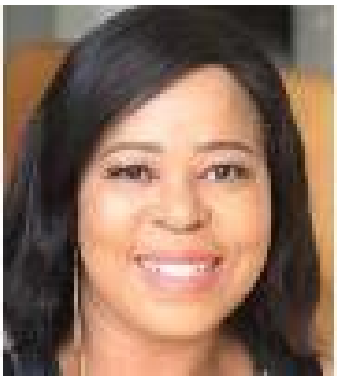
ajfand Since 2001
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Afr. J. Food Agric. Nutr. Dev. 2024; 24(11): 25077-25092 https://doi.org/10.18697/ajfand.136.24875

Date	Submitted	Accepted	Published
	10th May 2024	26th August 2024	18th November 2024

A TEN-YEAR NUTRIENT INTAKE OF AN ELDERLY COHORT IN SOUTH AFRICA

Tshivhase ML[1]*, Marumo-Ngwenya K[1] and D Oosthuizen[1]



Letta Mmonakwane Tshivhase

*Corresponding author email: TshivhaseLM@tut.ac.za

[1]Department of Tourism & Integrated Communication, Faculty of Human Sciences, Vaal University of Technology, Private Bag X021, Vanderbijlpark, 1911, South Africa

Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

ABSTRACT

Food insecurity and malnutrition are often evident among the elderly population residing in low-income communities. This study is part of a broad collaborative investigation that recorded nutritional status, socio-demographic variables, and anthropometric indices from 2004 to 2014. The baseline was recorded for 2004, and a five-year follow-up was done for 2009, and 2014. The purpose of this study was to evaluate, over ten years, the dietary intake and nutritional status of elderly people in terms of anthropometric measurements at an elderly day care center, to determine if socio-demographic variables influence their diets, and if dietary intakes changed over the ten years. The study used a quantitative descriptive approach with a longitudinal cohort. This review only reflects the nutrient analysis of the diet amongst the cohort group (n=62). Measures included two 24-hour recalls assessing both the food and nutrient intake, as well as the dietary pattern of the cohort group. Results reflect many fluctuations in nutrient intake. Overall, participants consumed less energy, carbohydrates, and dietary fibre than dietary reference intakes (DRI), with protein intake above DRI during 2004 and 2009, but declining between 2009 and 2014. Micronutrient intake revealed calcium consistently below DRI, with variations in other nutrients over the years. Gender differences were significant for certain nutrients, with men generally consuming more niacin, vitamin B6 and vitamin E as compared to women. Median nutrient intakes failed to meet average requirements, except for protein, carbohydrates, chromium, riboflavin, pantothenate and vitamin K. Only a few nutrients, such as niacin, vitamin B6 and vitamin E reflected significant differences in values between the different genders. T-tests comparing nutrient averages between years found significant differences in fat intake between 2004 and 2009, and between 2009 and 2014, while protein differed significantly between 2009 and 2014. Other nutrients did not show significant differences across these periods, except for cholesterol and zinc between 2004 and 2014, and protein, fat, cholesterol, and zinc between 2009 and 2014. The collective picture reveals deficiencies, especially in key nutrients like zinc and iron, which fluctuated over a ten-year period. Analysis showed no significant difference in nutrient intake across the three periods, except for fat intake, which significantly differed between 2009 and 2014. Energy intake appeared to be higher from 2004 to 2009 but decreased notably by 2014. These findings underscore the importance of tailored dietary interventions to address nutrient deficiencies in aging populations, considering both individual needs and changing dietary patterns over time.

Key words: Cohort, elderly, nutrient intake, food insecurity, dietary intake, care centre

https://doi.org/10.18697/ajfand.136.24875

ajfand Since 2001
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

INTRODUCTION

Population ageing refers to the change in age groups present among the world's population and the number of elderly people is expected to increase from 600 million in 2000 to 2.1 billion by 2050 [1, 2]. Individuals are generally considered elderly when they reach the age of 60 and above and from that age onwards, various irreversible physiological changes may occur. Supplementary to a declining functional status, the elderly often experiences reductions in bone mass and immune functions, anaemia, slower mental functioning and poor wound healing. These factors, compounded by lifestyle, exposure to life's challenges and stresses and poor dietary intake patterns, can influence life expectancy rates.

Dietary intake patterns include the foods consumed daily, and in communities facing social and financial challenges, food insecurity and malnutrition are prevalent [3, 4]. Food insecurity and malnutrition stem from the inability to access quality foods and sufficient nutrients, which is evident among the elderly population [3, 4]. According to the World Health Organisation (WHO), 47.8% of the world's elderly population are living in low- and middle-income countries [5]. Factors such as available food supplies, social isolation, alcohol abuse, socio-economic status, and social or pension grants further impact the elderly's food consumption [6, 7]. The elderly are also affected by non-communicable diseases (NCDs) such as diabetes, high blood pressure and cardiovascular ailments, which add strain to their dietary needs [8, 9]. South Africa (SA) has one of the fastest-growing elderly populations in Africa, with an estimated 5.4 million people aged 60 and above [10]. The shift from traditional to Western diets, which are high in processed foods, salt and sugar, further impacts health. Poor-quality diets lead to macro- and micronutrient deficiencies, resulting in malnutrition [11]. The research question which guided this study was, what are the changes in nutritional status and dietary patterns of elderly people over ten years?

Many elderly individuals in SA receive a monthly pension, which is often used to support their families rather than their own needs. Changes in family structures, influenced by the impact of HIV and AIDS, have left older individuals responsible for caring for sick children. Food insecurity is more severe in households with elderly individuals due to limited pension income, with black African households, headed by elderly individuals, experiencing the highest rates of food poverty across all ethnic groups. Larger households are at a higher risk of food poverty, as household size increases, the choice of food purchases tends to decrease, potentially leading to malnutrition [12]. Elderly individuals, especially women, who share a pension income are at risk of inadequate nutrition, affecting entire households' access to sufficient nutritious food [8]. Compared to young adults,

Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

elderly individuals consume less food due to physiological reasons, which may result in essential nutrient deficiencies [13, 14].

MATERIALS AND METHODS

The study took place in Sharpeville, SA, a geographical region with a sociodemographic profile and social challenges typical of most townships in the country. The population of Sharpeville is approximately 37 599, with 5.43% being elderly people aged 60 years and older, as indicated in the last census conducted in 2011 [15]. The study population comprised all elderly people who attended the care centre from 2004 to 2014. The study used a quantitative descriptive approach with a longitudinal cohort, investigating intercept changes from 2004, 2009 and 2014. The investigation commenced in the year 2004 as this was when the day care centre was newly established in Sharpeville. In January 2005, breakfast and lunch were introduced five days a week at the care centre compared to no meals served previously. The food was prepared by volunteers. The daycare center catered to the elderly population and offered additional skills training services such as sewing, cooking and gardening, as well as religious activities. The meals included breakfast and lunch. Food items were donated, and from there meals were prepared. Each plate was pre-plated and served to the elderly. The most common food items consumed at the day care center included starchy foods such as sorghum porridge, maize meal porridge, white rice, brown bread with either peanut butter, margarine or jam, and cake. Vegetables included cabbage, green beans, pumpkin and spinach. The available fruit supplied was oranges, and the most common protein included chicken, which was usually cooked in vegetable oil. The most common legumes were either sugar beans or cooked samp and sugar beans, which is similar to findings within the same area [16]. To address the nutritional imbalances found in the diet of elderly people in the community, and across SA, the researchers were requested by the care centre management to investigate the dietary trends over ten years. Ethical approval was obtained from the University of Witwatersrand's Committee for Research on Human Beings (M040835, M070126) for the studies in 2004 and 2009. Data collection during 2004 and 2009 was conducted by a registered Dietician Professor W Oldewage-Theron, and a Public Health Nutritionist, Prof A Egal. During 2004 and 2009, the intervention comprised data collection of the socio-demographic profiles, nutritional status (anthropometric parameters) and dietary intake patterns of the elderly. In 2014, ethical approval for the data collection in 2014 was obtained from the Vaal University of Technology through the Research and Innovation Ethical Committee on 24 February 2014 (Reference number: 20140224-lms). The researcher conducted research in a two-phase approach. The situational analysis, phase one

of the study, involved cleaning data from the research conducted in 2004, and 2009. Phase two, intervention phase, involved the collection of data in 2014, and compilation of the complete database, including data from 2004, 2009 and 2014. Permission was also obtained from the management of the care centre in 2014 by the researcher, with voluntary consent signed by each participant throughout the research process.

In 2014, data collected by the researcher (Tshivhase) resulted in 119 participants. A power calculation was conducted in 2004 to determine the sample size required for statistically significant results, and data were collected on 176 individuals who attended the care centre. In this study, researchers followed up with the same group of elderly individuals who were initially assessed in 2004. This follow-up created a purposive sample that included these original participants. Specifically, there were 176 participants in 2004 and 195 participants in 2009. Over time, more elderly people began attending the care centre, which led to an increase in the number of participants during the data collection period. However, the target was the initial 176 participants for the 2004 study. The follow-up study in 2014 resulted in only 119 participants at the care centre. Although the data was collected from all 119 participants, it was noted that a complete data set was only obtained from 62 individuals who participated in all three years of the study, namely 2004, 2009 and 2014. This was mainly due to irregular attendance by the respondents and death amongst the elderly. Fieldworkers, proficient in the various indigenous languages of SA, were recruited and trained using a training manual to administer the instrument. A previously validated 24-hour recall questionnaire was used to collect data on food consumption over 24 hours, enabling food and nutrient intake assessments. The questionnaire was administered on two days, one weekday and one weekend day (Tuesday and Sunday), one week apart. The purpose of obtaining the data on the two days was to ensure accurate descriptive information regarding the elderlys' usual food consumption patterns and dietary intakes. The food consumption patterns included information about the meals consumed at the day care center, as well as food items consumed at home by the elderly during a weekend. The process involved documenting a comprehensive list of all food and drink consumed the previous day, recording explanations of food, drinks and cooking processes and acquiring product names. Additionally, food models and household utensils were used to assist participants in determining serving sizes of consumed items. The 24-hour recall questionnaire data was captured and analysed by a registered dietitian using the South African Medical Council's Food Finder 3 program, developed by the Medical Research Council and based on the South African Food Consumption Tables [17]. Since bread and maize were fortified in 2002, the research team developed additional codes for the fortified products,

Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

which were then included in the Food Finder® application. Thus, fortified values were employed in the nutritional analysis of the 24-hour recall for both bread and maize. During all three phases, data gathering was carefully monitored to ensure accuracy and correctness.

The data were analysed for medians and standard quartiles and compared with dietary reference intakes (DRI) for the age group over 70 years old [17]. Frequencies were utilised to determine the percentage of participants with nutrient intake below 100% of DRI. The micronutrient (minerals and vitamins) requirements vary considerably between older and younger persons [8]. Parameters such as fibre (lower for elder persons), calcium (higher), iron (lower for women, not men), chromium (lower) and vitamin D (higher) were considered. Vitamin D is the only micronutrient with different recommendations for persons aged 51 to 70 years and 70+ years. Paired t-tests and analysis of variance (ANOVA) were conducted to determine statistically significant ($p<0.05$) differences within and between the groups for the three years for the variables and parameters. Pearson correlation coefficients and the range of correlation values among different variables and data were calculated to determine significant ($p<0.05$) relationships between different variables.

RESULTS AND DISCUSSION

Respondent characteristics

The results will be presented for the longitudinal cohort of the elderly (n=62) with a complete data set from 2004, 2009 and 2014. The cohort group (n=62), which represents participants who were presented during all three years of measurement, was made up of 6 males and 56 females, with the average age of 71 and 74 years old, respectively. For this study, the age categories were grouped from 51 to 70 years and 71 to 100 years. There were a higher number of female participants than males across all three years of measurement and this was also evident in the cohort group (Table 1). The results indicate that there was a 32.1% increase in the number of male participants from the year 2004 to 2009 and a 28.3% drop of male participants was reported for the year 2014, which led to the cohort group having only six male participants. For the females, a decrease in the number of participants was visible over the three years of data collection. Statistical analysis revealed no significant average age difference between men and women. Results present the coefficient, standard error, and p-value for the age variable with respect to gender, indicating no significant difference in age between men and women ($p = 0.66$) (Table 2). The demographics of the elderly attending the day care centre reflects the possible significant changes occurring with the economy and the possible changes in social dynamics and gender roles within households.

https://doi.org/10.18697/ajfand.136.24875

ajfand Since 2001
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Nutrient intakes

The nutrient intakes of the elderly cohort group were compared with DRI for elderly people [18] and reported in Table 3 and Table 4. The macronutrient intake of the elderly participants across all three years of measurement are presented in Table 3. Participants were consuming lower than the DRI for energy and dietary fibre when considering the median values. However, the maximum values exceeded the DRI for all macronutrients except dietary fibre during 2004. Protein intake (median) was, however, above the DRI during 2004 and 2009 but declined for the year 2014. The carbohydrate intake (median) was also above the DRI of 100g over the three years (126.3g, 136.4g and 147.2g) showing a trend of an increase in intake by ±10g for each of the years. The total fat intake was above the recommended total energy intake of >25% for the year 2004 and 2009. However, in 2014, the total fat intake showed a positive decline in the intake, which was within the recommended margins. The results revealed the possible risk of poor dietary intake among the elderly, irrespective of receiving food at the day care center. The poor dietary intake may be attributed to a decline in appetite, illness, or possible physiological changes, which may lead to deficient intake of the majority of nutrients and low energy intake, both of which are associated with malnutrition. These findings align with those from other studies in similar settings [3, 7]. The dietary intake indicated that the consumption pattern did not change drastically from 2004, 2009 and 2014. However, the increasing intake of carbohydrates across the three years indicates that the elderly diets were increasingly carbohydrate-based. The diets reflect an urban diet, often coupled with poor nutrition and this is a familiar nutrition trend among black people in SA, which also leads to significant increases in diseases of lifestyle [18]. It may occur that the elderly often fulfil energy needs through low-cost, energy-dense foods lacking in nutritional value [19]. These foods, categorised as industrialised, are high in fat, sugar and salt, but low in fibre and micronutrients, contributing to inadequate nutrient intake. The low median nutrient intakes reflect overall poor nutritional status amongst all three years of data collection.

The micronutrient intake of the elderly cohort group, when compared to the DRI (Table 4), reflects calcium (Ca) levels (median) below the required values across all three years of measurement. The median intake for iron was sufficient during years 2004 and 2009, at 5.3 mg and 5.2 mg, respectively, with a slight drop to 4.5 mg during 2014. The median zinc intake diminished from 2004 (8.0 mg), which was above DRI values (6.8 mg), to 6.3 mg and 4.6 mg, respectively, in years 2009 and 2014. Vitamin B6 intake reflected values above the DRI for the year 2004, with a decline for the year 2009 which was below the DRI (1.3 mg). In 2014 an increase in the intake occurred, however, it was still below the DRI. Vitamin B12, had an

https://doi.org/10.18697/ajfand.136.24875

Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

extreme intake above DRI (2 μg) in the year 2004. However, a downward trend on the nutrient intake was observed on the follow-up years which reflected insufficient intake. Copper across all three years also showed an insufficient intake with the consumption remaining the same for the year 2009 and 2014. Vitamin A, D, C, E, folate and selenium showed deficient intakes across all three years. These micronutrients showed trends of fluctuation intakes (Vit A), declining intake (Vit D), remaining the same for 2004 and 2009 with a decline in 2014 (Vit C) and a slight increase over the years (Vit E).

The results indicate that there was no significant difference between the 2004-2009, 2009-2014 and 2004-2014 nutrients (Table 5). However, the average fat intake was significantly lower between 2009 and 2014 (p=0.00). For every unit increase in energy (kJ), the average energy in 2009 increased constantly by 248.63 as compared to the energy in 2004. Similarly, the unit increase of energy decreased on average by 366.99 in 2014 as compared to 2009, also a decrease of 118.36 was observed between 2014 and 2004.

The analysis of the results indicates significant differences in the intake of niacin ($p = 0.04$), vitamin B6 ($p < 0.001$), and vitamin E ($p < 0.001$) between male and female participants (Table 6). Specifically, for every increase in milligrams (mg) of these vitamins, the average intake among men was higher by a constant of 6.73 mg for niacin, 6.81 mg for vitamin B6, and 10.16 mg for vitamin E, compared to women. No significant differences were observed between men and women for the intake of other vitamins, with all corresponding p-values greater than 0.05. Even though the differences between men and women are in increments for the vitamins pantothenate and vitamin A, whilst in decrement for vitamin D and Biotin, irrespective that no significance was present. A t-test with median and mean was used to compare the average nutrients between years for the cohort group. The average nutrient intake was only significantly between 2004 and 2014 for niacin, vitamin B12 and vitamin E, with *p* values of 0.04, 0.00 and 0.00, respectively. The study results also reflected significant differences between the years 2004 and 2014, for all other nutrients, there was no positive significant difference except for protein with 0.00 and 0.00 and fat with 0.04 and 0.01. During the years 2009 and 2014, there was a significant difference between protein (0.02;0.02), fat (0.00;0.00), cholesterol (0.01; 0.00) and zinc (0.02;0.01). Nearly 50% of elderly individuals suffer from malnutrition and a significant association exists between age and nutritional status. Food insecurity and malnutrition among the elderly population are often linked with low-income demographics [20]. Similarly, this study reflects an overall poor nutrient intake among the cohort group. While the classification of age may vary slightly, with most considering individuals above 60

https://doi.org/10.18697/ajfand.136.24875

Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

as elderly [21], the participants amongst the cohort group's life expectancy surpasses common estimates, averaging just over 72 years. There exists a complex interplay between the nutritional status of aging individuals and personal/environmental factors [4, 20], with quality-of-life impacting food intake, subsequently affecting nutritional status. Although not part of this interpretation, the socio-demographics of the participants reflected income as a critical determinant of food choices, with nutrient intake declining as individuals age. Micronutrient intake notably deteriorated from 2004 to 2014, with minimal gender-based variations. Elderly individuals, typically less energetic and susceptible to illness, face challenges meeting their nutritional needs. Physiological reasons often lead to reduced food consumption among the elderly, resulting in nutrient deficiencies, as noted in our cohort group's deviation from daily nutritional requirements. Despite seemingly acceptable individual intakes, the collective picture reveals deficiencies, especially in key nutrients like zinc and iron, which exhibited a decline from 2004 to 2014. This downward trend is common among the elderly due to declining food variety, driven by socio-economic status and physiological factors [23]. The cognitive functioning of elderly people deteriorates as the years pass and include taste disorders, tooth decay and digestive disorders [24]. It is important to maintain good nutritional balance to ensure healthy nerve tissues and proper brain function. Many micronutrients are needed to promote proper eye health, heart and immune function [25]. Literature reflects how the potential reasons for the observed trend of poor nutrient intake can be influenced by factors of poor economic circumstances, which becomes evident amongst elderly populations. The low-cost, energy-dense foods are often consumed to meet energy needs economically [7, 22]. This practice usually contributes to inadequate nutrient intake. Furthermore, the physiological change with ageing also explains the possible decline in many nutrients. Coupled with the possible challenges of NCD caused by lifestyle changes ensuring adequate nutrient intake is crucial for maintaining health and quality of life in the aging population.

CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

Globally, there is a significant prevalence of malnutrition among the elderly. In SA, the elderly constitutes 9.1% of the population, a proportion notably higher than in many other African countries. Despite SA being deemed food secure at the national level, food insecurity persists at the household level. Elderly individuals are particularly vulnerable in society, influenced by various factors. Although care centres attempt to meet the nutritional needs of the elderly by providing meals, strict monitoring is required during meal consumption by the management to prevent the elderly from taking the food home instead of eating it themselves.

https://doi.org/10.18697/ajfand.136.24875

ajfand Since 2001
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Taking the food away does not guarantee that the elderly will eat it, given that the elderly individuals, especially women, share a pension income and the food may be shared in these situations. Therefore, the efforts to improve nutritional status of the elderly may not succeed. In summary, this study's primary findings highlight the nutritional vulnerability of elderly individuals, especially within low-income communities. These findings are consistent with global studies, indicating that elderly individuals often fail to meet their nutritional requirements, leading to a noticeable prevalence of malnutrition. There is a need for increased government attention to elderly nutrition to enhance understanding in this area. Additionally, longitudinal cohort data are essential for advancing comprehension of the aging process and its socioeconomic impacts on elderly individuals' health and nutritional status. The dietary intake of the elderly should not be underestimated, as reflected in this study's results, which underscore the risk of malnutrition among elderly participants. Addressing food insecurity amongst the elderly is crucial and can benefit the elderly by allowing opportunities to improve health and wellbeing, promoting a better quality of life, reducing the need for preventative care and contribute and engage in communities.

Recommendations for future research include introducing nutrition education programs within day care centres to teach the importance of nutrition, food preparation and home gardening amongst the volunteers and food handlers. Further studies are needed to assess whether incorporating an additional meal such as dinner, at the daycare center, will impact the nutritional status of the elderly, as this center only provided two meals, which may have been the only meals consumed by the elderly on that particular day. Implementing nutritional supplements could help bridge dietary gaps for those who cannot afford balanced meals. The study clearly highlights the need for regular nutritional assessments amongst the elderly, and more research must be done to prevent malnutrition whilst trying to advocate broader nutrition knowledge. Additionally, a review of the food-based dietary guidelines should be considered, and disseminating information among community members is necessary.

ACKNOWLEDGEMENTS

Acknowledgement to the National Research Fund (NRF) for funding this project.

Conflict of interest

The authors declare no conflict of interest.

Since 2001 ajfand AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Table 1: Gender and age classification of participants

Gender	2004	2004 Average Age (years)	2009	2009 Average age (years)	2014	2014 Average Age (years)	Cohort group	2014 Cohort Average age (years)
Men	17	71	53	72	15	78	6	71
Women	159	75	142	74	104	78	56	74

Table 2: Comparison of gender levels by age for the cohort group 2004, 2009 and 2014 (n=62)

Gender	Coefficient	Std. Error	P-value
Women*	-	-	-
Men	-1.33	3.07	0.66

*P-value < 0.05

Table 3: Macronutrient intake of elderly participants in the cohort group (n=62)

Nutrient / Year	UOM	DRI values	Mean values 2004	Mean values 2009	Mean values 2014
Energy	kJ	6182 (w) 6809 (m); Average 6495.5	4934.6	4907.5	4260.0
Total Protein	g	46	48.8	47.2	40.7
Carbohydrates	g	100	126.3	136.4	147.2
Total Fat	g	>25% TE	30.8	35.6	23.3
Dietary fibre	g	38	9.5	10.7	9.3

DRI – Dietary Reference Intakes; UoM - Unit of Measure; TE – total energy; w – women; m – male; g – grams; kJ – kilojoules

https://doi.org/10.18697/ajfand.136.24875

ajfand Since 2001
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Table 4: Micronutrient intake of elderly participants in the cohort group (n=62)

Nutrient / Year	UOM	DRI values	Mean values 2004	Mean values 2009	Mean values 2014
Calcium#	mg	1200	215.6	177.5	169.0
Iron	mg	5	5.3	5.2	4.5
Magnesium	mg	265	180.4	174.1	166.9
Copper	mg	0.9	0.8	0.6	0.6
Zinc	mg	6.8	8.0	6.3	4.6
Selenium	µg	45	18.8	19.0	13.3
Vitamin A	µg RE	500	30.9	153.8	90.5
Vitamin D#	µg	10	7.9	1.1	0.6
Vitamin B12	µg	2	42.8	1.8	1.3
Folate	µg	320	1.1	117.0	75.30
Vitamin B6	mg	1.3	6.8	0.6	0.5
Vitamin C	mg	60	13.4	13.3	9.0
Vitamin E	µg	12	1.5	2.2	2.4

DRI – Dietary Reference Intakes; UoM - Unit of Measure; mg –milligrams; µg – micrograms; # Adequate intake value provided

Table 5: Regression, comparison of estimates of macronutrients between different years

Nutrients	2004 versus 2009		2009 versus 2014		2004 versus 2014	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
Energy	248.6	0.581	-367.0	0.415	-118.4	0.793
Protein	49.9	0.270	-64.2	0.160	-14.3	0.755
Carbohydrates	8.8	0.568	18.7	0.226	27.5	0.075
Fat	4.6	0.304	-13.2	0.00*	-8.5	0.059
Dietary Fibre	2.3	0.185	-1.7	0.325	0.6	0.732

*Significant at 95% confidence limit

https://doi.org/10.18697/ajfand.136.24875

ajfand Since 2001
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
SCHOLARLY, PEER REVIEWED
Volume 24 No. 11
November 2024
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Table 6: Comparisons of men and women participants for average vitamins for the cohort group (n=62)

Vitamins	Coeff	Std err	P-value
Vitamin A	355.6	383.92	0.35
Thiamin	-58.6	610.16	0.92
Riboflavin	-25.5	174.93	0.88
Niacin	6.7	3.33	0.04*
Vitamin B6	6.8	2.54	0.00*
Folate	-35.8	43.96	0.30
Vitamin B12	7.5	14.58	0.60
Pantothenate	6.2	9.34	0.50
Biotin	-9.7	7.27	0.18
Vitamin C	-1.8	15.25	0.90
Vitamin D	-0.9	3.55	0.80
Vitamin E	10.2	3.68	0.00*

*P-value < 0.05

https://doi.org/10.18697/ajfand.136.24875

REFERENCES

1. **Aburtoa JM, Villavicencioc F, Basellinia U, Kjaergaarda S and JW Vaupela** Dynamics of life expectancy and life. *PNAS* 2022; **117(10):** 5250–5259. [*Online*]. Available at: https://www.pnas.org/doi/pdf/10.1073/pnas.1915884117 *Accessed 01/11/2022.*

2. **UN** World Population Prospects: The 2017 revision. [Online]. Available at: https://population.un.org/wpp/publications/files/wpp2017_keyfindings.pdf *Accessed 01/07/2024.*

3. **Grammatikopoulou MG, Gkiouras K, Theodoridis X, Tsisimiri M, Markaki AG, Cchourdakis M and DG Goulis** Food Insecurity increases the risk of malnutrition among community-dwelling older adults. *Maturitas* 2019; **119**: 8-13.

4. **Grobler WCJ and S Dunga** Analysis of food security status among the elderly in South Africa (no. 9412193). *Proceedings of International Academic Conferences* 2019. *IISES*. https://ideas.repec.org/p/sek/iacpro/9412193.html *Accessed: 20/04/2024.*

5. **WHO.** Fact sheet 2021. Malnutrition. [Online]. Available at: https://www.who.int/news-room/fact-sheets/detail/malnutrition *Accessed 11/11/2022.*

6. **Seivwright AN, Callis Z and P Flatau** Food Insecurity and socioeconomic disadvantages in Australia. *Int. J. Env. Res. Pub. He* 2020; **17(2)**: 559-572. https://doi.org/10.3390/ijerph17020559

7. **Oldewage-theron W and AA Egal** Is food insecurity a problem among the elderly in Sharpeville, South Africa? *Food Security.* 2021; **13**: 81-81. https://doi.org/10.1007/s12571-020-01125-9

8. **Charlton KE, Ferreira M and JM Fourie** Nutrient requirements and factors affecting nutritional status in older adults. *In* Norman JT and Steyn J Community Nutrition for Developing Countries. Athabasca University, Canada, and Unisa Press, University of South Africa. AU Press, 2016: 129-153.

9. **Lombard A and W Kruger** Older persons: the Case of South Africa. *Aging Int.* 2009;**34**: 119-135.

10. **STATS SA.** Mid-year population estimates 2020. [Online]. Available at: https://www.statssa.gov.za/?p=13453#:~:text=South%20Africa's%20mid%20year%20population,%25)%20living%20in%20this%20province *Accessed 11/11/2020.*

11. **Agbozo A, Amardi-mfoafo J, Dwase H and B Ellahi** Nutrition knowledge, dietary patterns and anthropometric indices of older persons in four peri-urban communities in Ga West municipality, Ghana. *Afri. Health Sci.* 2018; **18(3):** 743-755.

12. **Guthrie JF, Lin BH, Reed J and H Stewart** Understanding economic and behavioral influences on fruit and vegetable choices. Amber waves: the economics of food, farming, natural resources, and rural America, United States Department of Agriculture, Economic Research Service 2005, 36-41. https://doi.org/10.22004/ag.econ.128235

13. **Clegg ME and EA Williams** Optimizing nutrition in older people. *Maturitas* 2018; **112**: 34-38.

14. **Normak K, Haß U and M Porlich** Malnutrition in older adults – recent advanced and remaining challenges. *Nutrients.* 2021; **13,8**: 2764. https://doi.org/10.3390/nu13082764

15. **CENSUS**. 2011. Sharpeville. https://census2011.adrianfrith.com/place/760012 *Accessed on: 29/06/2023.*

16. **Medoua GN, Egal AA and WH Oldewage-Theron** Nutrient value and antioxidant capacity of lunch meals consumed by elderly people of Sharpeville, South Africa. *Food Chemistry.* 2009; **115**: 260-264.

17. **IOM**. Dietary reference intakes. *Food and Nutrition Board. 2003. Washington, DC: National Academies Press.*

18. **Langenhoven MK, Kruger M, Gouws E and M Faber** Medical Research Council. Food composition table 3rd edition. Parow, 1991.

19. **Vorster HH** The emergence of cardiovascular disease during urbanization of Africans. Public Health Nutrition 2002; **5(1A)**: 239-243.

20. **Park JY** Food insecurity among the elderly in developed countries: insights from a multi-national analysis. Master of Science degree, thesis. 2019. McGill University, Montreal.

21. **Motadi SA, Khorommbi T, Maluleke I, Mugware A and I Mushaphi** Nutritional status and dietary pattern of the elderly in Thulamela municipality of Vhembe district. *PHCFM* 2022; **14(1)**: 1-8. https://doi.org/10.4102/phcfm.v14i1.343

22. **Zarei M, Qorbani M, Djalalinia S, Sulaiman N, Subashini T, Appanah G and EK Naderali** Food insecurity and dietary intake among elderly population: A systematic review. *Int. J. Prev. Med.* 2021; **12**: 1-8. https://doi:10.4103/ijpvm.ijpvm_61_19

23. **Akbari A, Mirakhori F, Ashouri M and SNN Tehrani** The effect of micronutrient intake on cognitive function and physical activity of the elderly. *Inter. J of Sport Stud. Health.* 2022; **4(1)**: 1-27. https://doi.org/10.5812//intjssh.121360

24. **Inui T, Hanley B, Tee ES, Nishihira J, Tontisirin K and P van Dael** The role of micronutrient in ageing Asia: What can be implemented with the existing insights. *Nutrition.* 2021; **13**: 2222. https://doi.org/10.3390/nu13072222