



## Assessment of Nutritional Status of Elderly Living in Public Care Houses and Those Living with Their Families in Khartoum State December 2017

**Mohammed Altaher Abaker Abdegader<sup>1\*</sup>, Mofida Yousif Elkhalifa<sup>2</sup>,  
Suzan Ali Yousif Abo<sup>3</sup> and Sitana E Abdelrahman<sup>4</sup>**

<sup>1</sup>The National Ribat University Faculty of Graduate Studies and Scientific Research, Faculty of Medicine, University in Khartoum, Sudan

<sup>2</sup>Associate Professor at the Institute of Aromatic Plants and Folk Medicine, National Center for Sudan Research, Sudan

<sup>3</sup>Assistant Professor, Department of Nutrition and Food Science, Faculty of Science and Art - Al Baha University, Al Bahah, Saudi Arabia

<sup>4</sup>Department of Nutrition and Food Science, Faculty of Science and Art - Al Baha University, Al Bahah, Saudi Arabia

**\*Corresponding Author:** Mohamed Eltahir Abakar Abdolgadir, The National Ribat University Faculty of Graduate Studies and Scientific Research, Faculty of Medicine, University in Khartoum, Sudan.

**DOI:** 10.31080/ASMS.2020.04.0540

**Received:** December 30, 2019

**Published:** January 24, 2020

© All rights are reserved by **Mohammed Altaher Abaker Abdegader., et al.**

### Abstract

The objectives of this study is to assess the nutritional status of elderly males and females of 60 years and above in two public elderly care houses, and to compare them with the seniors living in households with their families residing in the same areas around the public care houses in Khartoum State.

All old age people living in the care houses participated in this study (55 elderly: 38 males and 17 females). These public care houses were Al- Dume Bahri public care house for males and El-Sajana public care house for females. Similar numbers of old persons living with their families were randomly selected to participate in this study from the areas surrounding the care houses. Data was collected through personal interviews guided by questionnaires (socio-demographics, health status, physical activities and food intake) in addition to anthropometric measurements (height, weight and BMI). Data was analyzed using computerized statistical package for social science (SPSS).

Considering the age of the elderly, significantly higher percentage (52.5%) of the elderly in the public care houses their ages were more than 80 years old compared to those living with their families (27.3%). Regarding the educational level, illiteracy was significantly more common among the elderly in the public care houses compared to those living with their families (32.7% vs. 10.9%, respectively).

Among the elderly in care houses, the major chronic diseases such as diabetes (DM) was significantly lower (compared to elderly living with their families (9.1% vs. 16.4%, respectively). Also, the presence of cardiovascular diseases among the elderly in the care houses was much lower compared to those living with their families (9.1% vs. 1.8%, respectively).

A high percentage of the study participants who lived in the elderly care houses were found to be severely underweight (18.2%) compared to those living with their families (3.6%). On the other hand, a significantly higher percentage of overweight/obese participants were noticed among those who were living with their families (21.9% vs. 10.9%, respectively). Adequacy of the energy intake was found to be better among the elderly who live with their families (65%) compared to the ones in the public care houses (52.7%). Also, excessive energy intake was higher among the elderly group who live with their families (23.6%) compared to the elderly people who live in care houses (18.2%). The food frequency questionnaire data revealed that for both groups studied, most

of the necessary food groups were taken regularly (daily – at least once a week), including grains, legumes, dairy products, cooked and fresh vegetables and fruits. However, a considerable percentage among the elderly living with their families rarely eats any type of meat. Unlike those living in the public care houses where they eat meat daily or at least once a week.

Although the foods offered to the elderly in the public care houses were found to be adequate, yet, many elderly were malnourished. Therefore, in-depth studies explaining these results were needed, meanwhile, providing of foods to every elderly according to his individual needs were urgently needed as to improve the nutritional status of these people. Therefore, the study recommends that policies should be taken by Sudan government to improve the nutritional status of the elderly in the public care houses via integrating nutrition/nutritionists as part of normal health care of these older individuals.

**Keywords:** Nutritional; Public

## Introduction

Ageing is a later stage of human growth in which physiological capacities of human body gradually breakdown, Ageing can be also defined as the process of progressive changes in the biological, psychological and social structure of individuals [1].

It is well known that with advancing age, the risk of developing nutritionally related diseases, increases the occurrence of malnutrition. Observations had shown that a factor complicating nutritional status of the elderly in developing countries is that many have had inadequate food intake during much of their childhood and adult life [2].

In Sudan, the lack of attention to the elderly in policies and programs is mirrored by the paucity of limited information and studies about the elderly and ageing process. Yet, these few studies observed a high rate of malnutrition among the elderly [3]. Therefore, nutrition of the elderly population must be tailored according to their needs and abilities.

Persons aged 60 years and over will double by the year 2025 and will reach virtually by 2050 up to 7.1 billion. The majority of them belong to the developing world [4]. Similarly, in Sudan as a developing country, there is a gradual increase in the number of the elderly. In the national Census in 1993, they were less than million (989,918). This number is projected to increase to 2,455,709 in 2018.

## Study justification

Most people in developing countries enter old age after a lifetime of poverty and deprivation, poor access to health care as well as diet that is usually inadequate in quantity and quality. However, nutritional intervention and research in African countries were and still more directed towards infants, pregnant and lactating

women. But very little is known about the nutritional status, food intake and health aspects of the elderly. Sudan like other developing countries had not focused on the elderly in the past, but recently some attention have been paid on this group as a result of the recent global movement towards the improvement of the elderly situation. Yet, few studies have been carried out. Therefore, more studies are needed to evaluate the nutritional status of the elderly and accordingly intervention programs must be designed to improve the health and nutritional status of the elderly.

## Objectives of the Study

### General objective

To assess the nutritional status of the elderly in two public care houses and to compare them with the elderly living with their families in households around these care houses (Sajana and Dium Bhri) in Khartoum State.

### Specific objectives

1. To describe the socio-demographics, health status and some daily physical activities of the elderly in the care houses and households.
2. To evaluate the participant's nutritional status according to their body mass indices (BMI).
3. To investigate the general dietary intake of the participants and particularly assess their energy and protein adequacy.

To compare between the elderly living in the care houses and the surrounding areas (nutritional status, socio-demographics, health status and daily physical activities).

## Materials and Methods

This chapter describes methods adopted for the conduction of this study including the study area, research design tools, sample selection method, samples size and data collection tools.

### General description of the area

The field study was carried out between August 2017 until February 2018 in Khartoum State; the Capital of Republic Sudan, at two elderly public care houses (males and females) and the area around them (Alsajna and Dium-Bhri). These are the only elderly care houses in Sudan. Both are governmental public houses and belong to the Ministry of Welfare in Khartoum State. During the year 2017, the total population of the elderly in these care houses ranged between 50 to 60 persons, 60 years old and above.

### Study design

This study is a descriptive cross-sectional study based on observations, interviews guided by questionnaire and anthropometric measurements. All the elderly in the public care houses participated in this study. In addition to a randomly selected elderly living with their families in the nearby neighbourhood of the care houses.

### Sample size

The total sample size was 110 elder person both males and females. All the elderly found in the two public care houses (38 males and 17 females) at the period of the study participated. A matching number (38 males and 17 females) were randomly selected elderly from the nearby areas of the two care houses participated as controls and for comparative issues (55 Elderly: 38 males and 17 females).

### Data collection

#### Pilot study

A pretesting questionnaire for the pilot study was conducted to assure the applicability of the questionnaire using a sample of 15 respondents chosen randomly from the study population living around the public care houses. According to the results of the pilot study, some questions have been revised.

### Primary data

Primary data was gathered using a questionnaire, which was filled by the researcher from direct interviews with the elderly (face to face). It included information about socioeconomic and demographic characteristics, general dietary habits, food intake 24-hour recall, and food frequency questionnaire.

Anthropometric measurements were also done to all participants (weight, height/arm span and then the body mass index was calculated) (for more details see appendix 1 and 2).

### Secondary data

The secondary data was collected from existing literature in the internet, books, journals, research reports in addition to unpublished dissertations.

### The administrative staff interviews

The staff interviews was done to obtain more information about the two public care houses (such as the year of establishment the houses, number of old persons at these houses, how many old persons can these houses accommodated, terms of admission and discharge....etc. In addition to detailed information about the food offered to the elderly (for more details see appendix 4).

### Data analysis

Data was entered and analysed using statistical packages for social sciences (SPSS) program version 11.5. The results were presented in the form of tables consisting of frequencies and percentages. Chi2 test was used to detect significant differences between the two groups (elderly in the public care houses and elderly living with their families).

The contents (macronutrients) of the diet consumed by the elderly from the two groups in the 24 hour recall food intake was analyzed electronically using Nutri-survey program 2007 and manually using the Sudanese national food composition table and B.1 Magboul tables (2008).

### Ethical concerns

Approval letter from the National Ribat University Ethics Committee was obtained and send to the Ministry of Welfare then to the Administrative departments of the two elderly care houses (males and females). Another letter for the Administrative Committee of Elsajana and Diume Buhri was also made (for more details see the appendix 5).

### The results

This chapter deals with results obtained from analyzed data collected from 110 respondent males and females aged 60 years and above.

### General characteristics of the elderly

As shown in table 1 the number of female elderly who live in the public care houses was found to be significantly lower than males (17 vs. 38, respectively). Equal numbers of the two sexes were selected to represent elderly living with their families.

Variables	Elderly in care houses N=55		Elderly in their homes N=55	
	Frequency	%	Frequency	%
Gender **				
Males	38	69.1	38	69.1
Females	17	30.9	17	30.9
Age **				
60-70	4	7.3	13	23.6
71-80	22	40.0	27	49.1
More than 80	29	52.7	15	27.3
Income Level (SDG)**				
None	53	96.4		
Less than 1000	2	3.6	6	10.9
1000 – 4000	-		26	47.3
More than 4000	-		3	5.5
Marital Status**				
Married	4	25.5	37	67.3
Divorce	14	7.3	4	7.3
Widow	9	16.4	11	20.0
Single	28	50.9	3	5.5
Education Level**				
Illiterate	18	32.7	6	10.9
Khalwa/Adult Education	15	27.3	12	21.8
Intermediate/High Secondary	18	32.7	30	54.5
University/Post University	4	7.3	7	12.7

**Table 1:** General characteristics of the elderly living in the public care houses [55] and in their homes [55].

p\*\* ≤ 0.005 (chi2).

Considering the age of respondents, significantly higher percentage (52.5%) of the elderly in public care houses were more than 80 years old compared to those living with their families (27.3%).

Concerning the income level of the elderly in care houses, the majority (96.4%) hadn't any sources of own income compared to the elderly living with their families where all of them had a sources of income with different amounts.

Regarding the marital status of the respondents, significantly higher percentage (50.9%) of those who were living in the care houses were singles compared to those living in households (5.5%).

Considering the educational level, Illiteracy was found to be significantly higher among the elderly in the public care houses (32.7%) compared to the group living with their families (10.9%).

**Health status of the elderly**

As shown in table 2, among all of the studied groups about two thirds of them suffered from different types of chronic diseases (more than 63%). No significant differences were detected between the two groups. Generally, diabetes and hypertension were found to be the main prevalent diseases among all the elderly, where more than 25% among the participants were either had diabetes, hypertension or both.

Variables	Elderly in care houses N=55		Elderly in their homes N=55	
	Frequency	%	Frequency	%
Presence of diseases				
Yes	36	65.5	35	63.6
No	19	34.5	20	36.4
Type of disease				
Diabetes (DM)	5	9.1	9	16.4
Hypertension (HTN)	2	3.6	2	3.6
Neurological disorders	4	7.3	2	3.6
Musculoskeletal disorders	5	9.1	3	5.5
Dental caries	3	5.5	1	1.8
Vision problems	4	7.3	1	1.8
Cardiovascular diseases	1	1.8	5	9.1
DM and HTN	8	14.5	3	5.5
Others	2	3.6	2	3.6
Eating problems				
Lack of enjoy Taste	8	14.5	8	14.5
Loss of appetite	10	18.2	9	16.4
Swallowing and chewing problems	11	20.0	11	20.0
None	26	47.3	27	49.1
Food allergies**				
Yes	7	12.7	13	23.6
No	48	87.3	42	76.4

**Table 2:** Health status of the elderly (chronic diseases, eating problems and presence food allergies).

P\*\* ≤ 0.05 (chi2).

Neurological disorders, musculoskeletal disorders, dental caries and vision problems were all higher among the elderly living in the public care houses. However, cardiovascular diseases were found to be higher among those living with their families.

No significant differences were found between the two groups regarding eating problems, except for food allergies where it was significantly higher among the elderly living with their families compared to those in the public care houses (23.6% vs. 12.7%, respectively).

### Physical abilities and the unhealthy lifestyle habits of the respondents

Regarding the daily living activities of the respondents, table 3 shows that about two thirds of the respondents were independent.

Variables	Elderly in care houses N=55		Elderly in their homes N=55	
	Frequency	%	Frequency	%
Physical abilities				
Independent	36	65.5	38	69.1
Needs help of others	12	21.8	14	25.5
Totally dependent	7	12.7	3	5.5
Leisure time**				
Listening to Radio	40	72.7	36	65.5
Watching T.V	2	3.6	9	16.4
Reading news papers	3	5.5	9	16.4
None	10	18.2	1	1.8
Unhealthy life style**				
Smoking cigarette	2	3.6	5	9.09
Sniffing	7	12.7	9	16.4
None	46	83.6	40	74.5

**Table 3:** Physical abilities, leisure time and unhealthy lifestyle habits of the respondents.

$P^{**} \leq 0.05$  (chi2).

Considering the leisure time usually spent by respondents, the majority of the seniors in care homes and those living with their families listen to radios (72.7% and 65.5%, respectively). However, watching TVs and reading news papers were significantly lower among the elderly who live in the elderly public care houses.

The majority of the elderly in public care houses (83.6%) do not smoke or sniff, while a considerable percentage among those who live with their families practice these unhealthy habit/s (25.5%).

### Nutritional status of the participants

#### Anthropometric measurements

Table (4) shows that the majority of the two groups had normal body weights (about 60%). However, significant differences were detected regarding the severe underweight/underweight and the overweight/obese.

Variables	Elderly in care houses N=55		Elderly in their homes N=55	
	Frequency	%	Frequency	%
Body Mass Index**				
Severe underweight/underweight BMI	16	29.1	7	12.7
Normal Weight BMI	33	60.0	34	61.8
Over weight/obese BMI	6	10.9	12	21.9

**Table 4:** Anthropometric measurements (BMI) of the participants.

$P^{**} \leq 0.05$  (chi2).

As, up to 20.1% among the elderly living in the public care houses were either severely under weight or under weight, compared to only 12.7% among those living with their families. On the other hand, significantly higher percentage among those living with their families was overweight or obese (21.9%) compared to the ones living in the elderly public care houses (10.9%).

#### Dietary intake of the elderly

Variables	Elderly in care houses N=55		Elderly in their homes N=55	
	Frequency	%	Frequency	%
Number of meals				
Two	-	-	10	18.2
Three	55	100	44	80.0
More than Three	-	-	1	1.8
Number of snakes				
One	-	-	1	1.8
Two	55	100	54	98.2

**Table 5:** Number of meals and snacks/day of the respondents

$p^{**} \leq 0.005$  (chi2).

All of the participants in the two public care houses (100%) usually eat three meals and two snakes per day. While, among participants living with their families only 80% eat three meals, but, almost all of them daily take 2 snacks (98.20%).



Variables	Elderly in care houses N=55		Elderly in their homes N=55	
	Frequency	%	Frequency	%
Energy **				
Inadequate	16	29.1	6	10.9
Adequate	29	52.7	36	65.5
Excessive	10	18.2	13	23.6
Protein**				
Inadequate	29	52.7	19	34.5
Adequate	19	34.5	25	45.5
Excessive	7	12.7	11	20.0

**Table 6:** Adequacy of energy and protein among the elderly  
 P\*\* ≤ 0.05 (chi2).

Significantly higher number of elderly living with their families had adequate energy and protein intake compared to those living in the public care houses (65% and 45.5% vs. 52.7% and 34.5%, respectively). However, inadequate energy intake among the elderly who live their families (10.9%) was much lower compared to those who live in the elderly public care houses (29.1%). Fur-

thermore, inadequate protein was among 52.7% of those living in the elderly public houses compared to a 34.5% among those who live in their homes.

**Frequency of foods taken by respondents**

Considering the consumption of bread, all of the respondents (100%) consumed it daily. Kisra, asida and ghurasa were all rarely or never consumed by the elderly living in the public care houses, while a considerable percentage among those living with their families consume these types of starches at least once a week.

Red meat, eggs and broad beans (foul) and lentils (Adas) were all taken once a week by all respondents (100.0%) in the public care houses. However, a considerable percentage among those living with their families rarely or never take these items (54.5% for meats, 36.6% for eggs, 20% for broad beans and 58.2% for lentils).

Regarding the elderly consumption of milk and its products, a very high percentage (69.1%) among the elderly living in the public care houses rarely or do not drink milk. However, a high percentage takes yogurt (100%) and white cheese (85.5%) once a week. On the other hand, up to 90.1% take milk a least once a week.

Food items	Elderly in care houses N=55			Elderly in their homes N=55		
	Daily - > once a week	Once a week	Rarely or never	Daily - > once a week	Once a week	Rarely or never
Starches						
Bread	100%	-	-	100%	-	-
Kisra	-	-	100%	38.2%	23.6%	38.2%
Rice	-	100%	-	-	-	-
Acida	-	-	100%	10.9%	25.5%	63.6%
Gorrasa	-	-	100%	-	10.9%	89.1%
Meats, eggs and legumes						
Red meat	-	100%	-	12.7%	32.7%	54.5%
Chicken	-	-	100%	-	20%	80%
Fish	-	-	-	14.5%	40%	45.5%
Egg	-	100%	-	16.4%	20%	63.6%
Broad beans (Foul)	-	100%	-	63.6%	16.4%	20%
Lentils (Adass)	-	100%	-	20%	21.8%	58.2%
Milk and milk products						
Milk	30.9%	-	69.1%	47.3%	43.6%	9.1%
Yogurt	-	100%	-	-	30.9%	69.1%
Cheese	-	85.5%	14.5%	25.5%	36.4%	38.2%
Vegetables and fruits						
Cooked veg.	100%	-	-	100%	-	-

Salad	100%	-	-	100%	=	-
Fruits	-	100%	-	1.8%	5.5%	92.7%
Beverages						
Natural juice	-	100%	-	65.5%	18.2%	16.4%
Coffee	-	56.4	4	20%	80%	
Tea	-	100%	-	54.5%	36.4%	9.1%
Soft drinks	-	-	100%	10.9%	30.9%	58.2%

**Table 7:** Frequency of foods taken by respondents Starches group intake by respondents.

The Natural juice were taken by once a week by all (100%) respondents in the two public care houses, while those living with their families up to 65.5% take it daily/more than once a week.

Drinking of coffee at elderly public female care house is considered as the weekly program. Every Tuesday all of them and all the staff sit together in the center of the house then distribution of coffee takes place to all elderly except for those suffering from hypertension hypertensions.

Soft drinks were rarely or never taken by the elder people at public care houses. While up to more than 40% among those living with their families at least once a week takes drink a soft drink.

The was tea consumed by all the elderly in public care houses on daily basis (100.0%) compared to only half among those living with their families.

**Discussion**

This chapter deals with the discussion of the results obtained from analyzing primary and secondary data. It is categorized into six sections (general characteristics of the respondents, health status, activities of daily living and physical abilities, food habits and dietary pattern of the respondents and nutrition status using anthropometric measurements and dietary intake).

According to general characteristics of respondents, the total number was 110 elder persons. 55 live in two care houses for the elderly. Among these people 69.1% were found to be males and 30.9% were females. Similar numbers were randomly selected from the neighbourhood of the elderly care houses from those who were living with their families (in households).

Regarding the number of old age people in the two care houses Aldow Hagog (for males) and Alsaggana (for females), Elkhalfa [5] carried a study during 2004 in these care houses and found fewer elderly were living in these care houses (only 33 seniors). A more

recent study during 2012 reported slightly lower numbers (52 seniors) than what were living recently in these care houses [6]. This indicates that that there is an increasing numbers of elders in the care houses, which might probably be due to the response to the general global increase of the old populations especially in developing countries.

With regard to the monthly income of the seniors living in the public care house, this study found almost all of them (96.4%) haven't got any source of income. Similar observations were reported by Abdalla [6]. On the other hand, a significantly higher number of elderly living with their families have regular monthly incomes especially males.

When considering the marital status of the respondents, significantly higher percentage (52.7%) of those who were living in the care houses were found to be singles compared to only (5.5%) among those who were living with their families. Thus, loneliness might be a strong contributory factor which supports the need and the idea of living in the public care houses for seniors.

Regarding the general health status and type of diseases of the respondents, although, aging is a normal biologic process, however, it involves some decline in many physiological functions. Organs change with age and the rates of change differ among individuals and within organ systems. Therefore, it is important to distinguish between normal changes of aging and changes caused by chronic diseases such as atherosclerosis (Jayant., *et al.* 2014). In this study the major chronic diseases found were diabetes (DM), hypertension and cardiovascular diseases. Among the elderly in the public care houses, diabetes was significantly lower among them compared to the elderly living in their homes (9.1% vs. 16.4%, respectively). Although, the presence of hypertension (HTN) was equal among the two groups, but, the presence of both (DM and HTN) among the respondents in the public care houses was higher (14.5%) compared to respondents living in the household (5.5%). However,

the presence of cardiovascular diseases among the elderly in their homes was found to be (9.1%) compared to (18%) among elderly in public care houses. This agrees with the study carried out by Ibrahim and Alhaj [7] when they assessed the nutritional status of geriatrics in two centers in Khartoum State. They found that DM and HTN was (18%) among the elderly. Another study on the common disorders affecting the Sudanese elderly in Khartoum State hospitals found hypertension and diabetes were (19% and 20%, respectively) [8].

A study in Juba, the capital of South Sudan among hospitalized elderly in private and public hospitals reported that the prevalence of DM was (24% and 14%, respectively) and HTN was (18% and 16%, respectively) [9]. Similar results were also observed in Mogadishu the capital of Somali by Omer and Omer [10], as he found that the prevalence of DM was (18.2%) among the elderly of Somaliland [10].

Regarding the functional activities of daily livings (ADLs), the majority of the respondents were independents (65.5%) in care houses and (69.1%) in the households dependent on their selves). However, up to (12.7%) in the care houses and only (5.5%) in the household were totally dependent on others for their daily living activities.

Among hospitalized patients, Salih [8] found a higher percentage of totally dependent elderly (48%). Generally, diseases and hospitalization leads to physical inactivity which may contribute to the development of malnutrition that further accelerates the loss of muscles. Diseases, stress, and medications may also increase energy and nutrient needs and at the same time reduce food intake [11]. Concerning the nutritional status of the studied participants, no significant differences were observed between the two groups. Using anthropometric measurement (BMI) up to (60%) of the elderly in the public care houses and 61.8% among those living in households enjoy normal weights (this mean that they fall within (18.5 - 24.9). On the other hand, (18.2%) among those living in the care houses were severely underweight compared to only (3.6%) among those living with their families only. When comparing between sexes females were found to be better nourished than males (11.8% vs. 21.1%, respectively) this might be due the younger ages of females compared to males in the public care houses (57.9% vs. 41.2%, respectively, their ages were older than 80 years).

These results were much better those obtained previously by Abdalla during 2012 where only about half (53%) of the elderly in the care houses had normal BMIs. In India Rashmi, *et al.* [12] found (15%) of the elderly were severely malnourished and up

to 55% were at risk of malnutrition. Among the Somalian elderly, (50%) had normal weights [10]. In Iran Sakineh, *et al.* found that among the elderly people living at a nursing home, (12.26%) were well nourished, (49.06%) were malnourished and (38.68%) were at risk of malnutrition.

Geissler and Powers [13] stated that under nutrition is always recognized as a potential problem among the elderly especially among oldest age group. However, there are difficulties in diagnosing under nutrition in the elderly because of physical and biochemical changes, which take place as part of normal ageing.

The dietary intake of the study respondents' was evaluated using three different methods, the adequacy of food offered particularly in the public care houses group, the food frequency intake and the 24 hours recalls for both groups. Regarding the food offered in the two public care houses, it was found to be qualitatively very nutritious and consisted of all food groups. In contrast to the earlier findings of Elkhalfifa during [5] when she observed that the food offered in the elderly care houses lack fresh vegetables and fruits [5]. These results indicate a better nutritional awareness of the staff at the public care houses.

On the other hand, adequate energy intake (calculated from the 24hour recalls) was noticed to be lower among the elderly in the public care houses compared to those living with their families (52.7% vs. 65%, respectively), also, the in adequate energy intake among the elderly who lives in their house was only (10.9%) compared to those who live in the elderly public care houses (29.1%). These results were much better than that presented by Abdalla [6] who stated that more than half seniors in public care houses in Khartoum State consumed inadequate energy per day to maintain good nutrition.

Furthermore, significantly higher intake of adequate protein was observed among the people who were living in their homes (45.5%) compared to the people who live in the public care houses (34.5%), inadequate intake of protein was (52.7%) among people who live in elderly public care houses compared to those who live in their home (34.5%). This could even be worsened as the inadequacy of energy intake may bring about the transfer of some of this inadequate protein to energy.

Regarding the food frequency taken by the respondents, significant differences were detected between the two studied groups. The biggest difference was on meat, fruits and soft drinks consumption. Consumption of red meat and fruits was significantly higher among elderly in the public care houses compared to the



households. This can be explained by the high price of both red meats and fruits for most of the families and therefore cannot afford buying them. Also, Soft drinks were highly consumed by those living in the households and this might be a contributory factor to overweight and obesity among the elderly living with their families.

Nevertheless, these results have shown that the food intake of the majority of the elderly studied from the two groups is still nutrititious. This disagrees with the observations of Elkhalifa [5] who reported that the food served at the two public senior homes lacks fresh vegetables and fruits.

Good nutrition helps adults feel healthy and vigorous as they age and improve their overall sense of well-being. An adult who eats healthy foods does not tend to develop heart disease, hypertension and diabetes at older ages and have more years of life than adults who do not [14-57].

## Conclusion

**Based on the results of the present study, several conclusions can be drawn**

1. In Sudan there is only two elderly care houses one for males (Bahri) and the other for females (Elsajana). The number of males was found to be higher than females and also significantly higher numbers of males were found to be older than females (older than 80 years).
2. The educational level of the elderly studied was generally very low particularly among those living in the elderly public care houses and among females compared to the ones living with their families.
3. The majority of the respondents spent their leisure time listening to radios (especially the males in public care houses), while watching TVs and reading newspapers were significantly higher among those living with their families
4. A considerable number of elderly from both groups suffer from chronic diseases (diabetes, hypertension and cardiovascular diseases).
5. The food offered in the two public care houses was very nutritious and consisted of all necessary food groups. Nevertheless, many of the elderly in the care houses had inadequate energy and protein intakes, which probably lead to the high number of underweight among the elderly in the public care houses.

## Recommendations

Based on the findings of the study and in order to help in improving the nutritional status of the elderly population, the following recommendations can be considered:

1. The nutrition of older people is essential for maintaining their health and preventing malnutrition, thus, the vulnerable older people should be urgently identified and appropriate care should be applied according to individual motivations and capabilities.
2. Cooperation and coordination between ministries of health and social welfare as well as NGOs and agencies is required to ensure an adequate approach in meeting all the needs of the elderly especially in the public care houses.
3. The Sudan government should set policies to include nutrition/nutritionists as an important part of the normal care in older individuals.
4. Nutritionists' staff in the elderly public care houses should make full nutritional assessment to every new admission and make special follow up nutritional forms for every senior as to regularly monitor their nutritional status throughout their stay and accordingly set intervention plans.
5. Further studies must investigate the benefits of different nutritional education and awareness interventions for the elderly living in households and also for those living in the public care houses as to adopt the best to improve the nutritional status of elderly in Khartoum State.

## Bibliography

1. WHO. "A life course perspective of maintaining independence in older age". World Health Organization Geneva (1999).
2. AAAS. "Addressing Malnutrition to Improve Global Health". The American Association for the Advancement of Science-AAAS (2014).
3. Abdalla SI. "Factors Affecting Nutritional Status of Elderly People at Resident Homes in Khartoum State". M.Sc Dissertation in Nutrition and Dietetics, Ahfad University for Women (2016).
4. WHO. World Report on Ageing and Health - World Health Organization (2015).
5. Elkhalifa MY. "Assessment of Dietary Habits and Food Intake for Sudanese Older people living in Khartoum State". *The Sudanese Society in Care of Older People (SSCP)* (2004).

6. Abdalla KHM. "Assessment of the nutritional status and health risk factors of Elderly people in Resident Homes in Khartoum State, Sudan". M.Sc. Dissertation in Nutrition and Dietetics, Ahfad University for Women (2012).
7. Ibrahim AY and Alhaj MI. "Assessment of Nutritional status and identification of health risk factors of Elderly people in Geriatrics centers in Khartoum and Khartoum North". B.Sc. Dissertation in Nutrition and Dietetics, Ahfad University for Women (2016).
8. Salih OA. "Health Problems and Nutritional Status of Sudanese Elderly in Khartoum State Hospital". *The Ahfad Journal* 24.2 (2008): 43-56.
9. Henry GM. "Assessment of Nutritional status and identification of health risk factors of Hospitalized Older person In Juba City (South Sudan)". M.Sc Dissertation in Nutrition and Dietetics, Ahfad University for Women (2015).
10. Omer ME and Omer LMH. "Assessment of Nutritional status and identification of health risk factors of older Women in Magadishu and Bossaso Cities in Somlia". B.Sc Dissertation in Nutrition and Dietetics, Ahfad University for Women (2014).
11. Martin I, *et al.* "Prescribing for patients aged 65 years and over in New Zealand general practice". *New Zealand Medical Journal* 115.1164 (2002).
12. Rashmi. "Assessment the nutritional status of the elderly using the Mini Nutritional Assessment (MNA) India srilakshmi". B. Dietetic India (2016).
13. Geissler G and Powers H. "Human Nutrition". 11th ed. Amsterdam: Elsevier (2005).
14. Brown JE. "Nutrition now. - 5th ed. Australia: Thomson/Wadsworth (2008).
15. Agarwalla R, *et al.* "Assessment of the nutritional status of the elderly and its correlates". *Journal of Family and Community Medicine* 22.1 (2014): 39-43.
16. Ali EMA. "Assessment of Nutritional and Health Status of the Elderly in Bara Locality". Published Ph.D thesis. University of Khartoum (2009).
17. Ali HA and Ahmed SM. "Assessment of Nutritional status and identification of health risk factors in Elderly Women in Jabal Awlia Health center". M.Sc. Dissertation in Nutrition and Dietetics, Ahfad University for Women (2014).
18. Ali SBF and Abdel Magied A. "Nutrition Status, Health Risk Factors and Food Security of Older Person Living in Kass province (South Darfur State)". *The Ahfad Journal* 22.2 (2005).
19. American Dietetic Association. "Position of the American Dietetic Association: Nutrition across the spectrum of aging". *Journal of the American Dietetic Association* 105 (2005): 616-633.
20. American Dietetic Association. "Position of the American Dietetic Association: nutrition, ageing, and the continuum of care". *Journal of the American Dietetic Association* 100 (2000): 580-595.
21. Arya J. "Food is your Best Medicine". 1st ed, Arya Publication (2014).
22. Barrett-Connor E, *et al.* "Coffee-associated osteoporosis offset by daily milk consumption: the Rancho Bernardo Study". *Journal of the American Medical Association* 271 (1994): 280-283.
23. Benelam B. "Satiety and the anorexia of ageing: review". *British Journal of Community Nursing* 14 (2009): 332.
24. Bernstein M and Munoz N. "Nutrition for the older adult". Burlington, M.A: Jones and Bartlett (2016).
25. Bissett S and Preshaw P. "Guide to Providing Mouth Care for Older People". *Nursing Older People* 23.10 (2011): 14-21.
26. Blane D, *et al.* "Background influences on dietary choice in early old age". *Journal of the Royal Society for the Promotion of Health* 123 (2003): 204-209.
27. Caraher M, *et al.* "The state of cooking in England: the relationship of cooking skills to food choice". *British Food Journal* 101.8 (1999): 590-609.
28. Dam TT, *et al.* "An evidence-based comparison of operational criteria for the presence of sarcopenia". *Jouranal of Gerontology A Biological Sciences and Medical Science* 69 (2014): 584.
29. De Castro J. "Age-related changes in the social, psychological, and temporal influences on food intake in free-living, healthy, adult humans". *Journals of Gerontology Series A: Biological Sciences and Medical Sciences* 57 (2002): 368-377.
30. Doley J. "Nutrition management of pressure ulcers". *Nutrition in Clinical Practice* 25 (2010): 50.
31. Donini LM, *et al.* "Eating habits and appetite control in the elderly: the anorexia of aging". *International Psychogeriatrics* 15 (2003): 73-87.
32. Erikson BG, *et al.* "Cross-cultural analysis of longevity among Swedish and American elders: the role of social networks in the Gothenburg and Missouri longitudinal studies compared". *Archives of Gerontology and Geriatrics* 28 (1999): 131-148.

33. Federal Interagency Forum on Aging Related Statistics: Older Americans 2012: Key Indicators for Well-Being (2012): 32.
34. Feskanich D., et al. "Vitamin A intake and hip fractures among postmenopausal women". *Journal of the American Medical Association* 287.1 (2002): 47-54.
35. Galvin JE and Sadowsky CH. "Practical guidelines for the recognition and diagnosis of dementia". *Journal of the American Board of Family Medicine* 25 (2012): 367.
36. Gariballa SE and Sinclair AJ. "Nutrition, ageing and ill health". *British Journal of Nutrition* 80 (1998): 7-23.
37. Hsieh C. "Treatment of constipation in older adults". *American Family Physician* 72.11 (2005): 2277-2284.
38. Litwin H and Shiovitz-Ezra S. "Network type and mortality risk in later life". *Gerontologist* 46 (2006): 735-743.
39. Mahan KL and Escott-Stump S. "Krause's food and nutrition therapy". 12th St. Louis, Mo. Elsevier Saunders (2008).
40. Mahan LK and Escott-Stump S. "Krause's food, nutrition and diet therapy". Eleventh edition. Elsevier (2004).
41. Mahan LK., et al. "Krause's Food and the Nutrition Care Process". Ed. 13. Elsevier, USA (2012).
42. Martin DC. "B12 and folate deficiency dementia". *Clinics in Geriatric Medicine* 4.4 (1988): 841-852.
43. Ministry of Health. "Food and Nutrition Guidelines for Healthy Older People: A background paper". Wellington: Ministry of Health (2013).
44. Mohammed HH and Osman RM. "Assessment of the nutritional status and identification of health risk factors of older Women in Alsagana Khartoum State". B.Sc Dissertation in Nutrition and Dietetics, Ahfad University for Women (2014).
45. Mohammed IM and Haiba MA. "Diet and its Relationship to the Health problems among Sudanese Elderly in Khartoum Teaching Hospital - Alshaab Teaching Hospital and Elderly Women Home care in Khartoum State". B.Sc Dissertation in Nutrition and Dietetics, Ahfad University for Women (2012).
46. Morley JE. "Undernutrition in older adults". *Family Practice* 29 (2012): i89-i93.
47. Pham DQ and Plakogiannis R. "Vitamin E supplementation in cardiovascular disease and cancer prevention: part 1". *Annals of Pharmacotherapy* 39 (2005): 1870-1878.
48. Rampersaud GC., et al. "Folate: a key to optimizing health and reducing disease risk in the elderly". *Journal of the American College of Nutrition* 22.1 (2003): 1-8.
49. Saeidlou SN., et al. "Assessment of the nutritional status and affecting factors of elderly people living at six nursing home in Urmia, Iran. Part I". *International Journal of Academic Research* 3 (2011): 1.
50. Schafer R., et al. "Marital food interaction and dietary behaviour". *Social Science and Medicine* 48 (1999): 787-796.
51. Schiffman S. "Sensory impairment: taste and smell impairments with aging". In Bales CW, Ritchie CS, editors: Handbook of clinical nutrition and aging, ed 2, Totowa, N.J., Humana Press (2009).
52. Thomas DR. "Role of nutrition in the treatment and prevention of pressure ulcers". *Nutrition in Clinical Practice* 29 (2014): 466.
53. U.S. Census Bureau: Census Summary (2010).
54. Wellman NS and Kamp BJ. "Nutrition in Aging: Ch 21". In: Mahan, L.K. Escott-Stump, S. and Raymond, J.L. Krause's Food and the Nutrition Care Process. Ed. 14. Elsevier, USA (2017).
55. WHO. Global report on diabetes (2016).
56. Wylie C., et al. "Health and social factors affecting the food choice and nutritional intake of elderly people with restricted mobility". *Journal of Human Nutrition and Dietetics* 12 (1999): 375-380.
57. Yueh B., et al. "Screening and Management of Adult Hearing Loss in Primary Care Scientific Review". *Journal of the American Medical Association* 289.15 (2003): 1976-1985.

#### Assets from publication with us

- Prompt Acknowledgement after receiving the article
- Thorough Double blinded peer review
- Rapid Publication
- Issue of Publication Certificate
- High visibility of your Published work

Website: <https://www.actascientific.com/>

Submit Article: <https://www.actascientific.com/submit.php>

Email us: [editor@actascientific.com](mailto:editor@actascientific.com)

Contact us: +91 9182824667