

# Nutritional Status and Disease Profile of Elderly (>60 Years) Living in the Home for Aged / Old Age Home

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**Abstract:** *One of the major challenges for the health sciences in the present scenario is healthcare of elderly population. A study was conducted to assess the impact of nutrition status and disease profile of elderly using Mini nutritional assessment (MNA). However, very few studies have been done in developing countries to identify and manage their healthcare needs. Hence, the present study was taken up to assess the adequacy of meals, diet quality, nutritional and dietary status of elderly peoples from old age home. A total 120 subjects were selected, a questionnaire were developed to record health status, dietary habits. Nutritional status of respondents was assessed by 24 hour dietary survey and anthropometric measurements, BMI of each subjects is calculated. It was found from MNA that out of 120 elderly people, 30% were well nourished, 55% were at risk of malnutrition, and 15% were found to be malnourished. The study also revealed that the elderly living at old age homes, nutrients intake of Energy, Protein, Fat, Carbohydrates, Calcium, and Iron were statistically significantly lower at 5% level. Comparison of nutritional status of MNA and BMI shows that MNA is the most sensitive tool to determine the nutritional status of elderly more accurately. The study results that high risk at malnutrition in peoples are more and confirm the need of increased care and nutritional support among the elderly peoples. Consuming food rich in nutrients and other bioactive component such as phytochemicals may help to protect peoples against major age-related disorders. The provision of energy dense meals may be the first approach to increase the energy intake with the fortification of food to increase the micro-nutrient intake.*

## 1. Introduction

Old age comprises "the later part of life; the period of life after youth and middle age, usually with reference to deterioration". At what age old age begins cannot be universally defined because it differs according to the context. Most developed-world countries have accepted the chronological age of 50 years as a definition of 'elderly' or older person. The United Nations has agreed that 65+ years may be usually denoted as old age and this is the first attempt at an international definition of old age. However, for its study of old age in Africa, the World Health Organization (WHO) (2016) set 55 as the beginning of old age. At the same time, the WHO recognized that the developing world often defines old age, not by years, but by new roles, loss of previous roles, or inability to make active contributions to society.

Most developed Western countries set the age of 60 to 65 for retirement. Being 60–65 years old is usually a requirement for becoming eligible for senior social programs. However, various countries and societies consider the onset of old age as anywhere from the mid-40s to the 70s. The definitions of old age continue to change especially as life expectancy in developed countries has risen to beyond 80 years old. In October 2016, a paper published in the science journal nature presented the conclusion that the maximum human lifespan is an average age of 115, with an absolute upper limit of 125 years Vansant and Hester (2016)

Gerontologists have recognized the very different conditions that people experience as they grow older within the years defined as old age. In developed countries, most people in their 60s and early 70s are still fit, active, and able to care for themselves. However, after 75, they will become

increasingly frail, condition marked by serious mental and physical debilitation (Allyn & Bacon, 2010)

Therefore, rather than lumping together all people who have been defined as old, some gerontologists have recognized the diversity of old age by defining sub-groups. One study distinguishes the young old (60 to 69), the middle old (70 to 79), and the very old (80+) (E Daniel, 1992). Zizza C.A et al., (2009) another study's sub-grouping is young-old (65 to 74), middle-old (75–84), and oldest-old (85+). A third sub-grouping is "young old" (65–74), "old" (74–84), and "old-old" (85+) Delineating sub-groups in the 65+ population enables a more accurate portrayal of significant life changes (Springer, 2002)

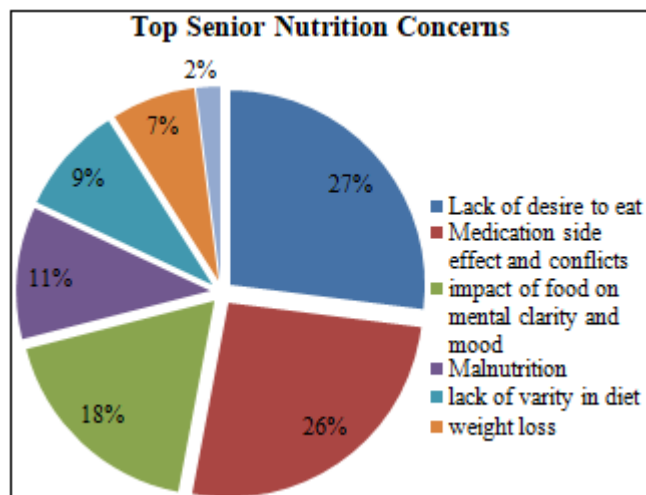
The entire world has been witnessing an increase in the proportion of the elderly population (60 years and above) as a result of low fertility and mortality (Suriya, 1999). In India there are over 70 million peoples above sixty years of age (commonly referred to as elderly) i.e. 6 percent of the population which is likely to touch a hefty 12 percent by 2025 when they will burgeon to about 150 million (Census, 2001). According to Census figures, the proportion of elderly persons (60+) in Uttar Pradesh is expected to have 19 million elderly in 2021 and proportion of elderly persons (70+) is expected to increase 3.75 percent in 2021 for India (Irudaya et al., 2006)

The people of India are living longer. Millions are living up to their eighth or ninth decade of life (Kalyan Bagchi, 2000). As per the Human Development Report, the life expectancy in India has increased from 59.1 in 1990 to 63.3 during 2000 (2002). According to the 2001 census of India, the population of the elderly in the country is about 70 million (7%) and by 2016, it is expected to increase to 114 million, constituting 8-9% of the population (Zechariah, 2001). This change could be attributed to increased access to improved

health facilities, improvement in the overall development of socio-economic status, and change in life-style pattern of the community, leading to transition from high birth and death rates to low fertility and mortality rates (Suriaya Ismail 1999)

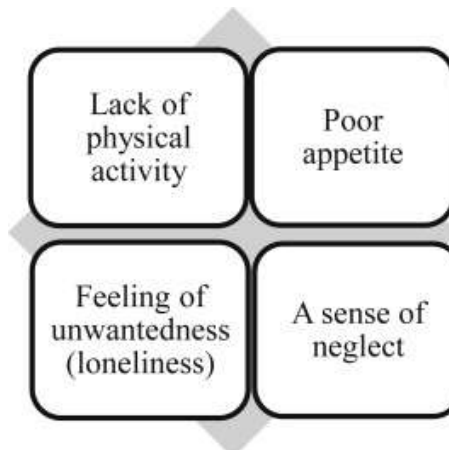
The increased longevity on the other hand is associated with multiple problems and the elderly are nutritionally at greater risk with multiple risk factors such as psycho-physiological, socio-economical, environmental and the like (Odilian et al., 1999). Similarly, with the increase in the proportion of the aged population worldwide, the burden of chronic diseases and disabilities also is poised to increase (Woo, 2000)

In India, elderly are at a high risk of chronic under nutrition (Gopalan, 2000) with an overall prevalence of 51% of Chronic Energy Deficiency (Arlappa et al., 2003). In India, Tribes constitute about 8% of the total population and about 472 groups with great ethnic diversity have been recognized as Scheduled Tribes by the Government of India (Basu, 1993). Tribes are endogamous population, isolated from general people with physical, socio-economic, and cultural characteristics (Figure 1) they reside in hilly and thick forest areas. These tribes are socio-economically most backward and vulnerable to health and nutritional problems, with higher infant and maternal-mortality rates and under nutrition (2001) compared with rural population. Nutritional assessment plays significant role in identifying those persons who are at nutritional risk (Beverley, 1999). Though the information on the nutritional status of rural elderly at national level is reported by National Institute of Nutrition (Arlappa et al., 2003)



**Figure 1:** Factors effecting nutritional status of elderly (Arlappa et al., 2003)

As a population, older adults are more prone to age-related diseases, functional impairment, and physical inability that may interfere with the maintenance of a good nutritional status (Figure 2) Aging refers to a multidimensional process in humans, the process of physical, psychological, and social changes.



**Figure 2:** Age-related changes relevant to nutrition

The cutoff for old age cannot be defined exactly because the concept of old age does not have the same meaning in all societies. Government of India adopted the “National Policy on Older Persons” in January 1999. The policy defines “senior citizen” or “elderly” as a person who is 60 years of age or older; however, the age of senior citizen differs in various parts of the world. According to the definition given by the National Policy on Older Person (Government of India), the elderly group is stratified on the basis of age (Table 1) (Rowl and Kahn, 2005)

#### Age stratification among the elderly

60–69 y	70–79 y	80 + y
Old	Old old	Oldest old
60–74 y	75–84 y	85 + y
Young old	Middle old	Old old

**Note-** From “National Policy on Older Persons” (2005)

Demographically, aging is the growth of the aged population (60 + years) in proportion to the total population over a period of time. A country is said to be aging if the proportion of people over 65 years of age reaches 7%. The elderly population is the fastest growing segment throughout the world. In the next 30 years, there will be a rise in elderly population of up to 300% in Asia and Latin America (Table 2) (2012)

**Table 2:** World trends in population growth of people aged 60 + years, 1980–2020 (in millions)

	1980	1990	2000	2010	2020
World	381.2	484.7	608.7	754.2	1011.6
Developed countries	173.3	203.6	234.6	232.4	308.2
Developing countries	207.9	281.8	374.1	491.8	703.4
China	78.6	101.2	131.7	167.9	238.9
India	44.6	60.2	81.4	107	149.7

**Note.** From “United Nations” (2012)

Older adults (aged  $\geq 65$  y) tend to be more prone to nutritional deficiencies, because aging may come with an accumulation of diseases and impairments. These include cognitive and physical decline, depressive symptoms, emotional variation, and poor oral health, along with socioeconomic changes. All of these factors may directly influence the balance between nutritional needs and intake. Even in cases of adequate nutrient and energy intake, the nutritional status of older adults can be challenged by a

compromised nutrient metabolism (such as absorption, distribution, storage, utilization, and excretion), drug–nutrient interactions, or altered nutrient needs. This will result in an increase of older adults at risk of malnourishment (Zeanandin G et al., 2012)

Malnutrition is related to a decline in general functional status and to decreased bone mass, immune dysfunction, delayed post surgery recovery, high hospitalization and readmission rates, and increased mortality, among other problems. Although malnutrition is a prognostic factor associated with morbidity, mortality, and costs of care. Nutritional problems in older adults often remain undetected or unaddressed. One-fourth of the patients who are nutritionally at risk do not receive nutritional support or counseling, despite having been in contact with health care professional's Orrevall Y et al., (2009).

Each older has unique needs, so dietary recommendation should be individualized. The current dietary reference intake, establish to optimize health for individuals and groups, provide a guideline for assessing intake and estimating needs and reflect the latest understanding about nutrient requirement (Krause, 2004)

The geriatric population has multiple issues that can affect their health. Financial worries and lack of emotional support can compound their health problems. A small study was undertaken with following objectives-

- To assess the nutritional status of elderly peoples (60 years and above) living in the old age homes.
- Different assessing tools were used such as BMI, 24 hour dietary recall and MNA (Mini Nutritional Assessment).
- Impact of socio-economic status on nutritional status of elderly peoples living in old age homes.
- Determine the disease profile of elderly people living in old age homes

## 2. Methodology

Nutritional wellbeing is an important component of health, independence and overall quality of life among individuals. Diet plays a vital role in maintaining health for everyone but is especially important for older peoples. Nutritional needs changes throughout life. For the elderly, these changes may be related to normal aging processes, medical conditions, or lifestyle. Older people are considered to the vulnerable groups in society often suffering from a multitude of health problems (Sumathi S et al., 2015)

An older person is defined as any individual aged 60 years or above. In developed countries, the population median value of chronic multi-morbidity, disability and mortality are close to 65, 75, 85 years of age, respectively. Accordingly three subsets can be found in elderly population:

The young old age group (65 -75) encompasses a population with a high prevalence of chronic multi-morbidity and relatively low rate of frailty, disability and mortality. The middle old age group (75 -84) has a high prevalence of multi- morbidity, frailty and disability. The atypical presentation of disease becomes 'typical' with an increased frequency of geriatrics symptoms and functional impairment

has the first symptoms of disease. Survival is largely influenced by the patient's functional status.

The oldest – old age group (85 years and above) has a high morbidity, frailty and disability rate. It is a population of a group where the incidence of disease selected decline and the profanity of death deceleration. Survival is definitely influenced by the level of function.

### Study design:

The comparative trend study was carried out with the following descriptive analytical aspects.

### Selection of subject:

The present study was undertaken to assess nutritional status, Disease profile and the factors contributing the adequacy of diet quality of the elderly people living in old age homes.

### Selection of area:

The present study was conducted to assess the nutritional status; Disease profile and dietary pattern of elderly. 120 subjects were selected. Who are Residing at old age homes (Fatima old age home) from Falaknuma and Nampally, Hyderabad.

### Sample size:

A total of 120 subjects in the age group 60 years and above from old age homes were selected. The subjects were briefed about the study prior to the data collection.

### Data collection:

The data was collected in a single way by using a convenience sampling method. The sample was explained about the purpose of the study. For the content to be valid, the questionnaire and MNA was pre-tested on five samples.

Before administering the questionnaire necessary explanations for filling the questionnaire was given to the sample. Those who were willing to participate were present during the period of the study were only included as the sample.

Questionnaire is an important tool of study. A questionnaire is a written form used in gathering information on some subjects, consisting list of questionnaire. It consists of precise questions to yield information needed for research study.

A well designed and pre-tested questionnaire was administered to all samples comprising of question related to Demographic Data, Food frequency list, Diseases profile and Dietary Habits.

The questionnaire consisted of the following heads: (Appendix I)

- 1) General information.
- 2) Anthropometric data.
  - a) Measurement of height.
  - b) Measurement of weight.
  - c) Calculation of BMI.
- 3) Demographic data.
- 4) Dietary Information.



- 5) Past Medical history.
- 6) Medical history.
- 7) MNA questionnaire (Appendix II)
- 8) 24 hours dietary recall (Appendix III)

#### **General information:**

Data regarding the subjects name, age, gender, family type were collected. The results are tabulated and discussed in chapter VI.

#### **Anthropometric assessment:**

Anthropometry involves obtaining physical measurements of an individual and relating them to standards that reflects the growth and development of the individual. These physical measurements are another component of the nutritional assessment is useful for evaluating over nutrition or under nutrition. They can be used to monitor the effects of nutritional intervention. Anthropometric data are most valuable when they reflect measurement and are recorded over a period of time. Common voluble measurements are height, weight, skin fold thickness and mid upper arm circumference.

#### **Measurement of height:**

The rate of length or gain reflects the long term nutritional adequacy. Height of the subject was measured by using a measuring scale. The subjects were asked to stand erect and look straight ahead and body in same position and height was measure in cm. The results are tabulated and discussed in chapter-IV.

#### **Measurement of weight**

Weight is another measure that is easy to obtain and sensitive measure of nutritional adequacy than height and reflects recent nutritional intake.

Subjects were asked to stand over the centre of weighting scale with the body weight evenly

Distributed between both feet, arms hanging freely by the side of the body and palms facing the thigh, head up, facing forward. Weight was recorded in Kg. The result are tabulated and discussed in chapter-IV.

#### **Body Mass Index (BMI):**

BMI is validated measure of nutritional status. This required height and weight measurement based on the results it indicated nutritional status. BMI account for difference in the body composition.

BMI was obtaining by dividing the body weight in Kg height in meter square.

$BMI = \text{Weight in Kg} / \text{height in m}^2$ .

BMI index has the last correlation with body height and the highest correlation with

Independent measure of body fat for adults. BMI ranges are based on the relationship amount

Body weight, diseases process and mortality.

Healthy BMI for adults is considered as 18.5-22.9 Kg/m<sup>2</sup>.

According to WHO (2007), BMI is classified as

<18.50	Underweight
18.5 - 22.9	Normal
23 - 24	Overweight 1
>25	Overweight 2
25 - 27.49	Pre-obese 1
27.5 - 29.9	Pre-obese 2

The results are tabulated and discussed in Chapter-IV.

#### **Demographic profile:**

Data regarding the monthly income, employment, marital status were collect from the subjects. The results were tabulated and discussed in Chapter-IV.

#### **Dietary information:**

Data regarding subjects eating habits wither they are vegetarians and non- vegetarians, timing of meals, gastro intestinal symptoms experienced and consumption of tea/coffee, smoking or drinking habit of subject was collect by interviewing the subject and subjects and were recorded in the questionnaire Food frequency questionnaire is either interviewer administered or self completed. Detail questionnaire includes the list of foods and the subjects answers as how often and in what quantity each food eaten per day, per week per month. It gives an estimate of the amount of frequency of the various food consumed by the individual.

Data regarding frequency of consumption of junk food like burger, pizza, puff, chips, fresh fruit juices, cool drink, and soft drinks were obtained from subject and the responses were recorded in the questionnaire.

#### **Past Medical History:**

To know the medical condition of the subjects. Information regarding the subjects past medical history was collected. Information regarding the subjects past medical history like HTN, DM, hyper thyroid and Hypo thyroid, the duration of diseases and the family history was collected. The results were analyzed, tabulated and discussed in chapter-IV.

#### **Medical history:**

For clinical assessment, each patient was interviewed for the presence of signs and symptoms such as Dizziness, Insomnia, Vision problem, Diabetes, Hypertension, Arthritis, Osteoporosis, Asthma, Heart problems and frequent infection were recorded on the questionnaire. The results were analyzed and tabulated in chapter-IV.

#### **MNA (Mini Nutritional assessment): (Nestle Nutrition Institute 2016) (Appendix II)**

The MNA is a validated nutrition screening and assessment tool that can identify geriatric patients age 65 and above who are malnourished or at risk of malnutrition. The MNA was developed nearly 20 years ago and is the most well validated nutrition screening tool for the elderly. Originally comprised of 18 questions, the current MNA now consists of 6 questions and streamlines the screening process. The current MNA retains the validity and accuracy of the original MNA in identifying older adults who are malnourished or at risk of malnutrition.

The Mini Nutritional Assessment (MNA) has been developed to detect malnutrition in elderly patients. It

includes anthropometric measurements. The MNA distinguishes adequate nutritional status (MNA score >24), risk of malnutrition (MNA score 17 – 23) and frank malnutrition (MNA score <17). The results were analyzed, tabulated and discussed in Chapter- IV.

#### 24 Hour dietary recall: (Appendix III)

24 hour dietary recall is method is used to obtain a general picture of person's food intake. It is used to elicit an accurate picture of the diet history. In 24hr dietary recall method, the actual food and drink consumed in the immediate past 24 hours is recorded. Information regarding the food intake was obtained through 24 hour dietary recall method. The subjects were interviewed using standard cups, serving size and amount of food consumes was recorded. The nutritive value for energy, fat, protein, calcium and iron was calculated using Nutritive Value of Indian foods by ICMR. The mean intake of above nutrients was compared with RDA .The results were analyzed using t-test and tabulated in chapter-IV.

### 3. Results and Discussion

Nutrition is the basic human need and a prerequisite for healthy life. A well proportionate diet is essential from the beginning stages of life for complete growth, development and maintenance of normal body functioning, Physical activity and health (RDA, ICMR, 2016) Nutrition in geriatric needs a special attention considering factors that affect the nutritional status of an aging individual .Physiological changes that occur with age like body composition reduced, impaired organ function, therapeutic drugs affect nutritional status of elderly people. Apart from these, emotional problems, insufficient funds, inability to shop and food preparation problems, adherence to specific diet, alcohol, above all the individuals taste play a more important role for the selection of food than does the availability of nutrients (Sebring NG et al., 1995)

It is widely recognized that a nutritionally sound diet is fundamental to human health and wellbeing across the lifespan. A poor diet contributes a poor health and is a well-established, modifiable risk factor for the development of non communicable diseases, which are leading causes of death globally (Geneva WHO., 2009) during old age; people are often not keen in opting for variety of foods. In some cases, food become monotonous and few starts skipping their meals, resulting in malnutrition. On the convenient and fast foods, become the victims of over nutrition (NIN, ICMR, 2016)

Peoples consume foods and nutrients in different combination, and analyzing food consumption as dietary patterns is a complementary method to the traditional method that focuses on single nutrients and foods. By studying food synergy, the interaction between different foods, one might better understand the relationship between food consumption and health (Jacobs Jr et al., 2009)

The results of the present study are discussed as follows:

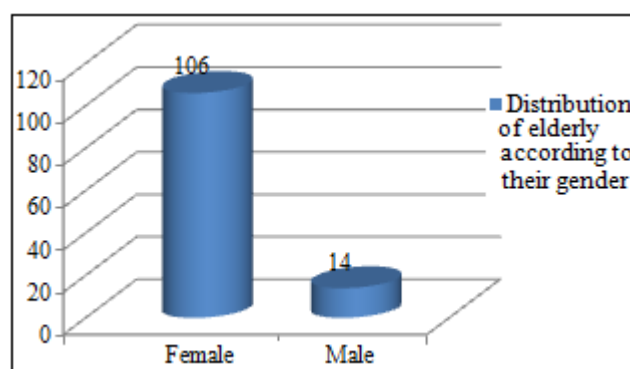
#### 3.1 General Information

**Table 1:** Gender profile of elderly

Gender	Old age home (n=120)
Female	106(88)
Male	14(11)
Total	120

The values given in parenthesis {( )} are percentages

The data in the Table no.1 shows the distribution of elderly subjects residing at Old age homes according to their gender. It was observed that in the old age homes out of 120 subjects, majority 88% were females and 11% were males. Thus, it was observed that females residing at old age homes were higher in number than the males.



**Figure 1:** Distribution of elderly according to their gender

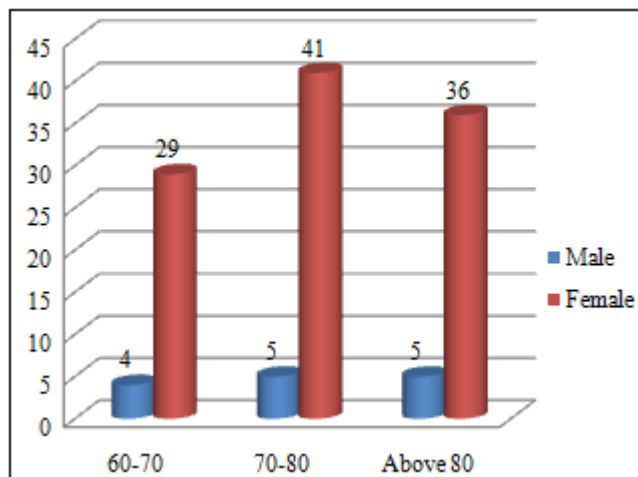
Figure 1 shows the number of females residing at old age home where more than males

**Table 2:** Distribution of elderly according to their age

Age	Old age home (n=120)		Total (N=120)
	Males	Females	
60-70	4	29	33(27)
70-80	5	41	46(38)
Above 80	5	36	41(34)
Total	14	106	120

The values given in parenthesis {( )} are percentages

The data in table no 2 shows the distribution of subjects living in Old age home according to their ages. It was observed that in Old age home 27% were in the age group of 60-70, 38% belongs to 70-80 years of age group while 34% were above 80 years of age. Majority 38% of the subjects in the age group of 70-80 years



**Figure 2:** Represent's Distribution of elderly living in old age home according to their age

Figure 2 shows that 24% of females residing at old age home were in the age group of 60-70 years, 31% were 70-80 years of age and 28% females were above 80 years of age. The numbers of males residing at old age home was comparatively lesser than females and 6-8% males were in the age group of 60-80 while 4% were above 80 years of age.

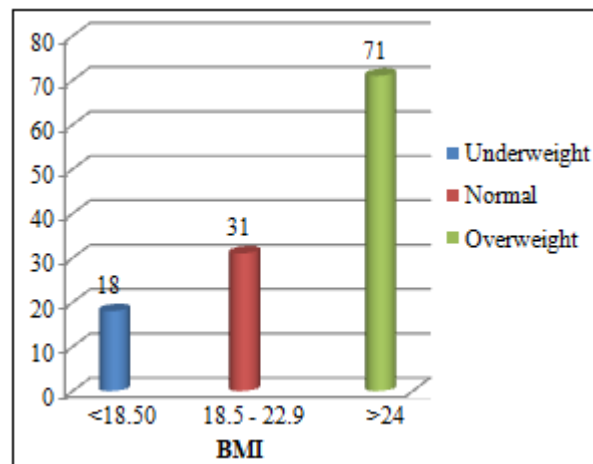
#### Anthropometric data

**Tables 3:** Distribution of elderly according to their BMI

BMI (units)	BMI Classification	Old age home (n=120)
<18.50	Underweight	18(15)
18.5 - 22.9	Normal	31(25)
>24	Overweight	71(59)
Total	Total	120

The values given in parenthesis { ( ) } are percentages

The data given in table no 3 shows the distribution of elderly subjects living in the old age home according to their BMI. It was observed that majority 59% of the subjects living at old age home were fall under the overweight, 25% of them were with normal BMI and 15% amongst them were having underweight. It was observed that majority 59% of subjects living at old age home were found to be overweight. Saxena V, et al (2015) reported that 35.5% elderly were found undernourished and 15% were in the category of overweight/obese. Neelam Yadav, et al (2012) reported that maximum numbers of elderly were normal 48.4% whereas 36.9% were obese. Percentage of underweight elderly was 14.6%.



**Figure 3:** Distribution of elderly living in old age home according to their BMI

Figure 3 shows that 71% of the subjects residing at old age homes were overweight. Whereas 31% of subjects were normal with their BMI and 15% were underweight.

#### Demographic Data

**Table 4:** Distribution of elderly according to their employment

Employment	Old age home(n=120)
Homemaker	98 (82)
Self employed	0(0)
Government employ	4(3)
other	14(11)

The values given in parenthesis { ( ) } are in percentages

The data in the table no.4 shows the distribution of subject living at old age home according to their employment. It was observed that in old age home 82% of subjects were Homemaker, followed by 3% amongst them were government employ, whereas 11 % of the subjects living at old age home were employed. Thus it was observed that majority of the subject living at old age home were homemaker. Puneet Ohri, et al (2014) reported that out of individuals, 59% individuals were illiterate, 46% among males and 71% among females. Most of 68.8% elderly individuals belonged to lower socio-economic class.

**Table 5:** Distribution of elderly according to their monthly income

Monthly income	Old age home (n=120)
2-5,000	66(55)
5-10,000	32(26)
10-15,000	15(12)
Above 15,000	7(5)
Total	120

The values given in parenthesis { ( ) } are in percentages

The data in the table no.5 shows the distribution of subject living at old age home according to their monthly income. It was observed that in old age home 55% if subjects were in range of 2-5,000 income and 26% of subjects were in range of 5-10,000 income, while only 15% amongst them were in high income of 10-15,000. Thus it was observed that

majority of the subjects who did not earn wages more stay at old age home.

**Table 6:** Distribution of elderly according to their marital status

Marital status	Old age home(n=120)
Single	3(2)
Married	95(79)
Separated / divorced	6(5)
Widowed	17(14)
Total	120

The values given in parenthesis {} are in percentages

The data in the table no.6 shows the distribution of subject living at old age home according to their marital status. It was observed that majority 79% of the subject was married, 14% of the subject were widowed and 5% of the subjects were separated/divorced. Thus it was observed that in old age home the more number of subjects are married. Surajit Lahiri, et al (2014) reported that elderly subjects living at old age homes 86% were married the rest were widow.

**Table 7:** Reasons for staying at old age home

Reasons	Old age home(n=120)
Self	10(8)
No financial support	22(18)
Loneliness	79(66)
Children settled abroad	9(6)
Total	120

The values given in parenthesis {} are in percentages

The data in the table no.7 shows the distribution of subject living at old age home according to their reasons for staying at old age home. It was observed that majority 66% of subjects stayed at old age home that they feel lonely, 18% of the subject have no financial support, whereas 6% of the subjects were stayed at old age because of their children settled at abroad.

### Dietary Information

**Table 8:** Distribution of elderly according to their Food preference

Food preference	Old age home(n=120)
Vegetarian	35(29)
Non vegetarian	75(63)
Ovo vegetarian	10(8)
Vegan	0
Total	120

The values given in parenthesis {} are in percentages

The data in the table no.8 shows the distribution of subject living at old age home according to their food preference. It was observed that majority 63% of the subjects were non vegetarian, followed by 29% of the subjects were vegetarian. While only 8% of the subjects were ovo vegetarian.

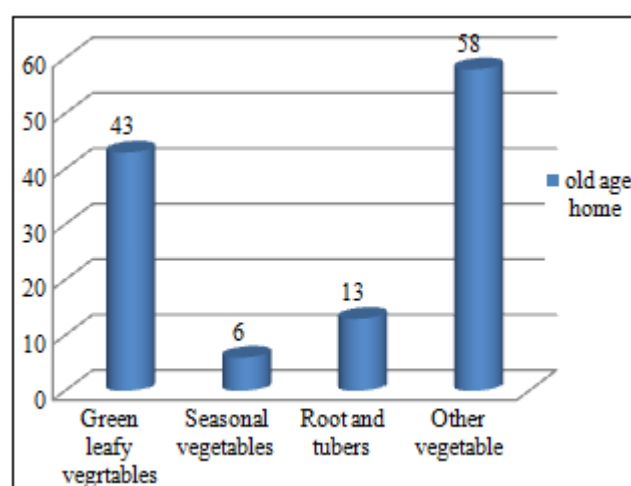
**Table 9:** Distribution of elderly according to their dietary information

Characteristics		Old age home
Number of meals per Day	<div><div>✓</div>≤ 3 meals</div> <div><div>✓</div>3-4 meals</div> <div><div>✓</div>4-5 meals</div> <div><div>✓</div>≥ 6meals</div>	<div><div>•</div>2(1)</div> <div><div>•</div>101(84)</div> <div><div>•</div>17(14)</div> <div><div>•</div>0</div>
Meal timings	<div><div>✓</div>Regular</div> <div><div>✓</div>Irregular</div>	<div><div>•</div>96(80)</div> <div><div>•</div>24(20)</div>
Skipping of meals	<div><div>✓</div>Sometimes</div> <div><div>✓</div>Often</div> <div><div>✓</div>Rarely</div> <div><div>✓</div>Never</div>	<div><div>•</div>10(8)</div> <div><div>•</div>17(14)</div> <div><div>•</div>42(35)</div> <div><div>•</div>52(43)</div>
Type of diet Consumed	<div><div>✓</div>Normal diet</div> <div><div>✓</div>Soft diet</div> <div><div>✓</div>Semi solid diet</div> <div><div>✓</div>Liquid diet</div>	<div><div>•</div>106(88)</div> <div><div>•</div>3(2)</div> <div><div>•</div>11(9)</div> <div><div>•</div>0</div>
Fasting	<div><div>✓</div>Weekly</div> <div><div>✓</div>Monthly</div> <div><div>✓</div>Yearly</div> <div><div>✓</div>None</div>	<div><div>•</div>13(10)</div> <div><div>•</div>0</div> <div><div>•</div>0</div> <div><div>•</div>107(89)</div>

The values given in parenthesis {} are in percentages

The data in the table no.9 shows the distribution of subject living at old age home according to their dietary information. It was observed that number of meals consumed per was 3-4 meals was high 84% amongst the subjects, followed by 14% of the subject consume ≤ 3 meals per day. It was also observed that meal timings was regular 80%, 20% of the subject was carrying irregular meal timing. Skipping of meals was observed as less 8% amongst the elderly living at the old age home .The type diet consumed by majority 88% was Normal diet, 9% of the subjects were on semi solid diet. Elderly practicing religious fasting were 10%. It was observed that majority of the elderly consumed 2-3 meals per and consume normal diet with no fasting.

### Distribution of elderly according to their food frequency questionnaire:



**Figure 4:** Distribution of elderly according to their food frequency questionnaire

Figure 4 shows that 69% of the subjects residing at old age homes were consume other vegetables. Whereas 51% of subjects were consume green leafy vegetables and 7-10% were consumed seasonal vegetables and root and tubers. It



was observed that majority were consuming other vegetables on daily bases.

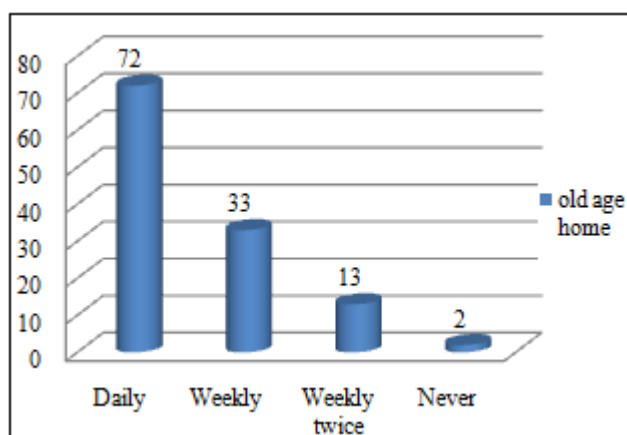
**Table 10:** Distribution of elderly according to their food consumption

Characteristics	How often they consume Food	Old age home (n=120)
Root and tubers	✓ Everyday	• 40(33)
	✓ Ones a week	• 35(29)
	✓ Twice a week	• 45(37)
	✓ Ones a month	• 0
Other vegetable	✓ Everyday	• 47(39)
	✓ Ones a week	• 18(15)
	✓ Twice a week	• 21(17)
	✓ Ones a month	• 34(28)
Non vegetarian	✓ Everyday	• 26(21)
	✓ Ones a week	• 41(34)
	✓ Twice a week	• 47(39)
	✓ Ones a month	• 6(5)
Fruit	✓ Everyday	• 42(35)
	✓ Ones a week	• 63(52)
	✓ Twice a week	• 13(10)
	✓ Ones a month	• 2(1)

The values given in parenthesis {} are in percentages

The data in the table no.10 shows the distribution of subject living at old age home according to their food consumption. It was observed that the number subjects consume root and tubes everyday were 33% and 45% consumed root and tubes twice a week. Other vegetable were consumed by 39% everyday, 18% were consumed ones a week and 34% subject were consume other vegetables ones a month. Non vegetarian were 91% in old age home. Often consumption of non vegetarian like egg ,meat ,poultry and sea food.21% consume on everyday base followed by 34% were consumed ones a week and 5% ones a month. Consumption of fruits in old age home were 35% everyday, 52% ones a week and 2-13% twice a week or ones a month. It was observed that the numbers of subjects living in old age home were non vegetarian and they consume green leafy vegetables in moderate quantity.

#### Distribution of respondent consumption of milk:



**Figure 6:** Distribution of respondent consumption of milk

The values given in parenthesis {} are in percentages

Figure 6 show that elder living in old age home consumes milk daily. It was observed that majority of 60% subject consume milk.60% of subjects consume milk daily followed by 27% consumed milk weekly and 1% never consume the Milk.

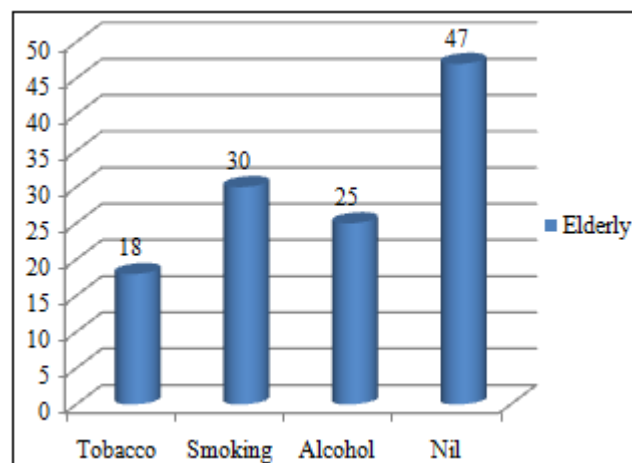
**Table 11:** Distribution of elderly according to their consumption of snacks and Dry fruits

Characteristics	n=120	Old age home
Snacks	✓ Yes	• 120
	✓ No	• 0
Dry fruits	✓ Yes	• 74(61)
	✓ No	• 46(38)

The values given in parenthesis {} are in percentages

The data in the table no.11 shows the distribution of subject living at old age home according to their consumption of snacks. It was observed that cent percent of the subject takes snacks whereas only 61% of the subjects consume dry fruits.

#### Distribution of elderly according to their unhealthy life style habit:



**Figure 7:** Distribution of elderly according to their unhealthy life style habit

Figure 7 show the unhealthy life style habit of subjects living in old age home. It was observed that 39% of elderly living a healthy life style whereas 15 - 30% of subjects are involve in smoking, alcohol or tobacco consumption. Majority of elderly were living a healthy life style. Unhealthy life style can let too many problems which may be cause for many diseases.

**Table 12:** Distribution of elderly according to their exposure to sunlight

Characteristics	n=120	Old age home
Exposure to sunlight	✓ Yes	• 120
	✓ No	• 0
Duration	✓ 5 minutes	• 18(15)
	✓ 5-10 minutes	• 0
	✓ 10-15 minutes	• 68(56)
	✓ More than 30 minute	• 34(28)

The values given in parenthesis {} are in percentages



The data in the table no.12 shows the distribution of subject living at old age home according to their exposure to sunlight. It was observed that 56% of the subjects were exposed to sunlight for 10 -15 minutes per day. Followed by 18- 28% of the subjects were exposed to sunlight more than 30 minutes.

### 1) Medical history:

**Table 13:** Distribution of elderly people living at old age home according to their health condition

Symptoms	Old age home (n=120)
Dizziness	99(82)
Insomnia	89(74)
Diabetes	39(32)
Hypertension	18(15)
Arthritis	24(20)
Osteoporosis	23(19)
Asthma	6(5)
Heart problem	11(9)
Any other	37(30)
None	18(15)

The values given in parenthesis { ( ) } are percentages

The data given in table no. 13 are distribution of elderly people living at old age home according to their health condition. It was observed that 82% of the subjects were suffering with dizziness, followed by 74% of them were suffering from insomnia, 32% of diabetes, 15% of hypertension, 20% of arthritis, 19% of osteoporosis, 5% of asthma, 11% of heart problem and 18% were with no medical history having none of the above dizziness, frequent infection. It was observed that subjects residing in old age home were more prone to diabetic, dizziness and insomnia was seen higher in the subjects living in old age home. Hence it was observed that the above conditions were seen more in all the subjects living in old age home.

It was also observed that majority suffer from constipation, gastritis, difficulty in chewing or swallowing, dental caries, and loss of appetite.

### 2) Mini nutritional assessment:

**Table 14:** Distribution of elderly people living at old age home according to their Mini Nutritional Assessment (MNA) score

Malnutrition indicator score	MNA score	Old age home (N=120)
Malnourished	< 7	18(15%)
At risk of malnutrition	8-11	66(55%)
Well nourished	12-14	36(30%)
Total	14	120

The values given in parenthesis { ( ) } are percentages

The data given in the table no.14 are distribution of elderly people living at old age home according to their Mini Nutritional Assessment (MNA) score. It was observed that the subjects living at old age home 15% of them were malnourished. Similarly 55% were at risk of malnutrition, while only 30% among them were well nourished. Thus it was observed that majority 55% of the subject living at old

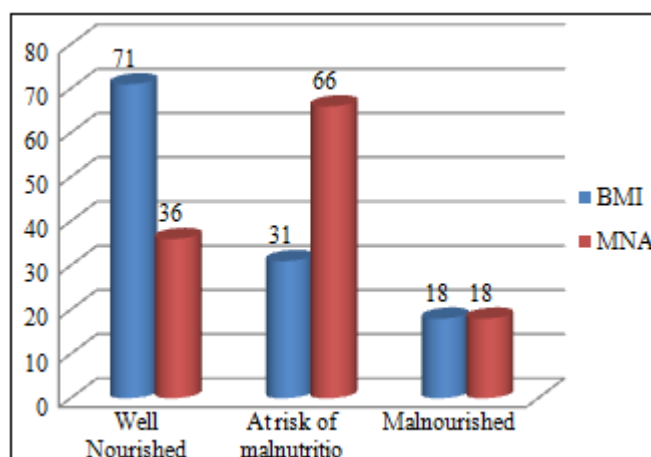
age home were at risk of malnutrition when compared to the subjects 15% were malnourished living at old age home.

**Table 15:** Comparison of nutritional status of elderly using MNA score and BMI

Residence	Well Nourished		At risk of malnutrition		Malnourished	
	BMI	MNA	BMI	MNA	BMI	MNA
Old age home	71(59)	36(30)	31(25)	66(55)	18(15)	18(15)
Total	n=120					

The values given in parenthesis { ( ) } are percentages

The data given in the table no.15 are comparison of nutritional status of elderly living at old age home using MNA score and BMI. It was observed that according to BMI 15% of the subjects were malnourished, whereas 59% were well nourished and 25% were at the risk of malnutrition. Thus, it was observed that according to BMI, 15% of the subjects living at old age home were malnutrition when compared with MNA score 15% of subjects were also seen to be malnourished, similarly according to BMI 25% of the subjects living at old age home were at risk of malnutrition when compared with MNA 55% of subjects living at old age home were at risk of malnutrition and 71% of subjects were well nourished according to BMI when compared with MNA 30% were well nourished. Majority (55%) of subjects living at old age home were at risk of malnutrition.



**Figure 8:** Comparison of nutritional status of elderly using MNA score and BMI.

Figure 8 shows the comparison of nutritional status of elderly using MNA score and BMI. It was observed that majority of the subjects were well nourished according to both MNA and BMI. Followed by the subjects at risk of malnutrition is more according to MNA and moderate according to BMI whereas in subjects were malnourished were equal (15%) according to MNA and BMI. Further comparison of data is calculated by coefficient of correlation formula given below in Statistical analysis.

Aditya Vedantam, et al (2009) reports that the MNA classified 14 % as malnourished and 49 % at risk of malnourishment. Using BMI as the only indicator, 59 % were in the normal range and 32 % were found to be underweight. Neelam yadav, et al (2012) reported that 38.9% were found to be well nourished, 37% were at the

risk of malnourish and 24.5% were malnourished in elderly population.

### 24hr Dietary recall

**Table 16:** Nutritional Intake of Elderly Living in Old Age Home

Nutrients	RDA	Old age homes	Calculated 't' value
Energy	1883 k.cal	1738.611±69.7	-87.7 <sup>NS</sup>
Protein	60 g	54.2±2.9	-8.48 <sup>NS</sup>
Fat	35 g	27.5±0.61	-51.7 <sup>NS</sup>
Carbohydrates	300 g	298.2±56.8	-0.12 <sup>NS</sup>
Calcium	600 mg	519.4±234.7	-0.16 <sup>NS</sup>
Iron	21 g	17.8±0.96	-15.05 <sup>NS</sup>

<sup>NS</sup> - Non-Significant.

### Energy

The data in the table no.16 shows the mean nutrient intake of elderly living in old age home. It was observed that mean energy intake of subjects living at old age home were found to be 1738.6 k.cal which is lower than the RDA. Hence, Non-Significant at 0.05% level so energy is considered as non-significant. Low intake of energy is due to the subject did not consume meals and skipped one of their meals.

### Protein:

The mean protein intake of subjects living at old age home was found to be 54.2 g. This is statistically non-significant than the RDA at 0.05% level because the diet was not rich in protein food, more plate wastage was seen and most of them were vegetarian.

### Fat:

The mean fat intake of the subjects living at old age home was found to be 27.5 g. This is statistically non-significant than the RDA at 0.05% level because the skipping of meals and plate wastage was more.

### Carbohydrate:

The mean carbohydrate intake of subjects living at old age home was found to be 298.2 g. This is statistically non-significant than the RDA at 0.05% level because the intake of carbohydrate from the meals is lower than the required RDA.

### Calcium:

The mean calcium intake of subjects living at old age old age home was found to be 519.4 mg. This is statistically non-significant than the RDA at 0.05% level because many of the people were osteoporosis.

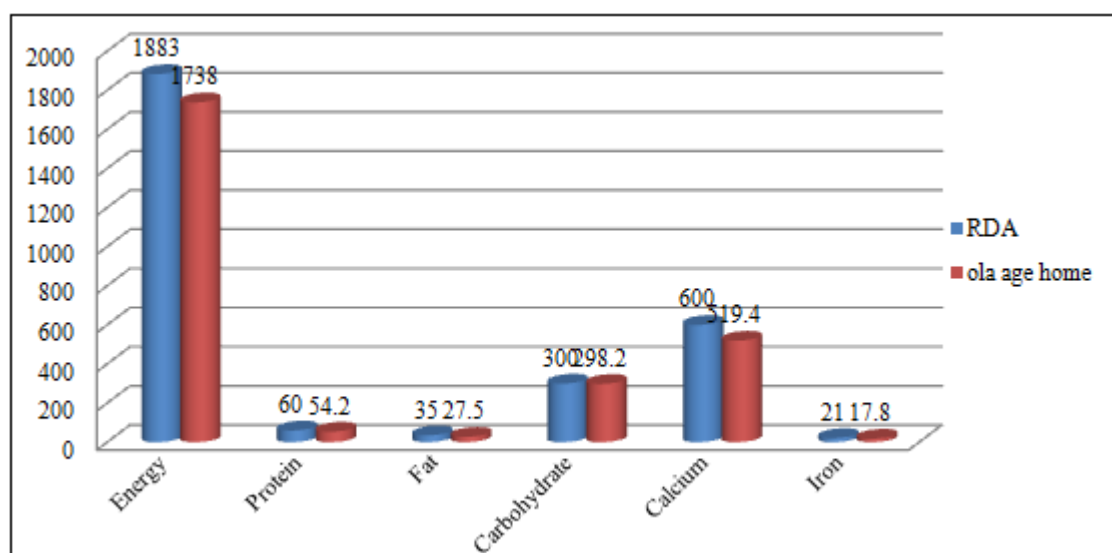
### Iron:

The mean iron intake of subjects living at old age old age home was found to be 519.4 mg. This is statistically non-significant than the RDA at 0.05% level because many of the subjects had low consumption of green leafy vegetables and animal foods.

Data on dietary intake of the subjects in term of nutrients are presented in table no 16. The subject's respondents had failed to meet the ICMR recommended level with respect to energy, protein, fat, carbohydrate, macro and micro nutrients.

Neelam yadav, et al (2012) reported that energy intake was found to be negative in at risk and well nourished group of elderly peoples. Proteins were also lesser than the RDA. Whereas in all the nutrients were found less than RDA.

A study was conducted by Agarwalla et al., (2015) which cited some reasons for inadequate calorie intake were difficulty in chewing and swallowing, and loss of appetite. The inability of elderly to take decisions about food intake, lack of funds, and lack of awareness were other reasons cited. Physical and financial dependently thus definitely influenced nutritional status.



**Figure 9:** Nutritional intake of elderly living in old age home

Figure 9 shows the Mean  $\pm$  standard deviation energy intake of subjects living at old age home. It was observed that the energy intake in subjects living at old age home was less than RDA. Comparison between RDA and nutrient intake at

old age home shows the decreased in nutrients intake according to their age and diseases condition which leads to malnourish in elderly.

It could be concluded from the present study that as the age advances there is corresponding decline in the nutritional status. Overall nutritional status of the subject living at old age home was at risk of malnourishment. Regular assessment of nutritional status of elderly population may be of great concern in maintaining the health status of elderly population. Elderly subjects should be encouraged to include proteins, iron and micro nutrients rich foods (fruits and green leafy vegetables) in their daily dietaries. Utmost care and attention for the elderly is required by their caretakers, nutritionists and medical practitioners as well.

#### 4. Summary and Conclusion

Old age had never been a problem for India where a value based joint family supposed to prevail. Indian culture is automatically respectful and supportive of elders. Ageing as a natural phenomenon has all along engaged the attention of civilized world. Provision for the aged in the society has become one of the constitutive themes of our modern welfare state.

In Indian diet main source of energy mainly plants food based are carbohydrates, fat, a protein considered to be macro-nutrients. Other nutrients are vitamins and minerals, which are considered as micro-nutrients. Only a well-balanced diet can provide required nutrients for different physiological groups. The geriatric population being a very important asset for our society, their experience and guidance in real life is indispensable (RDA, ICMR; 2016).

Old age is defined as the age of retirement, for it is at the time that the combined effect of ageing, social changes and diseases are likely to cause a breakdown in a health. An increase in longevity and decline in fertility have contributed to peoples living much longer today than ever before in the last 50 years (Alurmani and John, 2004).

The WHO has predicted that ageing in population will present new challenges to health care. The health of elderly will be an important issue defining the health status of a population (WHO 2008).

Traditionally, nutrition research has focused on individual nutrients, and more recently dietary patterns. This study explores the nutritional status, dietary intake and effect of nutritional intervention in older people. The purpose of the study was to determine the nutritional status of geriatrics, to assess food consumption patterns; quantity of meals served and plate wastage at old age home.

This study consist of 120 respondents, reflecting the sex distribution of the general population the sample include more women than men. All the respondents from old age home belonged to the age group 60 – above years. In old age home maximum percent of respondents were married and widower found. The pattern of single and nuclear family was more prevalent (37 – 33%) in old age home.

The old age home respondents were mostly illiterate and minimum percentage respondents were highly educated or educated up to primary or secondary standard. Educational qualification was low in old age home. Majority of the

respondents were house wives. The number of children was more 50% of respondent having more than 4 children.

According to BMI maximum numbers of respondent were had normal BMI followed by overweight 30%; normal 55%; underweight 15%. Majority of the respondents were non vegetarian 63% followed by 35% of vegetarians and 10% mixed diet.

From the research, it was explored that the number of meals served at old age home and describes the respective dietary patterns. Maximum percentage 84% of respondents consume 3-4 meals per day whereas 15% of respondent consume 4- 5 meals per day. Information elicited on meals skipping of the respondent indicate that majority of the subjects rarely skip the meals 43%, whereas 22% skip the meals such as snacks, lunch, dinner. Plate wastage was seen more this may be because, the respondents are bored of same taste menu and contents of distributed food had unappealing appearance provided in old age home. Developing assistance regarding food and meals for elderly peoples required knowledge about the individual's current need but habits found in earlier life must to be taken under consideration.

The consumption of other vegetables was more compared to roots and tubers and green leafy vegetables. Majority of the subjects 69% consume other vegetables followed by 55% of root and tubers and green leafy vegetables. It was also observed that less amount on non-vegetarian food is provided one's a week. It may lead to low amount of protein in diet. Majority of the subjects were not consuming fruits only 35% subject consumed fruit. It was also noticed that the inclusion of fruits in the diet was lower in old age home. The majority 60% of the respondents consumes milk on daily bases while only 30% of respondent consume milk twice or thrice a week. It was also observed that majority of respondent aware of importance of physical activity and importance of sunlight for health. All cent percent of the subjects exposes them self to the sunlight daily.

Medical or health conditions of elderly subjects living in old age home were poor. Conditions such as diabetes 32%, hypertension 15%, arthritis 15%, osteoporosis 32%, heart problems 11%, dizziness and insomnia 89% were seen common in subject living at old age home.

Dietary intake of elderly people living at old age home, the mean  $\pm$  sd nutrients intake of energy, protein, fat, carbohydrates, and iron was statistically non significant at 0.05% level, indicating that inadequate calories, protein intake were seen. Problems like difficulty chewing and swallowing, constipation, and loss of appetite is commonly seen

It was also observed that calcium intake of elderly peoples living at old age home was statistically non significant at 0.05% level indicating that poor nutrient intake which had a great impact on health of elderly peoples in form of osteoporosis.

Individual needs of self determination and involvement should be considered in planning and development effort for elderly peoples related to food and meals.

Consuming food rich in nutrients and other bioactive component such as phytochemicals may help to protect against major age-related disorders. The provision of energy dense meals may be the first approach to increase the energy intake with the fortification of food to increase the micro-nutrient intake.

Nutritional status of elderly using MNA scoring indicated that maximum number of subjects living at old age home was at higher risk of malnutrition (55%). Comparison between MNA score and BMI, MNA score gives more accurate result of malnourishment in elderly peoples.

Thus from the result of the present study it can be concluded that nutritional status of elderly living at old age home were high at the risk of malnutrition. Hence, elderly living at old age home need great emphasis to provide health care and good nutritional support.

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## Appendix – I

### Nutritional Status and Disease Profile of Elderly (>60 Years) Living in the Home for Aged/ Old Age Homes

#### 1. General Information

- a) Name
- b) Age
  - 60-70 -
  - 70-80 above 80 -
- c) Gender - ☐ Male ☐ Female

#### 2. Anthropometric Data

- a) Height (cm):-
- b) Weight (kg):-
- c) BMI ( $\text{kg/m}^2$ ):-

#### 3. Demographic Data:

- 7. Education status
  - A) No formal education B) Less than primary
  - C) Primary/ Secondary school completed D) Above
- 8. Type of occupation
  - A) Homemaker B) Self employed
  - C) Government employ D) Other
- 9. If earning range of monthly income
  - A) 2 - 5,000 B) 5 - 10,000
  - C) 10 - 15,000 D) Above 15,000
- 10. Marital status
  - A) Single B) Married
  - C) Separated /Divorced D) Widowed
- 11. Reason for staying at old age home
  - A) Self B) No financial support
  - C) Loneliness D) Children settled abroad
- 12. Type of family you had
  - A) Extended B) Joint
  - C) Nuclear D) Single
- 13. Number of children you have
  - A) 1 – 2 B) 2 – 4
  - C) 4 – 6 D)  $\geq 7$
- 14. Active participation / Involvement in social activities
  - A) YES B) No
- 15. Type of occupation
  - A) Homemaker B) Self employed
  - C) Government employee D) Other

#### 4. Dietary Information

- 16. What are the Food Preferences?
  - A) Vegetarian B) Non vegetarian
  - C) Ovo vegetarian D) Vegan
- 17. How many Number of meals consumed in a Day
  - A)  $\leq 3$  meals B) 3 – 4 meals
  - C) 4 – 5 meals D)  $\geq 6$  meals
- 18. What are the timings of Meal?
  - A) Regular B) Irregular
- 19. Skipping of meal
  - A) Sometimes B) Often
  - C) Rarely D) Never
- 20. Consistency of diet you consume daily
  - A) Normal diet B) Soft diet
  - C) Semi solid diet D) Liquid diet
- 21. Type of diet is consumed
  - A) Regular diet B) Neutropenic diet (weakened immune system)
  - C) Therapeutic diet (food allergies) D) Restricted diet
- 22. Religious fasting
  - A) Weekly B) Monthly
  - C) Yearly D) None

#### 5. Food Frequency Questionnaire

- 23. If you are a vegetarian, what vegetables do you consume?
  - A) Green leafy vegetables B) Seasonal vegetables
  - C) Root and tubers D) other vegetables
- 24. How often you consume green leafy vegetables like Spinach:
  - A) Everyday B) Once a week
  - C) Twice a week D) Once a month
- 25. How often you consume Root and tubers:
  - A) Everyday B) Once a week
  - C) Twice a week D) Once a month
- 26. How often do you consume other vegetables?
  - A) Everyday B) Once a week
  - C) Twice a week D) Once a month
- 27. If you are non vegetarian, how often do you consume non vegan
  - A) Daily B) Once a week
  - C) Twice a week D) Never
- 28. What you consume in Non vegetarian mostly:
  - A) Poultry B) Meat
  - C) Egg D) Sea food
- 29. How often do you consume Non vegetarian food?
  - A) Everyday B) Once a week
  - C) Once a month D) Never

30. How often do you consume fruits?

- A) Everyday B) Once a week  
 C) Twice a week D) Once a month

31. How many serving of cereals are consumed in a day:

- A) 1 serving B) 2 – 3 servings  
 C) 4 – 5 servings D) More than 5 servings

32. How many serving of pulses are consumed in a day:

- A) 1 serving B) 2 – 3 servings  
 C) 4 – 5 Servings D) More than 5 servings

33. How often do you consume milk?

- A) Once a day B) Twice a day  
 C) Weekly D) Never

34. Do you consume snacks?

- A) Yes B) No

35. If yes, what type of snacks do you prefer?

- A) Chips B) Biscuits  
 C) Bakery items D) Samosa

36. What kind of Unhealthy life style habits do you carry?

- A) Tobacco B) Smoking  
 C) Alcohol D) Nil

37. How often do you consume sweet?

- A) Everyday B) Once a week  
 C) Alternate day D) Once a month

38. Do you consume Dry fruits?

- A) Yes B) No

39. How often do you consume drink carbonated beverages?

- A) Everyday B) Once a week  
 C) Fortnightly D) Once a month

## 6. Disease Profile

40. Do you have any medical history?

- A) Yes B) No

41. If YES specify:

42. Have you recently experienced any kind of change in your weight?

- A) Gain B) Lost  
 C) Gain or loss rapidly D) None

43. How many hours of sleep do you have per night:

- A)  $\geq 8$  hours B) 6 – 7 hours  
 C) 5 – 6 hours D)  $\leq 5$  hours

44. What kind of physical activities you do in an average day:

- A) Walking B) Jogging  
 C) Yoga D) Nil

45. Do you expose yourself to sunlight?

- A) Yes B) No

46. If YES, what is the duration of exposure to sunlight?

- A) 5 mins B) 5 – 10 mins  
 C) 10 – 15 mins D) more than 30 mins

47. Number of consultation in the past 6 months:

- A) 1 – 2 B) 2 – 3  
 C) 3 – 4 D) None

48. Number of Polypharmacy (Number of medication)

- A) 1 – 2 B) 2 – 3  
 C)  $\geq 3$  D) Nil

49. Suffering from any of the following condition:

Symptoms	Yes	No
1) DIZZINESS		
2) INSOMNIA		
3) DIABETES		
4) HYPERTENSION		
5) ARTHRITIS		
6) OSTEOPOROSIS		
7) ASTHMA		
8) HEART PROBLEMS		
9) ANY OTHER		
10) NONE		

50. How do you rate your health?

- A) Poor B) Fair  
 C) Good D) Excellent.

## APPENDIX – II

### MINI NUTRITION ASSESSMENT (MNA) (Nestle Nutrition Institute)

Complete the screen by filling in the boxes with the appropriate numbers

First name: Last name:

Sex:

Age:

Weight, kg:

Height, cm:

Date:

### Screening

A) Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?

0 = severe decrease in food intake

1 = moderate decrease in food intake

2 = no decrease in food intake

B) Weight loss during the last 3 months

0 = weight loss greater than 3 kg (6.6 lbs)

1 = does not know

2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)

3 = no weight loss

C) Mobility

0 = bed or chair bound

1 = able to get out of bed / chair but does not go out

2 = goes out

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[illegible]