

Nutritional Status and Dietary Pattern of the Elderly in Tshiulungoma and Maniini Village of Thulamela Municipality, Vhembe District.

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Abstract

Introduction: Dietary patterns provide a comprehensive information about the food consumption habits within a population. Dietary patterns of every individual changes as we grow older. Dietary pattern of elderly is essential to the evaluation of their nutritional status. This study aimed to describe the nutritional status and dietary pattern of the elderly.

Methods: This was a cross sectional study involving elderly people aged 60 years and above. Socio demographic information was obtained from elderly people through a questionnaire. Dietary information was assessed using a questionnaire and dietary diversity score. Data on dietary intake were collected using Food Frequency Questionnaire (FFQ). Height and weight were measured. BMI were determined and classified using BMI category.

Results: A total of 300 elderly people had participated in the study, 150 from Maniini village and 150 from Tshiulungoma village. The prevalence of underweight, overweight and obesity was 2%, 34% and 17% respectively. Most (66%) of the participants ate three meals per day. It was found that 13.7% of the elderly skipped breakfast every day. About 19.6% of elderly ate supper sometimes while 13.7% did not eat supper.

Conclusion: The findings of study reveals that most of the participants ate three main meals a day, with minority skipping either breakfast or dinner or eat in- between meals. Obesity was more prevalent in female as compared to the male counterparts. Improving nutritional status of elderly should follow an integrated approach tackling both malnutrition at the same time considering behavioural approach.

Introduction

Aging refers to irreversible continuous changes such as physiological, decline in physical and mental abilities which occur from birth to death and this changes may adversely affect food choice and dietary intake (Shatestein *et al.*, 2013). The number of elderly people in the sub-Saharan Africa is expected to increase from 36.6 million to 141 million between 2005 and 2050, with the large proportion of them in the rural area (Kimokoti & Hamer, 2008). Despite the epidemic of non-communicable and communicable disease life expectancy has reduced by mother 30 years in various parts on the of the continent, the number of elderly people continue to rise in Africa. In South African the number of elderly people aged 60 years and above relative to those aged 59 and younger has increased over a period of 15 years from 1996–2011. The number of elderly people in South Africa has increased from 2.8 million in 1996 to 4.1 million in 2011 with Limpopo having 8.7% of the entire population of elderly people (Lehohla, 2014).

Appropriate nutrition is vital for elderly people because of the physiological changes that occur as one is aging (Agbozo et al., 2018). Loss of muscle mass, metabolic abnormalities and reduced immune function is the results of functional limitations and poor diet in most elderly people (Vellas *et al.*, 2000). Good nutritional status and proper diet during aging is critical for boosting immune system and infection resistance (Pae, Meydani & Wu, 2012). Eating variety of food to meet their nutritional need of their

changing physiological state is very rare (Donini et al., 2013). Past experiences of food during childhood and earlier adulthood may influence attitudes concerning food and meals in later life (Edfors & Westergren, 2012). However, Dietary pattern are not static and may change as the individual is aging.

South Africa like many developing countries is undergoing nutrition transition which promote and exacerbate weight gain in age groups. Even though dietary changes caused by these nutrition transition occur, undernutrition among elderly people still prevails especially in rural areas. In 2008 the prevalence of malnutrition in the sub-Saharan Africa varied according the country with Cameroon (6%), Ghana (48%), Uganda (68% for women and 32% for men) (Kimokoti & Hamer, 2008). Overweight and obesity were prevalent in most sub-Saharan Africa countries with South Africa and Botswana having the highest number of obese women (Van der Sande et al., 2001; Kimokoti & Hamer, 2008). However, Limpopo province (77.1%) and Eastern cape (64.4%) province where found to have the highest proportion of elderly people who are poor (Lehohla, 2014). In Limpopo province, deprived areas are mostly found in the rural areas where a considerable proportion of the population can be categorized as elderly. In view of this we conducted this study to evaluate the nutritional status and dietary pattern of elderly people in Thulamela municipality of Vhembe District.

Materials And Methods

A cross sectional study was carried out in 300 elderly people aged 60 years and above in Tshiulungoma and Maniini village of Thulamela Municipality, Vhembe District. Thulamela local municipality is the smallest municipality of four in the district, making up 10% of its geographical area. It is the largest municipality in the province in terms of population. The name Thulamela is a Karanga word meaning 'the place of giving birth. Data was collected during a three-month period (August to October 2019).

Simple random sampling was used to select Thulamela municipality from the four municipalities in the Vhembe District, Maniini and Tshiulungoma from 186 villages in Vhembe district. Convenience sampling was used to select study participants. A meeting with the elderly people was arranged at the chief's kraal. The researcher provided explanation on the aim, objectives and procedure of the study. Furthermore, the elderly people were given consent form to sign before data collection. All elderly people who agreed to participate were included, while those with cognitive deficits who were unable to respond to the interview were excluded. Furthermore, the study excluded elderly people who were in wheelchairs due to lack of equipment to measure their weight and height.

Data were collected by a team of trained health professionals (nutritionists and Biokineticists). Data was collected using a questionnaire and pilot tested to check for anything that could impede the instrument's ability to collect data in economical and systematic fashion. To ensure that the study participants recall food item consumed in the past given their age, food models were used. The following variables such as demographic data, dietary patterns, dietary diversity score as well as anthropometrics were measured. An expert from the Department of Linguistics at the University of Venda translated the questionnaire into the local language used in Thulamela Municipality which is Tshivenda to ensure that participants clearly

understood the questions. Anthropometric assessments were performed according to standard procedure. The following measurements were taken in duplicate using calibrated equipment with the adult wearing light clothing and no shoes: standing height and weight. Height was measured to the nearest 0.1 cm using a calibrated portable Seca solar scale (Seca-model 0213, Hammer Steindamm, Hamburg, Germany) and weight was measured to the nearest 0.01 kg on a portable Seca solar scale (model 0213) (Seca, Hammer Steindamm, Hamburg, Germany). The solar scale and stadiometer were calibrated before measurements using a calibration weight and steel tape respectively (Lee & Nieman, 2010).

Food survey

Food Frequency questionnaire was used to assess the dietary intake of elderly people. The adequacy of nutrients intake was compared with the recommended dietary intake for elderly people (Food and Nutrition Board, 2011). The dietary diversity score was interpreted using the WHO recommended cut-off point.

Definition of underweight, Normal, Overweight and Obesity

The BMI (Kg/m^2) was selected to estimate the prevalence of underweight, overweight and obesity according to WHO references values. Underweight was defined as less ($<$) 18.5, normal weight:

18.5 to 25, Overweight: 25-29.5 and Obesity: $>30 \text{ kg}/\text{m}^2$ (WHO, 1995).

Statistical Analysis

Statistical package of social sciences (IBM SPSS Statistics., Armonk, NY version 25) was used to analyze categorical and descriptive data such as mean, standard deviation, frequencies and percentages. Chi-square test for categorical data and Pearson's correlation were performed to assess the relationship between socio-demographic characteristics and nutritional status. A $p \leq 0.01$ and $p \leq 0.05$ was considered statistically significant. Food finder was used to analyze dietary intake of the study participants. The dietary diversity score was interpreted using the WHO recommended cut-off point.

Results

The socio demographic information of the study participants is summarized in Table 1. Half of the study participants had ages within 60–69 years. The mean (standard deviation (SD)) of the male participants was 70.04 (6.65) while that of female was 70.04 (6.65). Majority of the participants attended school. Of all those who attended school, 38.6% attended primary while 28.1% attended secondary school. Half of the participants were married. Almost all participants were receiving social grants. Most of the participants were Venda speaking while minority were Sepedi speaking.

Table 1
Socio-demographic characteristics of study participants (N = 300)

Variable	Gender		Total number of participants
	Female		
	n (%)	n (%)	
Age categories			
<i>M (± SD)</i>	70.04 (6.65)	68.77(7.35)	
60–69 years	70 (23)	105 (35)	175 (58)
70–79 years	47 (16)	44 (15)	91 (31)
80 and above	15 (5)	19 (6)	34 (11)
Educational level			
Primary school	55 (18.3)	61 (20.3)	116 (38.6)
Secondary school	34 (12)	50 (17)	84 (28.1)
Never attended school	43 (14)	57 (19)	100 (33.3)
Social grant			
Receiving	128 (42.6)	158 (52.4)	286 (95)
Not receiving	4 (1)	10 (3)	14 (5)
Other source of income			
Yes	34 (11)	58 (19)	92 (30)
No	99 (33)	111 (37)	208 (70)
Marital status			
Single	9 (3)	7 (2)	16 (5)
Married	103 (34)	65 (22)	168 (56)
Divorced	4 (1)	2 (1)	6 (2)
Widowed	18 (6)	93 (31)	111 (37)
Ethnic group			
Venda speaking	132 (44)	162 (54)	294 (98)
Tsonga speaking	0	6 (2)	6 (2)
Religion			

<i>Variable</i>	<i>Gender</i>		<i>Total number of participants</i>
	<i>Female</i>		
	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>
Christianity	88 (29)		134 (45)
Never attend church	45 (15)		34 (11)

The prevalence of underweight, overweight and obesity was 2%, 34% and 16.7% respectively. The prevalence of overweight and obesity was high in females (18.7% and 11.7%) as compared to their male counterparts (15.3% and 5%). Sixty percent of the participants had medium dietary diversity score while 38% of the participants had the highest dietary diversity score. However, minority of the participants had the lowest dietary diversity score. This finding was not statistically significant ($p = 0.064$) (Table 2).

Table 2
Association between sociodemographic characteristics and nutritional status (N = 300)

Characteristics	Underweight n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	P-value
Gender					
Male	5 (1.7)	66(22)	46(15.3)	15(5)	0.043
Female	1(0.3)	76(25.3)	56(18.7)	35(11.7)	
Age (years)					
60–69	1(0.3)	80(27)	63(21)	30(10)	0.824
70–79	2(0.7)	44(14.7)	31(10.3)	15(5)	
80 and above	3(1)	18(6)	8(2.7)	5(1.7)	
Educational level					
Primary school	3(1)	66(22)	48(16)	20(6.7)	0.293
Secondary school	0 (0)	30(10)	20(6.7)	12(4)	
Never attended school	3(1)	46(15.3)	34(11.3)	18(6)	
Social grant					
Receiving	6(2)	141(47)	97(32.3)	42(14)	0.000
Not receiving	0(0)	1(0.3)	5(1.7)	8(2.7)	
Other source of income					
Yes	3(1)	34(11.3)	31(10.3)	24(8)	0.011
No	3(1)	108(36)	71(23.7)	26(8.7)	
Marital status					
Single	0(0)	10(3.3)	6(2)	1(0.3)	0.073
Married	5(1.7)	71(23.7)	53(17.7)	39(13)	
Divorced	0(0)	5(1.7)	2(0.7)	0(0)	
Widowed	1(0.3)	56(18.7)	41(13.7)	10(3.3)	
Ethnic group					
Venda speaking	6(2)	142(47.3)	100(33.4)	46(15.3)	0.033
Tsonga speaking	0(0)	0(0)	2(0.7)	4(1.3)	
Religion					

Characteristics	Underweight n (%)	Normal n (%)	Overweight n (%)	Obese n (%)	P-value
Christianity	4(1.3)	105(35)	74(25)	40(13.4)	0.803
Never attend church	2(0.7)	37(12.3)	28(9.3)	10(3.3)	

Table 3 provide the meal pattern of the study participants. Most (66%) of the participants ate three meals per day. Of all the participants, most (86.3%) of them ate breakfast every day while the minority (13.7%) skipped breakfast. All participants ate lunch every day and 66.7% ate supper every day. However, 19.6% ate supper sometimes while 13.7% did not eat supper at all. Majority (84.3%) did not eat snacks between meals. However, only the minority of the participants were drinking alcohol (28%) and smoking (12.7%). most (86.3%) of them ate breakfast every day while the minority (5.3%) skipped breakfast. All participants ate lunch every day and 66.7% ate supper every day. However, 19.6% ate supper sometimes while 13.7% did not eat supper at all.

Table 3
Meal pattern of study participants

<i>Variables</i>	<i>n</i>	<i>%</i>
Number of main meals in a day		
Once per day	0	0
Twice per day	82	27.3
Three per day	198	66
More than three times per day	20	6.7
Breakfast skipping		
Yes	41	13.7
No	259	86.3
Breakfast		
Everyday	259	86.3
Sometimes	0	0
Do not eat	41	13.7
Lunch		
Everyday	300	100
Sometimes	0	0
Do not eat	0	0
Supper		
Everyday	200	66.7
Sometimes	59	19.6
Do not eat	41	13.7
Eats snacks		
Yes	47	15.7
No	253	84.3
Alcohol intake		
Yes	84	28
No	216	72
Tobacco use		

<i>Variables</i>	<i>n</i>	<i>%</i>
Yes	38	12.7
No	262	87.3

Majority (70.3%) of the participants ate vitamin A rich vegetables and tubers 2–3 times per week while 29.7% ate vitamin A rich vegetables and tubers 4–6 times per week. Moreover, 59.7% of the participants ate vitamin A rich fruit 4–6 times per week as compared to 40.3% of the participants who ate vitamin A rich fruit 2–4 times per week. Most (96.3%) of the participants ate dark green leafy vegetables 4–6 times per week while 3.7% ate dark green vegetable 2–3 times per week. However, 37% of participants ate flesh meat 2–3 times per week. More than half (56%) of the participants ate milk and milk products 2–3 times per week (Table 4).

Table 4
Frequency of different food groups intake by study participants in a week

<i>Food groups</i>	<i>2–3 times per week</i>	<i>4–6 times per week</i>
	<i>n (%)</i>	<i>n (%)</i>
Cereals	0	300 (100)
Vitamin A rich vegetables and tubers	211 (70.3)	89 (29.7)
White tubers and roots	58(19.3)	242(80.7)
Dark green leafy vegetables	11(3.7)	289(96.3)
Other vegetables (e.g. tomato, onion, eggplant), including wild vegetables	8(2.7)	292(97.3)
Vitamin A rich fruit	121(40.3)	179(59.7)
Other fruits (other fruits, including wild fruits)	214(71.3)	86(28.7)
Organ meat (iron rich)	73 (24.3)	0
Flesh meats	111 (37)	0
Eggs	116 (38.7)	0
Fish	195(65)	0
Legumes, nuts and seeds	216(72)	0
Milk and milk products	102 (34)	0
Oils and fats	218(72.7)	82(27.3)
Sweets	0	0
Spices, condiments,	86 (28.7)	0
Beverages	197(65.7)	103(34.3)

Half of the participants did meet their energy intake while 49.8% did not meet their energy intake ($p = 0.023$). The mean intake of energy was 2345 ± 942.35 . Of all the participants, 62.5% did not meet their protein intake while 56.4% while 37.5% did meet their protein intake. The mean intake of protein was 45.3 ± 19.4 while that of iron was 8.4 ± 7.5 and that of zinc was 11.2 ± 10.8 . Almost sixty percent of the participants did not meet their vitamin B2 intake while only 40.2% did meet their vitamin B2 intake (Table 5).

Table 5
Mean daily nutrient intake of the participants (n = 300)

<i>Nutrients (units)</i>	<i>Mean daily intake</i>			<i>Participants that did not meet reference intake</i>	<i>Participants that met/exceeded reference intake</i>	<i>P-value</i>
	<i>M (± SD)</i>	<i>RDA</i>	<i>Range</i>	<i>n (%)</i>	<i>n (%)</i>	
Energy <i>Kcal</i>	2345 ± 942.35	2300	1845–2328	49.8	50.2	0.358
Carbohydrates(<i>g</i>)	385 ± 127.34	130	93.4–230.4	26.7	73.3	0.451
Protein (<i>g</i>)	45.3 ± 19.4	56	41.3–78.2	62.5	37.5	0.046
Fats (<i>g</i>)	30.45 ± 27.6	ND	12.2–35.4	16.2	83.8	0.536
Calcium (<i>mg</i>)	845.23 ± 345.21	1000	120.6–984.5	56.4	43.6	0.023
Sodium (<i>mg</i>)	1.2 ± 0.94	1.3	0.45–1.18	32.2	67.8	0.674
Potassium (<i>mg</i>)	4.9 ± 4.6	4.7	0.32–4.89	72.7	27.3	0.523
Iron (<i>mg</i>)	8.4 ± 7.5	8	7.6–8.7	51.7	48.3	0.026
Zinc (<i>mg</i>)	11.2 ± 10.8	11	8.5–11.45	50.3	49.7	0.013
Folate (<i>mg</i>)	428.20 ± 415.23	400	389.5–486.7	43.2	56.8	0.034
Vitamin B1 (<i>mg</i>)	0.80 ± 0.57	1.2	0.8–1.29	61.6	38.4	0.672
Vitamin B2 (<i>mg</i>)	0.84 ± 0.53	1.3	0.7–1.36	59.8	40.2	0.026
Vitamin B6 (<i>mg</i>)	0.43 ± 0.59	1.7	0.24–18.4	49.8	50.2	0.361

Source: The Institute of Medicine of the National Academies (2002/2005).

ND: not determined

Academies (2002/2005). ND: not determined

<i>Nutrients (units)</i>	<i>Mean daily intake</i>			<i>Participants that did not meet reference intake</i>	<i>Participants that met/exceeded reference intake</i>	<i>P-value</i>
	<i>M (± SD)</i>	<i>RDA</i>	<i>Range</i>	<i>n (%)</i>	<i>n (%)</i>	
Vitamin C (<i>mg</i>)	93.5 ± 101.2	90	86.5-123.2	56.4	43.6	0.001
Vitamin A (<i>mg</i>)	923 ± 245.3	900	784.6-255.4	21.2	78.8	0.052
<i>Source: The Institute of Medicine of the National Academies (2002/2005).</i>						
<i>ND: not determined</i>						
<i>Academies (2002/2005). ND: not determined</i>						

Discussion

The ageing process is a biological reality which has its own dynamic, largely beyond human control (WHO, 2002). However, it is also depended on how each society makes sense of old age. Most elderly people in the current study were falling within the age range 60–69 years may reflect the picture of elderly in SA. The Older Persons Act 13 of 2006 in South Africa provides that an older person is a person who is 60 years old or older (Constitution of the Republic of South Africa, 1996). In African, elderly person is defined as age between 50 to 65 years, depending on the setting, the region and the country (Agbozo et al., 2018).

Our study examined the nutritional Status and dietary pattern of the elderly in Tshiulungoma village. We found low prevalence of underweight among elderly people, which was similar to previous study conducted in South Africa and other parts of Sub-Saharan countries (Kimokoti & Hamer, 2008; Van der Sande et al., 2001). This study support Mahan and Escott-Stump (2012), the actual prevalence of underweight among older adults is quite low, many adults are at risk for undernutrition and malnutrition. Underweight among elderly people may be due to poor mobility, inability to purchase and prepare food (Aganiba et al., 2015). Our data found that 34% of elderly people were overweight while 16.7% were obese. These findings are congruent with previous study that indicated that South Africa had the highest rate of overweight and obesity (Van der Sande et al., 2001). The prevalence was of overweight was slightly higher in elderly women (18.7%) as compare to 15.3% of elderly men while obesity was higher in elderly women (11.7%) as compared to 5% of elderly men. Similar findings were observed in sub-Saharan countries like South Africa, Ghana, Kenya, Senegal, Uganda, Botswana and Cameroon (Kimokoti & Hamer, 2008; Van der Sande et al., 2001; Cheserek et al., 2012; Agbozo et al., 2018). The findings of this study support Mahan and Escott-Stump (2012), prevalence of obesity has increased in all ages, older adults are no exception, obesity rates are greater among those ages 65 to 74 than among those ages 75 and over and over and obesity is associated with increase in mortality and contribute to many chronic diseases.

Prevalence of obesity and overweight could be due to the fact that aging is associated with a decrease in total energy expenditure, and if this coincides with a maintained or increased energy intake, overweight/obesity may develop (Edfors & Westergren, 2012). However, the socioeconomic disparities, poor nutritional qualities of traditional diets in many rural communities could not be ruled as they might have contributed to malnutrition among elderly people. Under and overnutrition among elderly coexist in the current study like many Sub-Saharan countries (Alao, Akinola & Ojofeitimie, 2015; Maila, Audain & Marinda, 2019). The prevalence of obesity was high among 13% female as compared to their male 4% counterparts (Mittal & Srivastava, 2006). This may be due to the fact that women are heavier than males while males are taller than females and in South Africa overweight and obesity is associated with “wealth and healthy” but the perception has drastically changed on the basis that overweight and obesity are associated with many non-communicable diseases (Motadi *et al.*, 2015)

The nutrition and health of the elderly is often neglected. Most nutritional intervention programs are directed toward infants, young children, adolescents, and pregnant and lactating mothers (Agarwalla, Saikia & Baruah, 2015). Every community has its own pattern and practices, with ideas as to which foods are good for the people at different ages and which one are not. What people think about food is also affected by what is available. Most of the elderly people know the nutritional values of the foods they eat. Some avoid certain foods because of personal dislike, social and cultural practices and religion. The dietary pattern of the participants shows that most of them ate three main meals a day which is necessary for good health. This is similar to findings from a study carried out among elderly in rural Southern African countries (Lee *et al.*, 1996). As shown by Shahar *et al.* (2003) the older population tends to continue the more traditional eating pattern of three meals a day. However, minority of them either skip breakfast or eat in-between meals. Minority of the participants sometimes skip breakfast or dinner. Skipping of meals is a very common practice among elderly people in the rural areas (Lee, Templeton & Wang, 1996). Minority of the participants in the current study snacked in between meals possibly to enable them cope with the energy needs of the body as they go about their daily activities. However, Lee *et al.* (1996) reported low intake of nutrient among elderly people who snacked frequently. The pattern also shows a low intake of snacks, alcohol and tobacco use among them.

The findings on food consumption revealed that many participants in the current study consumed food from different food groups. However, most of the participants consumed fruits, vegetables and cereals. Protein food sources were rarely consumed except that participants consumed legumes, nuts and seeds 2–3 times per week. These findings are congruent with previous studies that reported high intake of vegetables and cereals among older persons in South Africa (Govender, 2011) and Zambia (Maila *et al.*, 2019). Additionally, maize meal porridge is one of the staple foods in the South African diet and is usually consumed with green leafy vegetables and a small amount of animal-derived food (Labadarios *et al.*, 2005). The rarely consumption of this animal derived food sources could be due their high cost, limited supply and in some cases, due to religious or cultural practices. Insufficient consumption of these animal food source leads to low intake of important micronutrients among this age group (Roohani *et al.*, 2013).

Our study showed low consumption of milk and milk product among the participants. Perhaps this can be attributed to the fact that milk is perceived as tasteless by most elderly people due to deterioration of taste buds. Between 75 and 85 years, the taste buds' deterioration is 65% reduction of sensitivity to sweet and salty taste. One of the well-established factors that affect food choice is the sensory perceptions to food stimuli. Chemical and physical properties of the food are perceived by the individual in terms of sensory attributes. These sensory attributes of foods can be categorized, in broad terms, as appearance, texture, trigeminal mouth feel, odour and taste (Shepherd, 1999; Alao et al., 2015). The ability to perceive these sensory attributes in addition to liking them determines whether an individual consumes a food (Shepherd, 1999; Mahan & Escott-Stump, 2012). The low consumption of milk and dairy product can explain the reason why participants didn't meet their dietary intake of calcium. Congruently, in Zambia Maila *et al.* (2011) reported low consumption of milk and milk product. In Kenya Munoru (2018) reported high consumption of milk among elderly people. In addition, Chollet et al. (2014) reported higher percentage of 96% in the consumption of dairy products in Switzerland.

About (38%) of the study participants had the highest dietary diversity score. This may be due to the fact that almost all participants received social grant. A social grant is given to qualifying poor households as an important contributor in reducing poverty and food insecurity in South Africa. Socioeconomic status plays a vital role in quality of life, including the food choices that these elderly can make (Mkhize, Napier & Oldewage-Theron, 2013). However, Study conducted by Chakona and Shackleton (2019) in South Africa revealed that grant recipients do not use the money for food only but also on other household necessities instead of taking care of the beneficiaries' own needs. Alao et al. (2015) revealed that income remains a strong determinant in the choice of food consumed by the elderly people. Furthermore, highest dietary score may be linked to overnutrition observed among study participants as indicated by the prevalence of overweight and obesity.

Almost half of the participants didn't meet their energy intake in the current study. Alao et al. (2015) reported that older who may not eat enough to meet energy needs which can results in increases the risk of nutrition related illness. Our study revealed that even though many participants consumed food from different food groups, it is also noticed from the result of the study that participants didn't meet the dietary intake of iron, zinc, calcium, vitamin B1, B2 and vitamin C. These may be attributed to the age-related alterations to the sense of taste which is closely linked to poor appetite, inappropriate food choices, and lower nutrient intake. This insufficient intake of micronutrients may be due to the fact that the participants reported low intake of protein. Protein share the same food sources with zinc, iron, vitamin B1 and B2 (Mahan & Escott-Stump, 2012).

The limitation of the present study was that the information on dietary intake relied on the ability of the participants to recall, which might have resulted in under and overreporting. The study was conducted in two villages which cannot be generalized to Thulamela municipality.

Conclusion

The study reveals that most of the participants ate three main meals a day, with minority skipping either breakfast or dinner or eat in-between meals. Consumption of food from different food groups ensures balanced nutrition even though very few had highest dietary diversity score. BMI status of the study participants indicate that most of them had a normal weight. This study reveals that even though elderly people are known to be more knowledgeable about the role and importance of nutrition, it does not imply an improvement in dietary intakes. Understanding of dietary patterns of older people is necessary for providing appropriate nutritional guidance. Nutrition education to encourage healthy eating among elderly people should include family support.

Abbreviations

WHO: World Health Organization.

BMI: Body Mass Index

Declarations

Acknowledgments:

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Availability of data and materials:

The datasets used and/or analyzed during the current study are available from the corresponding author on request.

Authors' contributions:

KT and ML collected the data. MSA analyzed the data. MSA, KT, and ML contributed materials/analysis tools. MSA prepared the draft manuscript. MSA, KT and ML finalized the manuscript and provided a critical review. All authors have read and approved the final manuscript.

Ethical Considerations:

The study was approved by University of Venda Research Ethics Committee and the Ethical clearance certificate was issued (SHS/19/NUT/12/2405) and the permission to conduct the study was granted by the Limpopo Provincial Department of Health Research Committee. The study was performed in accordance with principles of the Declaration of Helsinki (2008), Good Clinical Practices and the laws of

South Africa. A full and adequate oral and written explanation of the study was given to the participants. Participants gave written signed informed consent to participate in the study. The consent form included the participants' right to withdraw from the study and codes were used to ensure confidentiality of the information obtained.

Consent to publication:

The manuscript does not contain any individual person's data in any form.

Competing interests:

The authors declare that they have no competing interests.

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