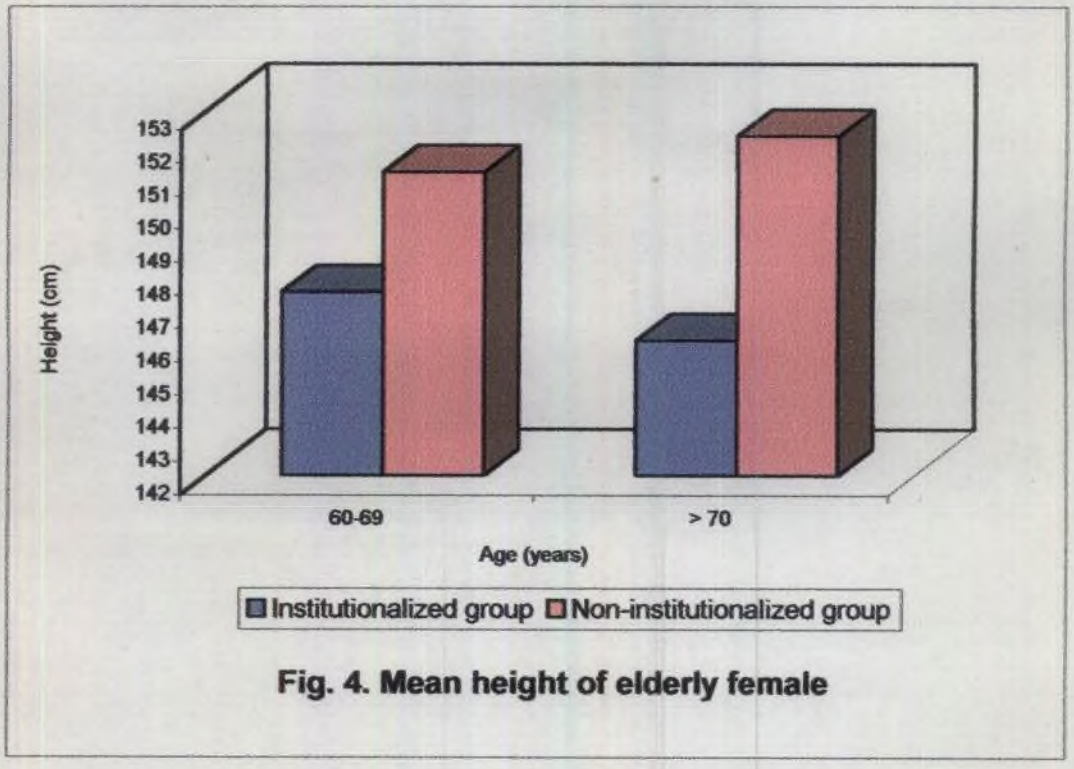


Fig. 4. Mean height of elderly female

Table 38. Distribution of elderly on the basis of BMI

BMI	Institutionalized group			Non-institutionalized group		
	Male	Female	Total	Male	Female	Total
< 16.0 (Grade III CED)	5 (20.00)	3 (6.00)	8 (10.67)	2 (7.14)	3 (6.38)	5 (6.67)
16-17.0 (Grade II CED)	1 (4.00)	6 (12.00)	7 (9.33)	1 (3.57)	1 (2.13)	2 (2.66)
17.0-18.5 (Grade I CED)	3 (12.00)	4 (8.00)	7 (9.33)	3 (10.71)	8 (17.02)	11 (14.67)
18.5-20.0 (Low-normal)	5 (20.00)	6 (12.00)	11 (14.67)	3 (10.71)	3 (6.38)	6 (8.00)
20.0-25.0 (Normal)	10 (40.00)	24 (48.00)	34 (45.34)	14 (50.00)	27 (57.45)	41 (54.67)
25.0-30.0 (Over weight)	1 (4.00)	6 (12.00)	7 (9.33)	5 (17.87)	5 (10.64)	10 (13.33)
≥ 30 (Obesity)	-	1 (2.00)	1 (1.33)	-	-	-
Total ($\chi^2 = 7.005^{NS}$)	25 (100)	50 (100)	75 (100)	28 (100)	47 (100)	75 (100)

Number in parenthesis are percentage
NS – Not significant

The results (Table 38) revealed that only 45.34 per cent elderly in institutionalized group and 54.67 per cent in non-institutionalized group were normal with BMI between 20 to 25 while the rest belonged to either different grades of chronic energy deficiency or obese. Obese elderly were found among 10.66 per cent in institutionalized group and 13.33 per cent in non-institutionalized group.

Among male and female elderly in institutionalized group only 40 per cent and 48 per cent respectively were found to be having normal nutritional status while in the non-institutionalized group it was found to be 50 per cent among male and 57.45 per cent among females.

The difference in body mass index between institutionalized and non-institutionalized elderly was not significant. Fig. 5 indicates the percentage distribution of elderly in institutionalized and non-institutionalized groups on the basis of BMI.

4.3.1.4 Mid-upper arm circumference

The mean mid upper arm circumference of institutionalized and non-institutionalized elderly and their comparison with the NNMB standards given by Brahman (1999) are given in Table 39.

The mid upper arm circumference of institutionalized elderly varied from 21 cm to 26 cm in male and 21 cm to 28 cm in females with a mean MUAC of 24.14 cm and 24.65 cm respectively in 60-69 years of age. The MUAC of elderly above 70 years of age varied from 20 cm to 30 cm in male and 19 cm to 28 cm in females with a mean MUAC of 23.71 cm and 24.07 cm respectively.

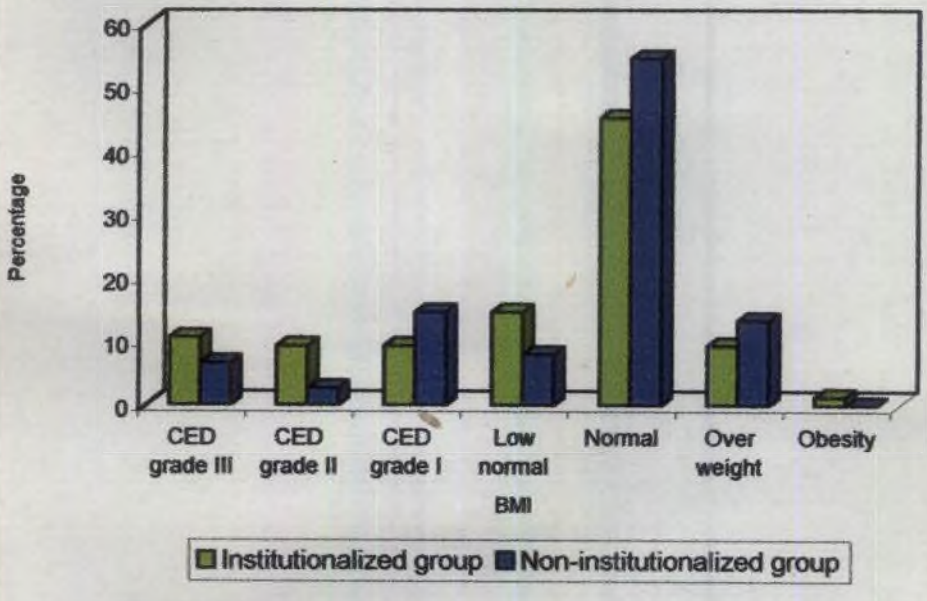


Fig. 5. Percentage distribution of elderly on the basis of BMI

Table 39. Comparison of the mean mid upper arm circumference of elderly with NNMB standards

Group	Sample size		Mean MUAC (cm)		NNMB standards (cm)		Deviation from Standard		't' value	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Institutionalized group										
60-69 years	11	23	24.14±1.36	24.65±2.13	23.0	22.2	+1.14	+2.45	2.7737*	.5056**
≥ 70 years	14	27	23.71±2.37	24.07±3.10	22.1	21.5	+1.61	+2.57	2.5475*	.3049**
Non-institutionalized group										
60-69 years	15	29	25.53±2.26	25.29±3.90	23.0	22.2	+2.53	+3.09	.3471*	.2621**
≥ 70 years	13	18	25.77±3.08	25.28±3.59	22.1	21.5	+3.67	+3.78	.3015*	.4734**

* Significant at 5 per cent level
** Significant at 1 per cent level
NS - Not significant

Among non-institutionalized elderly (60-69 years), the MUAC varied from 21 cm to 30 cm in males and 21 cm to 34 cm in females with a mean MUAC of 25.53 cm and 25.29 cm. In elderly above 70 years of age the MUAC varied from 17 cm to 30 cm in male and 21 to 31 cm in females with a mean MUAC of 25.77 cm and 25.28 cm respectively.

When compared with NNMB standards it was found that the mean MUAC of both institutionalized and non-institutionalized male and female elderly were higher than the standards and this difference was found to be statistically significant.

The difference in MUAC between the institutionalized and non-institutionalized male and female elderly was not statistically significant.

The mean mid upper arm circumference of elderly male and female is illustrated in Fig.6 and 7.

4.3.1.5 Waist to hip ratio

The waist to hip ratio of elderly was calculated and the results (Table 40) indicated that 80 per cent of male and 88 per cent of female in the institutionalized group were having upper body obesity with the ratio of above 0.95 among male and above 0.85 in females. In the non-institutionalized group upper body obesity was observed only among 46.43 per cent of male and 74.47 per cent of females.

The rest of the elderly in both groups did not have any upper body obesity.

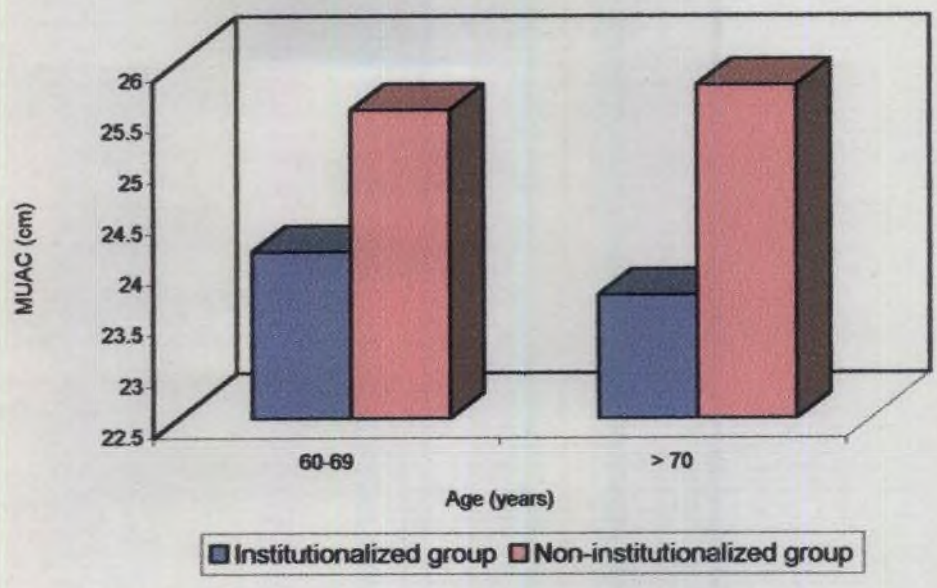


Fig. 6. Mean mid-upper arm circumference of elderly male

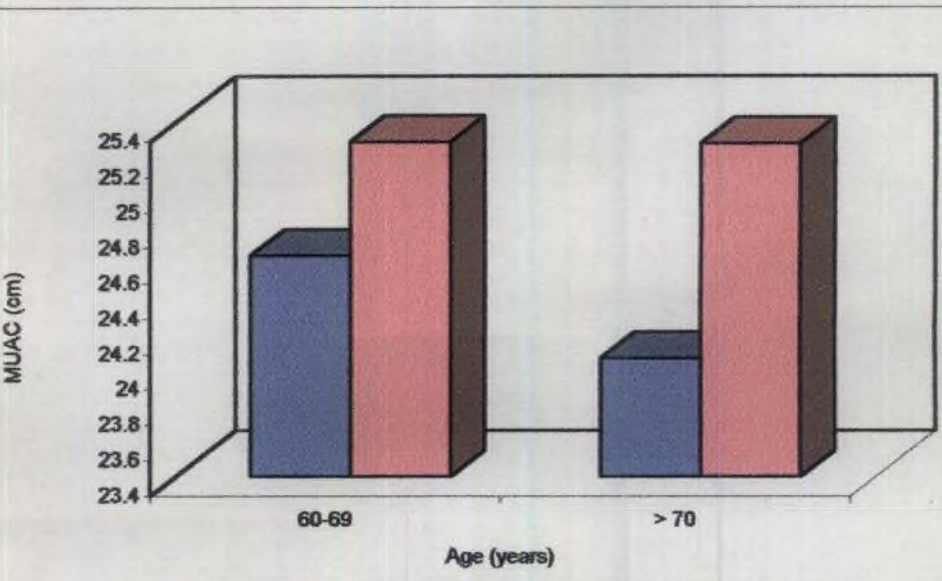


Fig. 7. Mean mid-upper arm circumference of elderly female

Table 40. Distribution of elderly on the basis of waist/hip ratio

Waist/hip ratio	Institutionalized group	Non-institutionalized
Male		
≥ 0.95 (Upper body obesity)	20 (80.00)	13 (46.43)
< 0.95	5 (20.00)	15 (53.57)
Total	25 (100)	28 (100)
Female		
≥ 0.85 (Upper body obesity)	44 (88.00)	35 (74.47)
< 0.85	6 (12.00)	12 (25.53)
Total ($\chi^2 = 4.987$*)	50 (100)	47 (100)

Number in parenthesis are percentage
* - Significant at 5% level

The waist to hip ratio of institutionalized and non-institutionalized elderly male were compared statistically and the difference was found to be significant at 5 per cent level. However, the difference in the ratio between institutionalized and non-institutionalized female elderly was statistically insignificant.

4.3.2 Clinical assessment

Incidence of clinical signs and symptoms observed among the institutionalized and non-institutionalized elderly are presented in Table 41. Majority of the elderly in both institutionalized (66.67%) and non-institutionalized (86.67%) groups were found to be healthy.

Xerophthalmia was present only in a minority of elderly (13.33%) in both groups but majority of elderly in institutionalized (93.33%) and non-institutionalized (87.67%) groups had visual disturbance mainly due to cataract.

The appearance of tongue was normal in 80 per cent of institutionalized elderly and 100 per cent of non institutionalized elderly while 6.66 per cent of the subjects in the institutionalized category had glossitis and the rest showed red, glazed, atrophic or fissured tongue.

Toothlessness was observed among 80 per cent and 60 per cent of institutionalized and non-institutionalized elderly respectively whereas difficulty in chewing was present only in 60 per cent and 46.67 per cent elderly in the two groups respectively.

Fluorosis was present only in 20 per cent elderly in institutionalized group while none of the subjects in the non institutionalized group had fluorosis. Dental caries was seen among 40 per cent institutionalized and 6.67 per cent of non-institutionalized subjects.

About 13 per cent of elderly in both groups had symptoms like hair loss and sparseness of hair.

The appearance of nail was found to be brittle in majority of elderly in institutionalized (93.33%) and non-institutionalized (80%) groups while thickening of nails was seen only in 13.33 per cent of elderly in the institutionalized group.

Skin texture was found to be smooth among 66.66 per cent and 60 per cent of institutionalized and non-institutionalized elderly whereas about 27 per cent and 33 per cent of elderly in the two groups had dry skin.

Among institutionalized group, numbness (6.67%) and pain in joints (20%) were observed only among few subjects whereas in non-institutionalized group these symptoms were present among 26.67 per cent and 66.67 per cent respectively.

Shortness of breath was present in 36.67 per cent and 20 per cent of institutionalized and non-institutionalized elderly respectively.

Symptoms like difficulty in breathing and dyspnoea were present in 26.67 per cent and 20 per cent of institutionalized and non-institutionalized elderly.

Symptoms of anaemia was observed among 40 per cent and 33.33 per cent institutionalized and non-institutionalized elderly. The percentage of anaemic symptoms was seen more among female elderly in institutionalized group while

Table 41. Details of clinical examination

Type of clinical symptoms	Institutionalized group			Non - institutionalized group		
	Male	Female	Total	Male	Female	Total
General appearance						
Healthy	5 (71.43)	5 (62.50)	10 (66.67)	5 (100)	8 (80.00)	13 (86.67)
Unhealthy	2 (28.57)	3 (37.50)	5 (33.33)	-	2 (20.00)	2 (13.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Xerophthalmia						
Present	2 (28.57)	-	2 (13.33)	-	2 (20.00)	2 (13.33)
Absent	5 (71.43)	8 (100)	13 (86.67)	5 (100)	10 (100)	13 (86.67)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Visual disturbance						
Present	6 (85.71)	8 (100)	14 (93.33)	4 (80.00)	9 (90.00)	13 (86.67)
Absent	1 (14.29)	-	1 (6.67)	1 (20.00)	1 (10.00)	2 (13.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Tongue						
Normal	6 (85.71)	6 (75.00)	12 (80.00)	5 (100)	10 (100)	15 (100)
Pale, coated & fissured	1 (14.29)	-	1 (6.67)	-	-	-
Red, glazed & atrophic	-	1 (12.50)	1 (6.67)	-	-	-
Glossitis	-	1 (12.50)	1 (6.66)	-	-	-
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Contd.

Table 41. Continued

Type of clinical symptoms	Institutionalized group			Non - institutionalized group		
	Male	Female	Total	Male	Female	Total
Toothlessness						
Present	7 (100)	5 (62.50)	12 (80.00)	3 (60.00)	6 (60.00)	9 (60.00)
Absent	-	3 (37.50)	3 (20.00)	2 (40.00)	4 (40.00)	6 (40.00)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Difficulty in chewing						
Present	6 (85.71)	3 (37.50)	9 (60.00)	3 (60.00)	4 (40.00)	7 (46.67)
Absent	1 (14.29)	5 (62.50)	6 (40.00)	2 (40.00)	6 (60.00)	8 (53.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Fluorosis						
Present	2 (28.57)	1 (12.50)	3 (20.00)	-	-	-
Absent	5 (71.43)	7 (87.50)	12 (80.00)	5 (100)	10 (100)	15 (100)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Dental Carries						
Present	4 (57.14)	2 (25.00)	6 (40.00)	-	1 (10.00)	1 (6.67)
Absent	3 (42.86)	6 (75.00)	9 (60.00)	5 (100)	9 (90.00)	14 (93.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Hair loss & sparseness of hair						
Present	-	2 (25.00)	2 (13.33)	1 (20.00)	1 (10.00)	2 (13.33)
Absent	7 (100)	6 (75.00)	13 (86.67)	4 (80.00)	9 (90.00)	13 (86.67)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Contd.

Table 41. Continued

Type of clinical symptoms	Institutionalized group			Non - institutionalized group		
	Male	Female	Total	Male	Female	Total
Nail Appearances						
Brittle	7 (100)	7 (87.50)	14 (93.33)	5 (100)	7 (70.00)	12 (80.00)
Flattened	-	1 (12.50)	1 (6.67)	-	3 (30.00)	3 (20.00)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Thickening of nails						
Present	2 (28.57)	-	2 (13.33)	-	-	-
Absent	5 (71.43)	8 (100)	13 (86.67)	5 (100)	10 (100)	15 (100)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Skin texture						
Dry	2 (28.57)	2 (25.00)	4 (26.67)	2 (40)	3 (30.00)	5 (33.33)
Oily	-	1 (12.50)	4 (6.67)	-	1 (10.00)	1 (6.67)
Smooth	5 (71.43)	5 (62.50)	10 (66.66)	3 (60.00)	6 (60.00)	9 (60.00)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Numbness						
Present	-	1 (12.5)	1 (6.67)	1 (20.00)	3 (30.00)	4 (26.67)
Absent	7 (100)	7 (87.50)	14 (93.33)	4 (80.00)	7 (70.00)	11 (73.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Contd.

Table 41. Continued

Type of clinical symptoms	Institutionalized group			Non - institutionalized group		
	Male	Female	Total	Male	Female	Total
Pain in joints						
Present	1 (14.29)	2 (25.00)	3 (20.00)	2 (40.00)	8 (80.00)	10 (66.67)
Absent	6 (85.71)	6 (75.00)	12 (80.00)	3 (60.00)	2 (20.00)	5 (33.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Shortness of breath						
Present	2 (28.57)	2 (25.00)	4 (36.67)	1 (20.00)	2 (20.00)	3 (20.00)
Absent	5 (71.43)	6 (75.00)	11 (73.33)	4 (80.00)	8 (80.00)	12 (80.00)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Difficulty in breathing & dyspnoea						
Present	2 (28.57)	2 (25.00)	4 (26.67)	1 (20.00)	1 (10.00)	2 (20.00)
Absent	5 (71.43)	6 (75.00)	11 (73.33)	4 (80.00)	9 (90.00)	13 (80.00)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Anaemia						
Present	2 (28.57)	4 (50.00)	6 (40.00)	3 (60.00)	2 (20.00)	5 (33.33)
Absent	5 (71.43)	4 (50.00)	9 (60.00)	2 (40.00)	8 (80.00)	10 (66.67)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Contd.

Table 41. Continued

Type of clinical symptoms	Institutionalized group			Non - institutionalized group		
	Male	Female	Total	Male	Female	Total
Hearing problem						
Present	2 (28.57)	2 (25.00)	4 (26.67)	3 (60.00)	3 (30.00)	6 (40.00)
Absent	5 (71.43)	6 (75.00)	11 (73.33)	2 (40.00)	7 (70.00)	9 (60.00)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Varicose vein						
Present	-	-	-	-	1 (10.00)	1 (6.67)
Absent	7 (100)	8 (100)	15 (100)	5 (100)	9 (90.00)	14 (93.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)
Oedema in legs						
Present	-	1 (12.50)	1 (6.67)	-	1 (10.00)	1 (6.67)
Absent	7 (100)	7 (87.50)	14 (93.33)	5 (100)	9 (90.00)	14 (93.33)
Total	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Number in parenthesis are percentage
NS - Not significant

among non-institutionalized higher percentage of male elderly showed the clinical symptoms of anaemia.

About 27 per cent and 40 per cent elderly in institutionalized and non-institutionalized groups had difficulty in hearing.

Other symptoms like varicose vein and oedema in legs were found only among very few subjects. The difference in clinical symptoms between the institutionalized and non-institutionalized groups (except clinical symptoms in tongue and pain in joints) were not statistically significant.

4.3.3 Food and nutrient intake

A one day food weighment survey was conducted among the subsample of non-institutionalized group to determine their actual food intake and to compute the nutrient intake. Among the institutionalized group food list method was employed to assess their actual food and nutrient intake. The actual food and nutrient intake of the two groups were compared with the quantity specified for a balanced diet of elderly as suggested by Pasricha and Thimmayamma (1992).

4.3.3.1 Actual Food Intake

The mean food intake of the two groups in comparison with the RDA for a balanced diet is presented in Table 42.

It was found that among institutionalized elderly the intake of all foods except pulses was lower than the recommended levels for males. Among females the intake of pulses, cereals and flesh foods was found to be higher than the RDA. The intake of food items like other vegetables, green leafy vegetables, roots and tubers, fruits, milk and milk products and fats and oils was found to be far below

Table 42. Mean food intake of elderly (g)

Food items	RDA (g/day)		Institutionalized				Non - Institutionalized			
	Male	Female	Male (n=7)	Percentage of RDA	Female (n=8)	Percentage of RDA	Male (n=5)	Percentage of RDA	Female (n=10)	Percentage of RDA
Cereals	350	255	303	86.57	305	119.60	335	95.7	256	100.39
Pulses	25	20	43	172	35	175	32	128	21	105
Other vegetables	200	150	44	22	33	22	33	16.5	22	14.6
Green leafy vegetables	50	50	14	28	17	34	16	32	-	-
Roots and tubers	100	100	41	41	33	33	25	25	26	26
Fruits	200	200	39	19.5	25	12.5	16	8	15	7.5
Milk and milk products	300	300	25	8.33	63	21	88	29.3	97	32.3
Sugars and jaggery	20	20	18	90	10	50	20	100	22	110
Fats and oils	25	20	10	40	10	50	22	88	22	110
Flesh foods	30	30	29	96.67	37	123.33	40	133.3	37	123.3

n – Sample size

the recommended allowances among male and female subjects. About 50 per cent of the requirements were met for sugar and jaggery and fats and oils by the females while among males 90 per cent and 40 per cent of the requirements were met for these two food items.

In the non-institutionalized group the intake of pulses and flesh foods was found to be higher than the RDA among males, while among females the intake of cereals, pulses, sugar and jaggery, fats and oils and flesh foods was found to be higher than the RDA. Other vegetables, roots and tubers, fruits, milk and milk products were included in the diet of males and females to meet 7.5 to 32.3 per cent of RDA. Green leafy vegetables were not at all induced in the diet of female elderly in the non-institutionalized group.

The difference in the mean intake of all food items except sugar and jaggery was found to be statistically insignificant between the institutionalized and non-institutionalized groups.

The percentage of food intake of institutionalized and non-institutionalized male and female elderly in comparison with the recommended balanced diet is presented in Fig. 8 and 9.

4.3.3.2 Actual nutrient intake

The nutrients present in the diet of elderly in the institutionalized and non-institutionalized groups were calculated to find out the quality of the foods consumed using the food composition table (Gopalan *et al.*, 1989). The results were compared with the RDA of nutrients suggested for elderly by Pasricha and

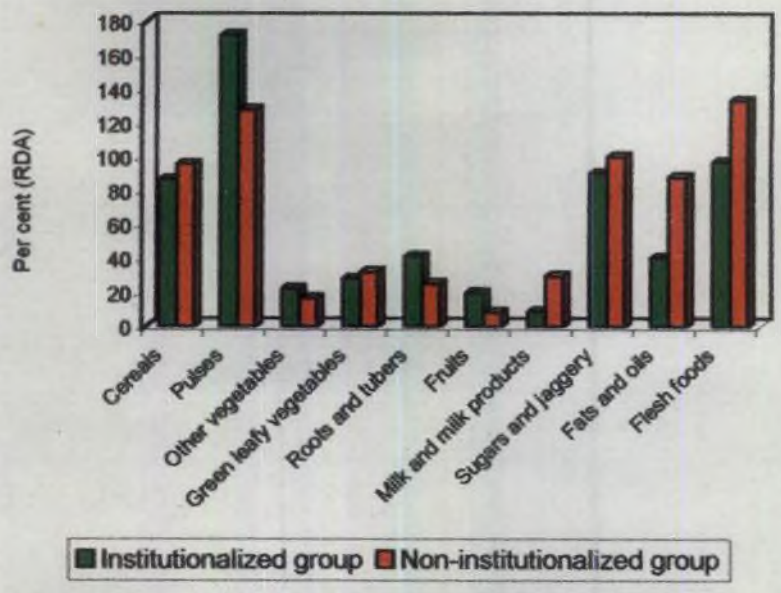


Fig. 8. Comparison of food intake of elderly male (Percentage of RDA)

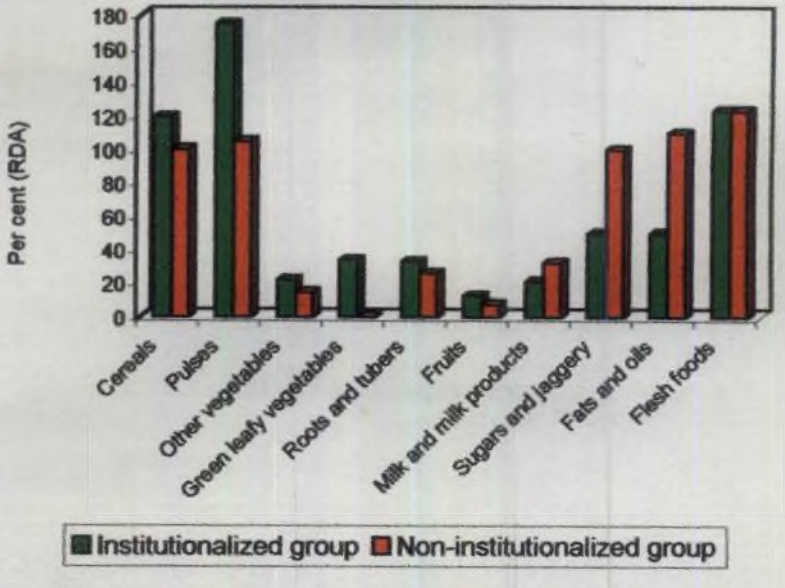


Fig. 9. Comparison of food intake of elderly female (Percentage of RDA)

Table 43. The mean nutrient intake of elderly

Nutrients	RDA		Institutionalized				Non–Institutionalized			
	Male	Female	Male (n=7)	Percentage of RDA	Female (n=8)	Percentage of RDA	Male (n=5)	Percentage of RDA	Female (n=10)	Percentage of RDA
Energy (Kcal)	2200	1700	1487	67.59	1439	84.65	1731	78.68	1412	83.00
Proteins (gm)	65	50	36.17	55.65	38	76	42	64.62	33	66
Fat (gm)	50	40	25.00	50.00	18.0	45	31	62	31	77.5
Calcium (gm)	1	0.9	0.55	54.60	0.23	25.56	0.40	40.00	0.30	33.33
Iron (mg)	38	30	8.11	21.34	6.37	21.23	9	23.68	7	23.33
Vitamin A (µg)	1030	930	130.7	12.69	248.30	26.70	286	27.77	121	13.01
Thiamine (mg)	1.96	1.45	1.90	96.94	1.20	82.76	0.94	47.96	0.74	51.03
Riboflavin (mg)	1.78	1.51	0.53	29.78	0.68	45.03	0.54	30.34	0.45	29.80
Vitamin C (mg)	40	40	33.9	84.75	35.73	89.33	29	72.5	13	32.50

n – Sample size

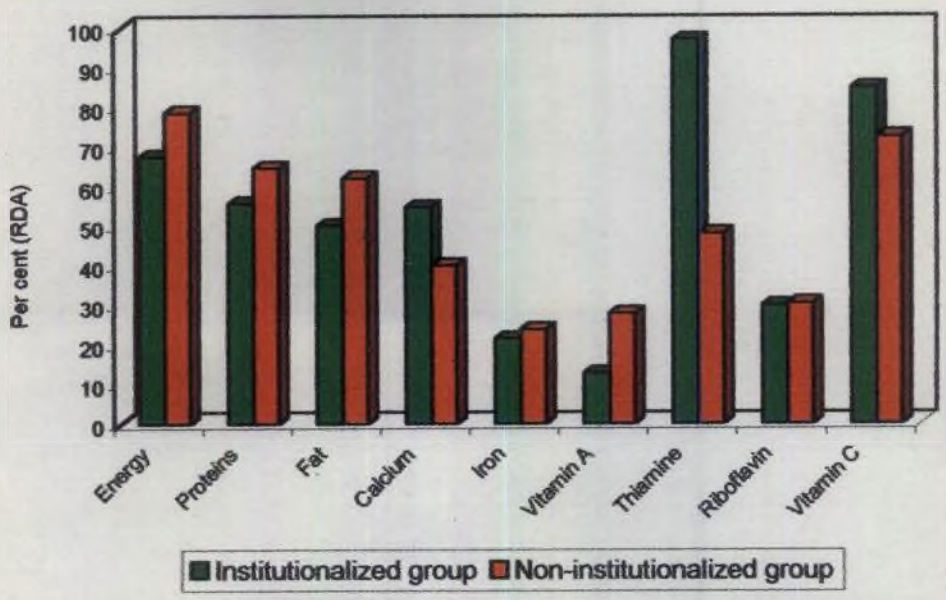


Fig. 10. Comparison of nutrient intake of elderly male (Percentage of RDA)

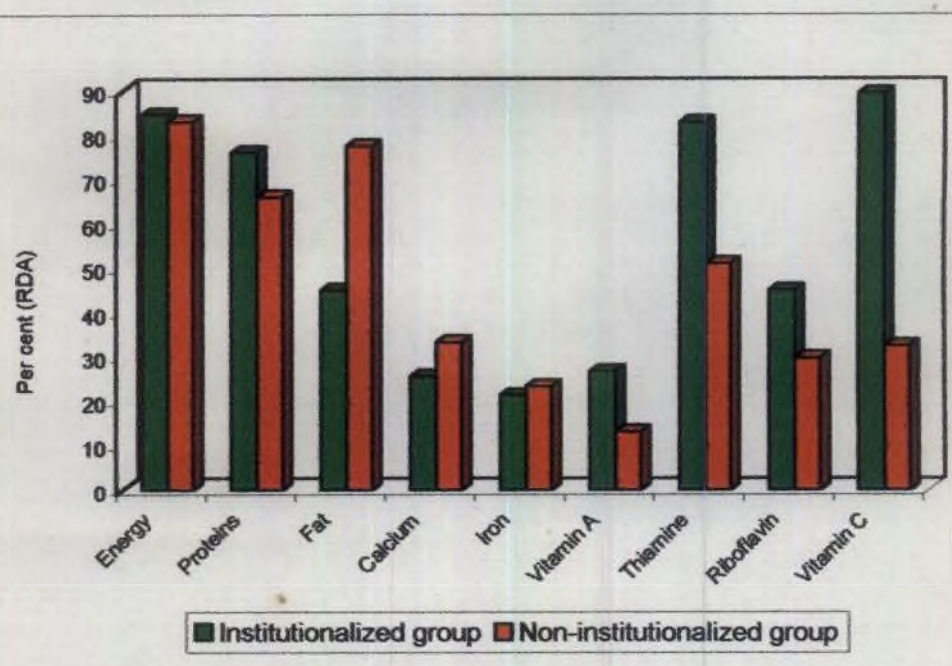


Fig. 11. Comparison of nutrient intake of elderly female (Percentage of RDA)

Thimmayamma (1992) and were statistically examined and results are presented in Table 43.

The mean nutrient intake of institutionalized male and female elderly indicated that the intake of all nutrients was lower than the recommended allowances. It was also found that about 97 per cent, 84 per cent and 68 per cent of the requirements for thiamine, vitamin C and energy respectively were met by the male elderly. In the case of females more than 50 per cent of the requirements were met for energy, protein, thiamine and vitamin C.

In non-institutionalized group the intake of all nutrients was found to be lower than the suggested values for male and female subjects. Among the different nutrients the percentage intake of calcium, iron, vitamin A and riboflavin was found to be below 50 per cent of recommended allowances for males and females.

When the nutrient intake of institutionalized and non-institutionalized elderly was compared it was found that except fats and thiamine, the difference in the intake of all other nutrients were statistically insignificant. The comparison of mean nutrient intake of elderly male and female in institutionalized and non-institutionalized groups are illustrated in Fig. 10 and 11 respectively.

4.4 Physical parameters of elderly

The physical parameters such as physical strength (grip strength), lung capacity, heart rate and blood pressure of the elderly belonging to the institutionalized and non institutionalized groups were measured and the results are furnished in Table 44 to 47.

4.4.1 Physical strength (grip strength)

The mean grip strength of male and female elderly in the institutionalized and non-institutionalized groups are given in Table 44. As the standard value for grip strength of elderly is not available, the grip strength of 20 to 25 years and 30 to 35 years of healthy individuals were taken for comparing the data.

Table 44. Grip strength of elderly (kg)

60-75 years					
Male			Female		
IG (n = 7)	NIG (n = 5)	't' value	IG (n = 8)	NIG (n = 10)	't' value
24.4	21.4	1.4295^{NS}	14.4	14.3	0.0286^{NS}

Mean grip strength of
Adult male (20-25 years) = 42.5 kg, Adult female (20-25 years) = 26.4 kg
Adult male (30-35 years) = 43 kg, Adult female (30-35 years) = 25.4 kg
n – number, IG – institutionalized group, NIG – non-institutionalized group
NS – not significant

The grip strength of male and female elderly in institutionalized group was found to be 24.4 kg and 14.4 kg respectively while in the non-institutionalized group it was 21.4 kg and 14.3 kg among males and females.

It was also found that as age increases, the grip strength decreases for male as well as for females. Statistical analysis of the data indicated the grip strength between institutionalized and non-institutionalized male and female elderly was not significant.

4.4.2 Lung capacity

The mean values obtained for lung capacity of male and female elderly in the institutionalized and non-institutionalized groups are given in Table 45. The

lung capacity of men and women aged 20 to 25 years and 30 to 35 years were also taken for comparison.

Table 45. Lung capacity of the elderly (cc/second)

60-75 years					
Male			Female		
IG (n = 7)	NIG (n = 5)	't' value	IG (n = 8)	NIG (n = 10)	't' value
571	812	1.4625^{NS}	455	544	0.8469^{NS}

Mean lung capacity of
Adult male (20-25 years) = 1520cc/second
Adult male (30-35 years) = 940 cc/second
Adult female (20-25 years) = 1100 cc/second
Adult female (30-35 years) = 920 cc/second
n – number, IG – institutionalized group, NIG – non-institutionalized group
NS – not significant

The lung capacity of elderly male in institutionalized group was found to be 571 cc/second and in non-institutionalized elderly it was 812 cc/seconds and for females the lung capacity was 455 and 544 cc/second respectively.

It was also found that as age increases, the lung capacity decreases among males and females.

The statistical analysis revealed that the difference in lung capacity between institutionalized and non-institutionalized male and female elderly were not significant.

4.4.3 Heart rate of elderly

Heart rate of the elderly was determined and the mean heart rate of males and females in the institutionalized and non-institutionalized categories are given in Table 46.

Table 46. Heart rate of elderly

Heart rate	Institutionalized group			Non-institutionalized group		
	Male	Female	Total	Male	Female	Total
Normal (72/min.)	1 (14.29)	3 (37.5)	4 (26.67)	-	1 (10.00)	1 (6.67)
Tachycardia (>72/min.)	5 (71.42)	5 (62.5)	10 (66.67)	4 (80.00)	9 (90.00)	13 (86.67)
Bradycardia (<72/min.)	1 (14.29)	-	1 (6.66)	1 (20.00)	-	1 (6.66)
Total ($\chi^2 = 2.191^{NS}$)	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Number in parenthesis are percentage
NS – Not significant

It was revealed that majority of the elderly in both institutionalized and non-institutionalized groups had abnormal heart rate. Only 26.67 per cent and 6.67 per cent of elderly in the institutionalized and non-institutionalized categories had normal heart rate of 72/minute. None of the male elderly in the non-institutionalized group had normal heart rate.

Majority of the elderly in institutionalized (66.67%) and non-institutionalized (86.67%) groups had an increased heart rate (tachycardia) of above 72/mt.

Equal percentages (6.67%) of elderly in both groups had decreased heart rate (bradycardia) of less than 72/mt. None of the female elderly in both groups had bradycardia while it was found to be 14.29 per cent and 20 per cent among males of institutionalized and non-institutionalized groups respectively.

The statistical analysis of the data indicated no significant difference in heart rate between institutionalized and non-institutionalized elderly.

4.4.4 Blood pressure

The blood pressure of elderly was measured by using sphygmomanometer and the values obtained were categorized into different stages as suggested by Whelton (1994). The results are given in Table 47.

It was found that only 13.33 per cent elderly in the institutionalized group had an optimum blood pressure of less than 120 mm of mercury. Optimum blood pressure was observed among 14.29 per cent male and 12.5 per cent of females in the institutionalized category. Normal blood pressure of 120-129 mm of mercury was found among 6.68 per cent and 13.33 per cent of institutionalized and

Table 47. Blood Pressure of elderly

Blood Pressure (mm of Hg)	Institutionalized group			Non-institutionalized group		
	Male	Female	Total	Male	Female	Total
<120 (Optimal)	1 (14.29)	1 (12.50)	2 (13.33)	-	-	-
120-129 (Normal)	-	1 (12.50)	1 (6.68)	-	2 (20.00)	2 (13.33)
130-139 (High normal)	2 (28.57)	3 (37.50)	5 (33.33)	1 (20.00)	1 (10.00)	2 (13.33)
140-159 (Hypertension Stage 1)	2 (28.57)	3 (37.50)	5 (33.33)	4 (80.00)	5 (50.00)	9 (60.00)
160-179 (Hypertension stage II)	2 (28.57)	-	2 (13.33)	-	2 (20.00)	2 (13.34)
180-209 (Hypertension stage III)	-	-	-	-	-	-
≥ 210 (Hypertension stage IV)	-	-	-	-	-	-
Total ($\chi^2 = 3.066^{NS}$)	7 (100)	8 (100)	15 (100)	5 (100)	10 (100)	15 (100)

Number in parenthesis are percentage
NS – Not significant

non-institutionalized groups respectively. None of the male elderly in the two groups had normal blood pressure, while it was found to be 12.5 per cent and 20 per cent among females of institutionalized and non-institutionalized groups respectively. Different degrees of Hypertension (stage I and II) were found among 46.66 per cent institutionalized and 73.34 per cent non-institutionalized elderly. High blood pressure was observed among 57.14 per cent and 80 per cent of male elderly in the institutionalized and non-institutionalized groups while among females it was 37.5 per cent and 70 per cent in the two groups respectively. The difference in blood pressure of institutionalized and non-institutionalized elderly was not significant.

4.5 Factors influencing nutritional status of elderly

Various nutritional problem have been identified among the elderly. The difference in various anthropometric indices namely weight, height, Body Mass Index and MUAC between the institutionalized and non-institutionalized elderly male and female was found to be statistically insignificant while the differences in waist to hip ratio of the male elderly of two groups was found to be significant at 5 per cent level.

The difference in the intake of most of the food items as well as nutrients was also found to be not significant between the institutionalized and non-institutionalized elderly. Among the different food groups intake of sugar and jaggery was found to be statistically significant between the two groups. Among the nutrients the intake of fat and thiamine was found to be significant between the institutionalized and non-institutionalized groups.

Thus, it can be concluded that the place where the elderly resides is not influencing their nutritional status.

To ascertain the factors influencing nutritional status of the elderly, multiple regression analysis was carried out on the non-institutionalized group. The independent variable taken included family size, educational status, monthly income, availability of land and monthly expenditure of food and the dependent variable taken was body mass index of the elderly. The results are given in Table 48.

Table 48. Results of regression analysis on factors influencing the nutritional status of elderly

Sl. No.	Independent variable	Regression coefficient	Standard error	Student 't' value
1.	Family size	8.4934 e-002	1.5510 e-001	0.548 ^{NS}
2.	Educational status of the respondent	3.3443 e-002	3.4714 e-001	0.096 ^{NS}
3	Monthly income of the family	4.2983 e-001	2.6900 e-001	1.598 ^{NS}
4	Availability of land	-3.8530 e-001	5.5604 e-001	-0.693 ^{NS}
5	Monthly expenditure of food	-1.2466 e-001	6.8307 e-001	-0.183 ^{NS}

NS – Non significant; $R^2 = 0.090$; Intercept = 18.878; F value = 1.37**
** Significant at 1% level

As revealed in Table 48, in general, there was no significant relationship between the different variables and Body Mass Index of the elderly.

Discussion

5. DISCUSSION

The discussion pertaining to the findings of the present study entitled 'Nutritional profile of elderly' is presented in this chapter under the following broad sections.

5.1 Socio-economic profile and personal informations of the elderly

5.2 Dietary pattern of the elderly

5.3 Nutritional profile of the elderly

5.4 Factors influencing the nutritional status of elderly

5.1 Socio-economic profile and personal informations of the elderly

The sample selected for the study consisted of institutionalized and non-institutionalized group of elderly in the age of 60 to 75 years. Each group had 75 elderly persons.

The sample consisted of 25 males and 50 females from institutionalized group and 28 males and 47 females in non-institutionalized group. Majority of the elderly in both groups were in the age group of 70 to 75 years. Among the different states, Kerala has the highest sex ratio which is expressed as the number of females per 1000 males and is a solitary exception while in all other states and union territories except Pondicherry the sex ratio is adverse to women (Manorama Year Book, 2001). The sex ratio of Kerala had reached a maximum in 2001 with 1058 females for 1000 males. In this study also similar trend in sex ratio was observed in the institutionalized and non-institutionalized groups.

Majority of the institutionalized elderly were Christians and majority of the non-institutionalized elderly were Hindus and this may be due to the fact that among the selected three institutions two institutions were managed by Christian missionaries and one was government aided.

Among the Hindus, majority were Ezhavas and among Christians majority were Roman Catholics in both institutionalized and non-institutionalized groups.

Though, joint family system prevalent in Kerala has fastly disintegrated and its place has been taken by nuclear type families, in the present study, a higher percentage of institutionalized (52%) and non-institutionalized (77%) elderly were found to be from joint families with a family size of 5-8 members. This may be due to the fact that a higher percentage of elderly in both groups were either widowed or unmarried.

According to Dube (1999) widowhood is one of the important problems among the elderly women due to the increased life expectancy and the tendency of men to marry women far younger than them and above 55 per cent of women above 60 years of age in India were reported to be widows. These findings are in contrast with the findings reported by Gwinn *et al.* (1992), Singh (1999a) and Patil (2000) where they observed more percentage of nuclear type families among the elderly. However, Chandrasekhar and Bhooma (1998) in a study conducted in Tamil Nadu among elderly reported more percentage of joint families among the elderly.

About 15 per cent of elderly in institutionalized group were married and living with their spouse and a majority of them were either unmarried or widowed, where as in non-institutionalized group majority were married and lived with their spouse. In case of non-institutionalized group, these findings are in line with the findings of Devi and Premakumari (1998) who found that 50 per cent of the elderly were living with their spouse in a study conducted in Coimbatore District of Tamil Nadu.

Literacy is considered as one of the most important indicators of the advancement of life. It was encouraging to note that majority of the elderly in institutionalized and non-institutionalized group were literates and this support the reports of Census of India 2001 (Manorama year book, 2001) which ranked Kerala as the most literate state and this could be attributed due to the adult literacy programmes prevalent in Kerala. Among them majority had education upto lower primary level. The study also showed that a higher percentage of male members were literate than the females. The latest census of Kerala also reported a higher percentage (94.20) of literacy among male members than female members (87.86%). Similar results were reported by Augustine (1993) in Thiruvananthapuram district and Shyna (1996) and Udaya (1996) in Thrissur district and Jose (1999) in Ernakulam district.

Unlike the modern era in which women are playing the dual role of housewife, mother and a member of the work force as a wage earner, in the present study, with respect to the past occupational status, majority of the female elderly in both institutionalized and non-institutionalized groups were found to be

unemployed. But most of the male members were employed. Among them 29 per cent of institutionalized elderly worked as coolies and 24 per cent of non-institutionalized elderly either worked as coolies or worked in private sectors.

Economic insecurity is an important problem among the elderly where most of them will be depending on their children or other family members for money. The results of the present study showed that majority of the elderly in institutionalized and non-institutionalized groups had no income of their own and were dependant on others. These findings are in line with the results of Maaravi *et al.* (1996), Chandrasekhar and Bhooma (1998), Devi and Premakumari (1998), Lalitha (1999), Sharada (1999), Sundaram (1999), and Kamalamma and Selsa (2000) who reported that the elderly used to face economic insecurity and financial problems.

The economic insecurity observed among the elderly may be due to the physical disability experienced by them and also due to sudden decrease in their earnings.

The study showed that there were a few pensioners in both institutionalized and non-institutionalized groups and similar results were obtained by Chandrasekhar and Bhooma (1998) in their study. Among the elderly in institutionalized group the pensioners received a pension in the range of Rs.100 to 500 per month and in non-institutionalized group a higher percentage (35.29%) elderly received between Rs.1000-1500 per month. Dube (1999) also reported that elderly are forced to subsist on the meagre pensions which they receive from the

government and nearly 12 per cent of India's ageing population has been officially declared as 'destitutes'.

About 52 per cent of the families in non-institutionalized group had a monthly income ranging between Rs.4000 to Rs.8000. Jose (1998) also reported that the monthly income of the different categories of families varied from Rs.2000 to 8000. Partly similar findings were reported by Prema (1996) and Ranganathan (1996) where the monthly income of families in Kerala varied from Rs.3000 to 5000.

The monthly expenditure pattern of the families in the non-institutionalized group revealed that in most of the families (88%) major expenditure was incurred for food (30 to 59.9%). Similar findings were reported by Usha *et al.* (1990) in Thiruvananthapuram district and Udaya (1996) and Mathen (1998) in Thrissur district among different categories of families. However, studies conducted by Cherian (1992), Augustine (1993), Karuna (1993), Rai and Sarup (1995), Prema (1996) and Ranganathan (1996) revealed that the rural families in Kerala spent upto 75 per cent of their total income for food.

The present study also reported that majority of the families spent less than 10 per cent of family income on clothing, shelter, transport, recreation, health, personal expenses and fuel. A higher percentage of families spent upto 20 per cent of their income for education.

As per the general family expenditure pattern next to food importance is given to health, clothing, shelter, recreation fuel as well as personal needs. Surveys conducted in Kerala among the low income families revealed that they used to give

more waitage to clothing, education, health, transport and fuel (Thomas, 1989; Seshadrinath, 1993; Udaya, 1996 and Jose, 1998). However, in the upper income strata they spent more for education, household expenses, clothing and savings (Varghese, 1989). In the present study also majority of the families spent more money for clothing, shelter and education.

Though, possession of land plays a lung role in determining the economic and social status of the families, the present study indicated that all the elderly in institutionalized group were landless where as a majority (82.76%) of elderly in non-institutionalized group owned upto 100 cents of land. In contrast with this, Udaya (1996) observed more than 100 cents of land among the farm families of Trichur District.

Results of the housing conditions revealed that 44 per cent elderly in non-institutionalized group lived in their own houses where as 56 per cent lived with their family members.

Majority of the houses had 3 to 6 rooms, with brick walls, cement flooring and tiled or concrete roofs. Similar results were obtained by Sujatha (1990) and Ranganathan (1996) among the unorganised sectors of Kerala.

About 76 per cent of elderly had a separate room for them. In institutions more than 2 members shared one room.

All the selected houses had separate kitchen, good drainage facilities, lavatory and electricity facilities and similar results were reported by Jose (1998). In contrast to the present findings Sujatha (1990), Karuna (1993) and Ranganathan (1996) reported that majority of the houses of fish vending women and agricultural

labourers had neither separate kitchen nor proper latrine facilities. The selected three institutions also had separate kitchen, proper drainage, lavatory and electricity facilities. This throws light on the importance of proper sanitation and hygiene given by the Keralites.

Most of the families and all the old age homes had their own well for drinking water.

Elderly people have limited occupational activities and often will be finding it difficult to spend their time effectively which will make them idle. In such situations, recreational activities will be a boon to them to spend their time. In this study also it was found that most of the elderly in institutionalized and non-institutionalized groups used to see various programmes in television and used to read newspapers also. Similar findings were reported by Jose (1999) in Ernakulam district among the institutionalized elderly.

About 68 per cent of the institutionalized elderly did not attend various social functions like marriage, birth days, festivals etc. while this was found to be 32 per cent among the non-institutionalized group. This finding is in tune with the studies of Patil (2000) who reported that during old age the scope and sphere of social interaction is reduced mainly to the family circle. This may be due to their decreased physical status, economic dependence and even due to the mental depression observed among the elderly.

Majority of the elderly from institutionalized and non-institutionalized groups used to visit religious places and among them 77 per cent elderly in institutionalized group visited the religious places daily where as in non-

institutionalized group 20 per cent made daily visits. This may be due to the fact that two old age homes had churches in their compound. Jose (1999) also found that the facilities to worship were good in private old age homes.

In the modern society people are more interested to take membership in social organisations mainly to show their status in the society. In the present study it was found that none of the elderly from institutionalized group and 80 per cent from non-institutionalized group were not members of any of the social organisations. This may be due to the social isolation and loneliness commonly experienced by the elderly. Thus, they try to build their own cocoons to live in and never try to interact or socialise with others and sometimes may become introverts and suffer from depression.

Due to decreased immunity, loss of lean body mass, changes in body composition and physical disability elderly are found to be more prone to various health problems. In this study also it was found that majority of the elderly in institutionalized and non-institutionalized groups had one or more health problems like arthritis, asthma, cataract, diabetes, cardiovascular diseases and gastro intestinal diseases. Similar findings were reported by Polasa (1998), Devi and Premakumari (1999), Dube (1999), Kumar (1999), Lalitha (1999), Prakash (1999) and Sreeramulu and Raghuramulu (1999).

Singh *et al.* (1996) in study conducted among the elderly of Varanasi reported arthritis, hypertension, visual problems, ischemic heart disease, hearing impairment, diabetes mellitus, tuberculosis, urinary problems and varicose veins.

Kawamoto (1994) reported acute infection of upper respiratory tract as the most frequent health problem among elderly.

Though various health problems were observed among institutionalized and non-institutionalized elderly, a higher percentage of the elderly subjects in both groups did not have a routine medical checkup and this might be mainly due to their financial problems. However, less than 50 per cent elderly in institutionalized and non-institutionalized groups took medicines regularly. Similar results were reported by Chandrasekhar and Bhooma (1998) in the study among elderly of Tamil Nadu.

As observed by Chandrasekhar and Bhooma (1998), in the present study also about 42.57 per cent of elderly in non-institutionalized group had unhealthy habits like smoking, alcohol consumption, tobacco chewing, and use of betel leaves while majority of the elderly in institutionalized did not possess any unhealthy habits. This may be due to their awareness on the health hazards caused due to these unhealthy habits.

As age advances there will be a decrease in the physical activities and this may lead to various health problems like obesity and further consequences due to obesity like cardio-vascular diseases, diabetes etc. In the present study it was interesting to note that majority of the elderly in institutionalized and non-institutionalized groups did some sort of physical exercise.

Majority of the elderly in institutionalized group and all the members in non-institutionalized group did the activities like bathing, dressing, transfer out to bed and feeding by themselves.

Most of the elderly in institutionalized group opted old age homes due to the reason that there is nobody to look after them and similar result was obtained by Jose (1999) in a study conducted among the elderly residing in institutions in Ernakulam district.

5.2 Dietary pattern of the elderly

Precise information on the dietary pattern of people is essential not only for assessing the nutritional status of the community but also for elucidating the food needs of population groups at national or regional levels (Thimmayamma and Rau, 1996). Food consumption pattern of the families has a strong impact on the nutritional status of the individual family members.

Majority of the elderly in institutionalized and non-institutionalized group were found to be non-vegetarians with rice as their staple food. Similar result was reported by Jose (1999) in the study on elderly in Ernakulam district. Stephanie (1984) also observed non-vegetarianism among majority (72%) of the elderly.

Just like the usual dietary pattern of three meals per day observed among the various segments of the community in Kerala by Karuna (1993), Shyna (1996), Udaya (1996) and Jose (1998) the elderly in institutionalized and non-institutionalized groups followed a dietary pattern of three major meals in a day with tea or coffee in the early morning and tea and snacks in the evening. The elderly who are the residents of the old age homes consumed the regular dietary pattern of their respective institutions and this included tea in early morning, cereals, pulses and vegetables for breakfast, cereals, pulses, vegetables, meat, fish

or curd for lunch, snacks and tea during evening and cereals, pulses and vegetables for dinner. Majority of the non-institutionalized elderly followed a dietary pattern of tea or black tea at early morning, cereals, pulses, vegetables, milk or egg for breakfast, cereals, pulses, vegetables, meat, fish or curd at lunch, only tea during tea time and cereals, pulses, vegetables and meat, fish or egg for dinner.

An analysis of the frequency of use of various food items by the elderly revealed that cereals, other vegetables, milk and milk products, nuts and oil seeds, fats and oils, spices and condiments and sugar were used daily by all the institutions and also by the families of non-institutionalized groups. The economic status of the family and the local availability of food items are the two important factors which influences the frequency of use of foods.

The frequency score with respect to the use of foods revealed that the most frequently used items were cereals, pulses, other vegetables, milk and milk products, fats and oils, sugar and spices and condiments. Partially similar results were reported by Ranganathan (1996). Though, majority of the institutionalized and non-institutionalized elderly were non-vegetarians, meat, fish or egg were never used on a day to day basis and it was found that the institutionalized group used these items weekly once or twice while non-institutionalized group used the items like meat and fish less frequently.

Majority of the families did not maintain any accounts for expenditure and those who did, maintained written accounts on a weekly or monthly basis. All the three institutions maintained written accounts for expenditure on a daily basis. This accounting system is required in all institutions because they have to certify all the purchases and issues by the higher authorities.

About 75 per cent of families did not plan their meals in advance and prepared the diet on the basis of food availability. Those who planned the diet also did it on the basis of availability of food and money and likes and dislikes of family members.

Majority of the elderly in non-institutionalized group did not maintain a regular time schedule for the consumption of food while in old age homes the elderly had a specific time schedule for food intake. Usually in all institutions there will be a specific time schedule for serving meals and the inmates have to take the meals within that stipulated time while in households the members are free to take their meals as and when they like.

As in all other institutions where the inmates used to take their meals together, in the present study also it was found that the institutionalized elderly took their meals together. But only 47 per cent of elderly in non-institutionalized category took their meals along with their family members.

Majority of elderly in institutionalized and non-institutionalized group did not have any restriction in intake of foods or did not avoid any food items completely.

Consumption of raw vegetables is very essential in our diet especially among the aged due to the presence of dietary fibre essential to contribute bulk in the intestinal tract and thus to relieve from constipation and to decrease blood cholesterol and glucose levels. However in the present study it was observed that majority of the elderly were not including any raw foods in the diet.

Majority of the subjects used boiled water for drinking.

The frequency of purchase of processed and prepared foods among elderly was found to be more among the non-institutionalized group where majority purchased these items either weekly or monthly while the institutionalized group used to purchase these items only occasionally, that too only in private run old age homes. During special conditions like festivals all the elderly in both groups had special foods like payasam or sadhya and on diseased conditions all of them used to modify their diets and included rice gruel, pickle, pappad, black tea etc. During birthdays the elderly in institutionalized group and majority in non-institutionalized group did not have any special foods.

Various studies conducted in different parts of India have shown that most of the elderly people suffer from micro-nutrient deficiencies (Sreeramulu and Raghuramulu, 1999). Chandrasekhar and Bhooma (1998) in a study conducted among the elderly in three cities namely Chennai, Coimbatore and Erode in Tamil Nadu indicated that elderly living with their children were in the regular habit of consuming vitamin and mineral supplements. However in the present study it was found that neither the elderly in the old age home nor living with the family members were in the habit of consuming nutrient supplements regularly.

5.3 Nutritional profile of the elderly

5.3.1 Anthropometric measurements

Anthropometry is considered as the most reliable and specific indicator of malnutrition in the older population (Kuczmarski *et al.*, 2000). In the present study the nutritional status of elderly were assessed by using weight, crown-heel

length, body mass index, mid-upper arm circumference, waist and hip circumferences.

The weight and height of elderly men and women tend to decline with age. Chandrasekhar and Bhooma (1998) also reported that weight remains constant until the age of sixty-five to seventy and then decreases progressively. According to Brahman (1999) aged people are light by about 41 kg compared to younger generation.

In the present study the mean weight obtained for elderly male and female in both institutionalized and non-institutionalized groups were higher than the standards suggested by NNMB and the increase was found to be statistically significant only in non-institutionalized group. These results are in contrast with the findings of Kullah and Ramnath (1985) who observed a significantly lower weight in the aged as compared to their adult counter parts. The difference in weight between the institutionalized and non-institutionalized elderly male and female in both age groups except in females aged above 69 years in the non-institutionalized category was found to be statistically insignificant.

It was observed that the mean height of elderly decreased as age advances. Chandrasekhar and Bhooma (1998) also reported a decrease in height among elderly men and women. This may be due to the shortening of spinal column and to the bone loss leading to osteoporosis. Chandrasekhar and Bhooma (1998) reported an actual bone loss of 12 per cent in men and 25 per cent in women elderly leading to osteoporosis. Kullah and Ramnath (1985) observed a significantly lower height among elderly compared to their adult counter parts.

The difference in height between the institutionalized and non-institutionalized elderly was found to be significant statistically only among females above 70 years. The mean height of institutionalized elderly was lower than the standards in both sex except in females above 70 years where the height was found to be higher than the NNMB standards. The mean height of non-institutionalized elderly was found to be significantly higher than the standards among females. Similar to the present findings Sarojini *et al.* (1990) reported higher mean height among elderly male than females.

The problem of chronic energy deficiency shows an increasing trend with advanced age. Brahman (1999) indicated that as many as 38 per cent of people aged 70 years and above suffer from chronic energy deficiency. In the present study also it was observed that nearly 29 per cent and 22 per cent of institutionalized and non-institutionalized elderly respectively had different grades of chronic energy deficiencies as evidenced by body mass index. Bulliya *et al.* (2000) among the elderly of Rayagada and Phulbani districts of Orissa also reported about the incidence and prevalence of chronic energy deficiency among elderly.

The mean mid upper arm circumference of institutionalized and non-institutionalized elderly were found to be significantly higher than the Indian standards. The mean mid-upper arm circumference of females was found to be slightly higher than male elderly only among 60-69 years of age in the institutionalized category. Contrary to this finding Chandrasekhar and Bhooma (1998) reported a higher MUAC among female elderly.

The waist to hip ratio of the elderly were computed and upper body obesity was found to be present in 80 per cent of male and 88 per cent of female in institutionalized group and 46 per cent and 74 per cent male and female respectively in non-institutionalized group. The difference in waist to hip ratio of male elderly was found to be significant statistically between the institutionalized and non-institutionalized groups.

5.3.2 Clinical assessment

Clinical examination is the most effective measure to find out the sub clinical nutritional deficiencies among individuals.

The clinical examination conducted among the subjects of the present study indicated that majority of the elderly in both institutionalized and non-institutionalized groups had visual disturbance and that may be due to the presence of cataract. Only a minority in both groups had symptoms of xerophthalmia due to deficiency of vitamin A. Lalitha (1999) also reported the prevalence of loss of eye sight in elderly due to cataract.

A higher percentage of institutionalized and non-institutionalized elderly had toothlessness and difficulty in chewing was present in about 60 per cent and 47 per cent of elderly respectively in both groups. These findings are similar to the findings of Prakash (1999) and Arulmani and Sarojini (2000) who reported about the dental problems and poor mastication in elderly.

The other health and nutritional problems like hairloss, sparsness of hair, flattened nail, thickening of nails, dry skin, numbness, pain in joints, shortness of breath, anaemia, hearing problems, varicose vein and oedema in legs

were present only in a lower percentage of elderly in both institutionalized and non-institutionalized groups. These findings are partly similar to the findings of Devi and Premakumari (1998), Dube (1999), Kumar (1999), Lalitha (1999) and Prakash (1999) who reported about prevalence of different multiple illnesses among elderly.

Majority of the elderly in institutionalized and non-institutionalized groups had normal nutritional status and the difference in clinical symptoms between the institutionalized and non-institutionalized elderly was statistically insignificant. Chandrasekhar and Bhooma (1998) in a comparative study on the nutritional profile of elderly living alone or living with family members or living in old age homes also reported that irrespective of the category of elderly above 65 years, majority of the elderly were healthy and were free from major health disorders.

5.3.3 Food and nutrient intake

The nutritional problems of developing countries are due to the fact that majority of the population subsist on an inadequate diet in terms of quantity and quality (Gopalan, 1991). Hence, determination of quantity and quality of foods in different age groups is of utmost importance.

One week food list survey among institutionalized elderly and one day food weighment survey among the non-institutionalized elderly were conducted to assess their actual food and nutrient intake. The findings indicated that except pulses in the male and cereals, pulses, and flesh foods among females in the institutionalized group all the other food items were below the suggested

quantities. Chandrasekhar and Bhooma (1998) observed a decreased intake of all food groups except fruits, sugar and jaggery among the elderly living in old age homes. In the non-institutionalized group also only the requirement of pulses, sugar and jaggery and flesh foods was met both by male and female elderly. The difference in the mean intake of only sugar and jaggery was found to be statistically significant between the elderly in the institutionalized and non-institutionalized categories. However Chandrasekhar and Bhooma (1998) reported that the elderly living alone had an intake of all food groups below the suggested quantities than their counterparts living either in old age homes or with their children.

A decrease in the intake of all food items among the elderly was reported by Brahman (1999), Devi (1999) and Wylie *et al.* (1999). Contributing factors of the decreased food intake observed among the elderly may be due to olfactory dysfunction, lowered sensory perception or due to poor oral health. Poverty and living conditions also lead to reduced food intake among elderly that directly or indirectly affects the nutritional status and quality of their life (Duran *et al.*, 1990).

Several studies have indicated that the nutrient intake decreases with advancing age. It was observed in the study that among institutionalized and non-institutionalized elderly, the intake of almost all nutrients was lower than the suggested values. The results of the present study are similar to the results reported by Garg and Singh (1983), Ahrari and Kimiagar (1997), Varela *et al.* (1998),

Chandrasekhar and Bhooma (1998), Devi and Khader (1998), Brahman (1999), Sharada (1999) and Arulmani and Sarojini (2000) among elderly.

Though a difference in the intake of various nutrients was observed between the institutionalized and non-institutionalized elderly the findings were found to be statistically insignificant except for fats and thiamine. An increase in the intake of fat was observed among non-institutionalized elderly and thiamine among the institutionalized elderly. Chandrasekhar and Bhooma (1998) in their study among three categories of elderly namely those living with their children, living alone and living in old age homes indicated that the nutrient intake of elderly living with their children was comparatively better when compared with their counter parts staying either in old age homes or living alone. Social isolation associated with depression and loneliness might have led to the decreased food and nutrient intake among elderly. However, economic status, retirement, fixed income, death of spouse and bereavement might also have contributed to this drastic decrease in food and nutrient intake.

5.3.4 Physical parameters

Physical parameters like physical strength (grip strength), lung capacity, heart rate and blood pressure of the elderly were also recorded.

The mean grip strength and lung capacity of male elderly in institutionalized and non-institutionalized groups were found to be more than the female elderly though the difference in both measurements were statistically insignificant. As age advances a decrease in grip strength and lung capacity were also observed. Phillips (1986) also reported lower grip strength among the elderly.

Decrease in grip strength can be attributed to the muscular dystrophy due to ageing and lack of regular physical exercises.

Vimala (1999) in her study among elderly found that the maximum breathing capacity fall about 80 percent over the age span of 30-90 years. She also observed a decrease in lung capacity and lung capacity among elderly compared to adults, which may adversely affect the respiratory function. The decrease in lung capacity in the elderly compared to adults may be due to calcification of cartilages and emphysema.

The measurement of heart rate among the sub samples revealed that majority of the elderly in institutionalized and non-institutionalized groups had an increased heart rate. Potty (1996) opined that as a result of ageing there is disturbance of heart rhythm and a decrease in lung capacity.

Different degrees of hypertension (Stage I and Stage II) were found among the elderly irrespective of whether they are living in the institutions or with the family members, and the difference was found to be statistically insignificant. This finding is in line with the findings of Ostberg and Samuelson (1994) who reported hypertension as the most common disease among elderly. Hypertension of above 140 mm of Hg was noted more among male than the female elderly in institutionalized and non-institutionalized groups. Chandrasekhar and Bhooma (1998) also reported that elderly men were more prone to hypertension than females.

The high blood pressure noted among the elderly in the present study may be due to the higher intake of flesh foods and lower intake of vegetable foods

with high fibre content. Bagchi (2001) indicated the close correlation between foods of animal origin with hypertension among elderly and concluded that vegetarianism should be the slogan for all elderly individuals due to its ability to prevent the onset of morbidities of old age.

5.4 Factors influencing nutritional status of elderly

It was found that various socio-economic factors as well as the place of residents are not influencing the nutritional status of the elderly. Thus, it can be concluded that more than improving the socio-economic status of the elderly, proper care, attention and protection to elderly should be given so as to improve their psychological, social and physical well being which will indirectly influence their nutritional status. Familial care and a feeling of security coupled with conducive psycho-social environment will bring an improvement in the nutritional profile of the elderly.

Summary

6. SUMMARY

The present study entitled 'Nutritional profile of the elderly' was conducted among 150 elderly subjects of 60 to 75 years of age. The subjects selected for the study consisted of institutionalized and non-institutionalized elderly. Each group consisted of 75 elderly persons.

The study carried out threw light on the socio-economic profile, personal informations, dietary pattern, and nutritional status of the elderly.

Information regarding socio-economic profile of the elderly indicated that among the total samples majority were females in both institutionalized and non-institutionalized groups. Majority of the elderly in institutionalized group were Christians where as in non-institutionalized group majority were Hindus and most of the elderly in both groups were from joint families.

About 85 per cent of the institutionalized elderly were either unmarried or widowed where as in non-institutionalized group majority were married and lived with their spouse. Most of the elderly in institutionalized and non-institutionalized groups were literate, but they had no income of their own and were dependent on others for money.

Information regarding past occupational status showed that most of the elderly women in both groups were unemployed where as the males were employed.

The monthly income of families of non-institutionalized group ranged from Rs.2000 to 8000 and there were only a few pensioners among the institutionalized and non-institutionalized groups. The major expenditure of the families was for food.

All elderly in the institutionalized group were landless whereas majority of the elderly in non-institutionalized group had upto to 100 cents of land.

About 44 per cent elderly in non-institutionalized group lived with their family members and their houses had 3 to 6 rooms, with brick walls, cement flooring and tiled or concrete roofs.

About 76 per cent elderly had a separate room for them where as in the institutions more than two members shared one room and both groups had a separate kitchen, good drainage facilities, lavatory and electricity facilities. Most of the elderly in institutionalized and non-institutionalized groups used to see television and read newspapers.

Majority of the elderly in institutionalized group and 32 per cent of elderly in non-institutionalized group never attended social functions while majority of the elderly from both groups used to visit various religious places.

Most of the elderly in institutionalized and non-institutionalized groups had one or more health problems like arthritis, asthma, cataract, diabetes, cardio-vascular diseases, hypertension and gastro intestinal diseases. However, a higher percentage of elderly from both institutionalized and non-institutionalized groups did not have a routine medical checkup and only less than 50 per cent elderly took medicines regularly to cure their health problems.

Unhealthy habits like smoking, alcohol consumption, tobacco chewing and use of betel leaves were found more among non-institutionalized group. Majority of the elderly in both groups did some sort of physical exercises and except a few elderly in institutionalized group all others did the activities like bathing, dressing, transfer out to bed and feeding by themselves.

Majority of the elderly in institutionalized group opted old age home due to the reason that there is nobody to look after them.

Among the various factors studied factors like family type, religion, marital status, recreational facilities, attending social functions, membership in social organizations and unhealthy habits were found to differ statistically between the institutionalized and non-institutionalized groups.

The dietary pattern of the elderly revealed that majority of them were non-vegetarians with rice as their staple food and almost all elderly followed a dietary pattern of three meals per day. Cereals, other vegetables, milk and milk products, nuts and oil seeds, fats and oils, spices and condiments and sugar were used daily by the institutionalized group and families of non-institutionalized group. Dietary pattern of the elderly differ significantly between the institutionalized and non-institutionalized groups.

Majority of the families of non-institutionalized elderly did not maintain accounts for expenditure and not planned their meals in advance. In the institutions they kept written accounts on expenditure. Most of the elderly in non-institutionalized group did not maintain a specific time schedule for food intake and took their meals alone whereas in institutionalized group, the elderly had a

specific time schedule for food intake and they took their meals along with other members. Consumption of raw vegetables by the elderly was found to be very less.

During festivals most of the elderly in both groups had special foods like sadhya or payasam and in diseased conditions they modified their diet to cure their diseases. Only a minority of elderly in non-institutionalized group took nutrient supplements.

Nutritional status of elderly revealed that the mean weight obtained for the elderly were higher than the NNMB standards but the increase was statistically significant only in non-institutionalized group. The mean height of institutionalized elderly except females above 70 years was lower than the standards whereas the mean height of elderly in non-institutionalized group was found to be higher than the standards and increase in height was found to be statistically significant only in the case of females. About 29 per cent and 22 per cent of institutionalized and non-institutionalized elderly had different grades of chronic energy deficiencies. The mean mid-upper arm circumferences were found to be significantly higher than the standards. About 80 per cent and 88 per cent of male and female elderly in institutionalized group were having upper body obesity on the basis of waist to hip ratio while this was found only among 46.43 per cent and 74.47 per cent of male and female elderly of non-institutionalized group.

Clinical examination of the elderly in both groups revealed visual disturbance, toothlessness and difficulty in chewing, hair loss and sparseness of hair, pain in joints, hearing problems and anaemia. Clinical symptoms observed

were statistically insignificant between the institutionalized and non-institutionalized groups.

Among institutionalized group, the intake of foods except cereals, pulses and flesh foods was found to be lower than the recommended daily allowance in females while all food groups except pulses was lower than RDA in the males. In non-institutionalised group only the requirement of pulses, sugar and jaggery and flesh foods was met both by male and female elderly. The intake of all nutrients was found to be lower than the recommended levels in both groups. Difference in intake of most of the foods and nutrients was found to be statistically insignificant between the institutionalized and non-institutionalized elderly.

Grip strength and lung capacity decreased as age advanced. There is no significant difference in grip strength and lung capacity between the institutionalized and non-institutionalized elderly. Majority of the elderly in both groups had an increased heart rate and different degrees of hypertension.

No significant relationship between the different socio economic variables and nutritional status was observed among the elderly subjects.

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Appendices

APPENDIX-I

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF HOME SCIENCE

INTERVIEW SCHEDULE TO ELICIT INFORMATION REGARDING THE SOCIO-ECONOMIC CONDITIONS, PERSONAL INFORMATION, PERSONAL HABITS AND OTHER PERSONAL PROBLEMS OF ELDERLY.

1. Serial No. :

2. Name of the respondent :

3. Age of the respondent :

4. Sex of the respondent :

5. Address :

6. Panchayath :

7. Place of survey :

8. Religion : Caste :

9. Type of family : Joint/Nuclear

10. Composition, education, occupation and income of the family members:

11. Marital status : a) Married
    b) Unmarried
    c) Divorced/separated
    d) Widowed

12. Details about spouse

    a) Spouse still alive : Yes/No
    if Yes,

    i) Name of spouse :

    ii) Age of spouse :

iii) If spouse not alive, who takes care of you : a) Son
b) Daughter
c) Servant
d) Home nurse
e) Grand children
f) Others (specify)

13. Are you staying with your spouse : Yes/No

14. If No, where are you staying : a) Old age home
b) Living with son
c) Living with daughter
d) Living with relatives
e) Living alone
f) Others (specify)

a) If alone, do you experience any difficulty : Yes/No

15. Source of income : a) Pensioner
b) Retired and dependent
c) No income
d) Business
e) Supported by children and others
f) Others (specify)

16. If you are a pensioner

a) Type of pension : Govt./Private/Family pension

b) Amount :

17. Do you have freedom to spend your income as you like : Yes/No

If No, who decides :

18. Do you, own any land in your/ spouse's name : Yes/No

If yes, specify

a) Total area :

b) Inherited/Purchased :

19. Have you given your land or home to any of the family members in partition : Yes/No

If yes,

a) to whom :

b) as whole or in part :

20. Do you cultivate any crops in your land : Yes/No

a) If yes, specify the crops

21. Do you have any debts : Yes/No

If yes, specify

a) The type of debt :

b) Amount :

c) Source of debt : Bank/Private/Neighbours others (specify)

22. Do you get any support from family members when there is

a need : Yes/No

If yes, specify

a) The support :

b) The person from whom you get the support :

23. Monthly expenditure pattern

Sl. No.	Item	Amount of expenditure Monthly (approximately) Rs.
1	Food	
2	Clothing	
3	Shelter	
4	Education	
5	Transport	
6	Recreation	
7	Health	
8	Savings	
9	Own expenses	
10	Repayment of loans	
11	Fuel	
12	Beedi	
13	Alcohol	
14	Others (specify)	

24. Details of housing

a) Ownership of house	:	In your name/family members'/ Rented
b) Area in square feet	:	
c) Number of rooms	:	
d) Type of roof	:	Thatched/Tiled/Concrete/ Others (specify)
e) Type of floor	:	Tiled/Mosaic/Marble/ Cemented/Others (Specify)

f) Type of wall : Brick/Stone/Thatched/ Others (Specify)

g) Separate room for individual members : Yes/No

h) Do you have a separate room : Yes/No

i) Do you have a separate kitchen in your house : Yes/No

j) Source of drinking water :
a) Own well
b) Public tap
c) Public well
d) Tank
e) River

K) Drainage facilities : Yes/No

l) Lavatory facilities : Yes/No

m) Electricity facilities : Yes/No

25. Is there any facility in the home modified to suit your requirements : Yes/No

a) If Yes, specify

26. Do you have recreational facilities like

1) Watching TV/Movies : Yes/No

2) Reading newspapers :

3) Reading other books :

4) Playing with grand children :

5) Gardening :

6) Playing cards :

7) Others (specify) :

27. Do you attend social functions such as,

a) Marriage

b) Birthdays

c) Any other (specify)

28. Do you visit any religious places : Yes/No

a) If yes, specify the type	:	a) Church
of religious place	:	b) Temples
	:	c) Others (specify)
b) Frequency of visit	:	Daily/Weekly/Monthly
c) Mode of Travel	:	walking/Bus/Own car/ Any other (specify)

29. Do you have any social organisation in your locality : Yes/No/No idea

30. Are you a member of any social organisation : Yes/No

If Yes,

a) Specify the name :

b) Type of membership :

c) Duration of membership :

d) Do you utilize the facilities available there :

31. Do you suffer from any health problems : Yes/No

If Yes, specify

Heal problem	Duration	Medication
1) Indigestion		
2) Anorexia		
3) Constipation		
4) Diabetes		
5) Cardio-vascular diseases		
6) Arthritis		
7) Osteoporosis		
8) Disabilities		
9) Cataract		
10) Asthma		

11) Hypertension

12) Insomnia

13) If any other (specify)

32. Do you take a routine medical check up: Yes/No
a) If yes, specify the frequency:

33. Do you take any medicines regularly to cure the health problems : Yes/No

If Yes, specify

i) Whether it is taken under medical supervision

ii) Type of medicines used :

iii) Frequency of use :

34. Do you utilise the medical facilities available in your locality : Yes/No

35. Have you changed your dietary : Yes/No
Pattern to overcome the
Health problems

If yes, specify the modification

36. Do you take physical exercise regularly : Yes/No

If yes, a) Type of exercise or physical activity :
a) Evening walk
b) Gardening
c) Cooking
d) Cleaning
e) Washing clothes
f) Purchasing
g) Care of domestic animals
h) Others (specify)

b) Duration/time : Morning/Evening

37. Whether you do the following activities by yourself

a) Bathing

b) Dressing

c) Transfer out to bed

d) Feeding

38. Do you have the personal habits of

i) Smoking

ii) Alcohol consumption

iii) Tobaco chewing

iv) Use of snuff

v) Use of betal leaves

vi) Any other (specify)

39. During diseased conditions, do the family members take you to the doctor : Yes/No

40. Do you have any servants at home : Yes/No

If yes, works done by the servant

1) Cooking

2) Washing

3) Cleaning

4) Purchasing

5) All

41. In there any sort of friction in your family : Yes/no

42. Do you feel lonely : Yes/No

43. Do you have a feeling of unwanted ness : Yes/No

If institutionalized

1) Name of institution :

2) Place of institution :

3) Specify, whether it is run by : Govt./Private

a) If private, specify details :

4) Number of inmates in the institution :

5) Do you get individual attention from authorities, when there is a need :

6) Do you have freedom to spend money :

7) Do you have freedom to go out :

8) Do you get care from other members living in the institution :

9) Do you have recreational facilities :

10) Do you visit your relatives : Yes/No

If yes, frequency of visit

a) Once in a month

b) Occasionally

11) Do your relatives come to the old age home to visit you : Yes/No

a) If yes, frequency of visit

b) The person who visit

12) Do you get any financial help form your relatives : Yes/No

13) Do you get any other help from family members : Yes/No

(I if yes, give details :

14) Can you specify the reasons for coming to old age home : Yes/No

If yes, specify :

1) Compulsion from children
2) your wish
3) No-body to look after
4) Others (specify)

15) Do you have other facilities like

a) Lavotary facilities

b) Electricity facilities

c) Medical facilities

16) The number of inmates staying in a room:

17) Do you like the atmosphere :

APPENDIX-II

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF HOME SCIENCE

INTERVIEW SCHEDULE TO ELICIT INFORMATION ON THE DIETARY PATTERN OF ELDERLY

1. Serial No. :
2. Food habit : Veg./Non veg.
3. Name of staple food :
4. Who decides the menu of the family
   : 1) Spouse
   : 2) Son
   : 3) Daughter
   : 4) Myself
   : 5) Servant
   : 6) Others (specify)
5. Daily meal pattern : 1) One major meal
   2) 2 major meals
   3) 3 major meals

b)	Meal time	Menu of Ist day	Menu of 2nd day	Menu of 3rd day
1.	Early morning			
2.	Breakfast			
3.	Lunch			
4.	Evening tea			
5.	Dinner			
6.	Any other			

6. Frequency of using various foods

Sl. No.	Food items	Frequency of use					
		Daily	Weekly 4 times	Weekly thrice	Weekly twice	Weekly once	Occasionally
1	Cereals						
2	Pulses						
3	Green leafy vegetables						
4	Roots and tubers						
5	Other vegetables						
6	Fruits						
7	Milk & milk products						
8	Egg						
9	Meat						
10	Fish						
11	Nuts and oil seeds						
12	Fats and oils						
13	Spices and condiments						
14	Sugar and jaggery						
15	Others						

7. Do you/family members maintain account for food expenditure : Yes/No

   i) If yes, in what from : Written/Memory

   ii) Daily/Weekly/Monthly :

8. Do you plan your meals in advance : Yes/No

   i) If yes, what is the basis for planning

   1) Money availability

   2) Total requirement of family members

   3) Likes and dislikes of family members

   4) Food availability

   5) Others (specify)

9. How many times do you cook meals in a day : Once/Twice/Thrice/more than thrice

10. Is there any special foods cooked for you : Yes

    a) If yes, specify

    b) Who does the cooking :

11. What is the cooking device : Gas/Kerosine/smokeless used chulah/wood/heater

12. Do you take any raw foods : Yes/No

    (i) If yes, specify

13. Do you use boiled water for drinking : Yes/No

14. Do you maintain specific time schedule for taking food : Yes/No

    i) If yes, specify with reason

15. Meal serving mattern

    1) Meals taken together with other members

    2) Meals taken by children first and then by parents

    3) Meals taken alone

    4) Others (specify)

16. Do you purchase any prepared food : Yes/No

    i) If yes, vegetable/non-vegetable :

    ii) From where : Hotels/Fast food centres

    iii) Frequency of purchase of prepared goods

Sl. No.	Items	Daily	Weekly	Occasionally	Never

iv) Reasons for purchase :

17. Do you prepare any processed food : Yes/No

i) If yes specify the foods prepared :

ii) Frequency of preparation:

iii) Frequency of use :

18. Do you purchase any processed foods from outside : Yes/No

i) If yes, specify the foods:

ii) Frequency of purchase :

iii) Frequency of use :

19. Do you take different foods on special occasion : Yes/No

i) If yes, give details

Occasion	Food taken	Reason
Birthday Marriage Death Festival Feasts Others (specify)		

20. Do you change the dietary Pattern during diseased condition : Yes/No

(i) If yes, specify

Sl. No.	Disease	Food item included	Reason	Food item avoided	Reasons
1 2 3 4 5 6 7 8	Fever Vomiting Diarrhoea Measles Chickenpox Cardio-vascular disease Constipation Others (specify)				

21. Have you changed your food pattern because of any : Yes/No

religious reasons

i) If yes, specify

22. Do you have any restrictions in taking food items : Yes/No

a) If yes, specify the items

b) Give reasons for restriction

1) Religious

2) Due to disease

3) Dislike towards that food

4) Any other (specify)

23. Do you take any nutrient supplements in the form of tablets or tonics : Yes/No

24. Do you take the nutrient supplement according to the advice of a physician : Yes/No

i) If yes specify, whether it is : Synthetic/Natural

25. Do you prefer any foods : Yes/No
i) If yes, specify the food/ foods

ii) Frequency of intake

26. Do you completely avoid any foods from your diet : Yes/No

a) If yes, specify the foods

b) Reasons for avoiding the food

27. Do you change the consistency of foods : Yes/No
If yes, specify the foods/Preparation

28. Do you have any mental confusion which affect the food intake :

If yes, can you specify it

APPENDIX-III

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF HOME SCIENCE

SCHEDULE FOR CLINICAL ASSESSMENT

1	Name :			Place:
2.	Sex		:	
3.	Age		:	
4.	General appearance		:	Good/Fair/Poor/Very poor
5.	Heart rate		:	
6.	Blood pressure		:	
7.	Eyes			
	i)	Xerophthalmia	:	Mild / Marked / Nil
	ii)	Xerosis	:	Mild / Marked / Nil
	iii)	Visual disturbance	:	Mild / Marked / Nil
8.	Mouth			
	a) Lips			
	i)	Angular stomatitis	:	Mild / Marked / Nil
	ii)	Chelosis	:	Mild / Marked / Nil
	b) Tongue			
	i)	Colour	:	Normal/Pale but coated/Red /Red & raw
	ii)	Surface	:	Normal/Fissured/Ulcered /Glazed and atrophic
	iii)	Glossitis	:	Mild / Marked / Nil
	c) Buccal mucosa			
	i)	Condition	:	Normal/Bleeding or gingivitis/pyorrhoea/ retracted
	d) Gums		:	Normal/Spongy bleeding gum

e) Teeth

i)	Toothlessness	:	Present / absent
ii)	Difficulty in chewing	:	Present / absent
iii)	Fluorosis	:	Present / absent
iv)	Carries	:	Present / absent

9. Hair

i)	Texture	:	Normal/loss of lusture/ discoloured & brittle
ii)	Hair loss	:	Present/absent
iii)	Sparseness of hair	:	Present/absent

10. Nails

i)	Appearance	:	Brittle/Concave/Flattened
ii)	Pitting nails	:	Present/absent
iii)	Thickening of nails	:	Present/absent

11. Skin and appendages

i)	Skin texture	:	Dry/oily/smooth
ii)	Phyrnoderma	:	Mild/moderate/nil
iii)	Rashes in skin	:	Present/absent
iv)	Pressure sore	:	Present/absent
v)	Psoriasis	:	Present/absent
vi)	Numbness	:	Present/absent
vii)	Pain in joints	:	Present/absent
viii)	Stiffness in joints	:	Present/absent
ix)	Swelling of joints	:	Present/absent
x)	Swelling of legs	:	Present/absent
xi)	Swelling of ankles	:	Present/absent
xii)	Pelvic deformity	:	Present/absent

12. Respiratory system

i)	Shortness of breath	:	Mild/marked/nil
ii)	Difficulty in breathing	:	Mild/marked/nil
iii)	Dyspnoea	:	Mild/marked/nil

13. Nervous system

i)	Parkinson's disease	:	Mild/marked/nil
ii)	Peripheral neuritis	:	Mild/marked/nil
iii)	Optic atrophy	:	Present/absent

14. Other problems

i)	Anaemia	:	Mild/marked/nil
ii)	Fatigue	:	Present/absent
iii)	Hard of hearing	:	Mild/marked/nil
iv)	Abnormal sweating	:	Hyperhydrosis/ hyperchromohydrosis
v)	Varicose veins	:	Present/absent
vi)	Oedema	:	Cardiac/hepatic/anasarca/nil
viii)	Goitre	:	Mild/marked/nil

15. Any other characteristic symptom observed by the physician :

16. Weight :

17. Crown-heel length :

18. Mid upper arm circumference :

19. Waist circumference :

20. Hip circumference :

21. Grip strength :

22. Lung capacity :

NUTRITIONAL PROFILE OF THE ELDERLY

By

ROSEMOL JOSE

ABSTRACT OF THE THESIS

Submitted in partial fulfilment of the requirement for the degree of

Master of Science in Home Science

(FOOD SCIENCE & NUTRITION)

Faculty of Agriculture

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ABSTRACT

A study on the nutritional profile of elderly was carried out among 150 elderly persons of 60 to 75 years of age residing in institutions and in houses to assess the socio-economic profile and personal informations, dietary pattern, nutritional status and the factors affecting their nutritional status.

The results of the study indicated that majority of elderly were from joint families and they were literate but they had no income of their own and were dependent on others for money. The past occupational status showed that most of the elderly women were unemployed while elderly male were employed in different sectors. The housing conditions and hygiene of elderly in both groups were found to be good and about 76 per cent of non-institutionalized elderly had a separate room for them whereas in institutions one room was shared by more than two members.

Eventhough majority of the elderly did not attend the social functions, they used to visit various religious places. More than 50 per cent of the elderly in both groups had more than one health problems. The unhealthy habits were found to be more among non-institutionalized elderly and majority of the elderly in both groups did some sort of physical exercises.

Majority of the elderly in both groups were non-vegetarians and followed a dietary pattern of three meals per day. Among the families of non-institutionalized group, major expenditure of the family income was incurred for food. The institutionalized elderly had a specific time for food intake and they had

their meals along with others whereas in non-institutionalized group majority of the elderly did not have a specific time schedule for food intake and they had their meals alone. Consumption of raw vegetables by the elderly was very less.

The weight and mid upper arm circumference of elderly were found to be higher than the suggested levels, but the increase was significant only in non-institutionalized group in the case of weight. The mean height obtained was lower than the standards but found to be significantly higher only in elderly women of non-institutionalized group. Different degrees of chronic energy deficiencies and upper body obesity was found in both institutionalized and non-institutionalized groups. Difference in most of the indices used to assess nutritional status was found to be statistically insignificant between the institutionalized and non-institutionalized groups.

Visual disturbance, toothlessness, difficulty in chewing, hearing problems and anaemia were the important clinical symptoms observed among elderly.

There is no significant difference in grip strength and lung capacity between the institutionalized and non-institutionalized elderly and majority of the elderly in both groups had an increased heart rate and various degrees of hypertension.

None of the socio-economic factors as well as the place of residence had any influence on the nutritional status of the elderly. Hence proper care, feeling of security and conducive psycho-social environment should be given to our elderly population which will indirectly influence their nutritional status.